James R. Wheaton (State Bar No. 115230)
Lowell Chow (State Bar No. 273856)
Nathaniel Kane* (State Bar No. 279394)
ENVIRONMENTAL LAW FOUNDATION
1222 Preservation Park Way, Suite 200
Oakland, CA 94612
Tel: (510) 208-4555
nkane@envirolaw.org

Attorneys for Petitioner Environmental Law Foundation

BEFORE THE STATE WATER RESOURCES CONTROL BOARD

In the Matter of Review of the Groundwater Protection Values for Central Valley Water Quality Coalitions	SWRCB File No. **PETITION FOR REVIEW**

INTRODUCTION

I. NAME, ADDRESS, TELEPHONE NUMBER AND E-MAIL ADDRESSES OF THE PETITIONERS

Environmental Law Foundation
1222 Preservation Park Way, Suite 200
Oakland, CA 94612
nkane@envirolaw.org
ATTN: Nathaniel Kane

II. THE ACTION OR INACTION OF THE REGIONAL WATER BOARD BEING PETITIONED

This petition challenges the Conditional Approval of the Groundwater Protection Values for Central Valley Water Quality Coalitions ("Conditional Approval"). A true and correct copy of this Conditional Approval is attached as Exhibit A.

The Central Valley Regional Water Quality Control Board (Regional Board)'s Executive Officer issued this Conditional Approval on October 27, 2021. Regional Board staff did not, however, provide this Conditional Approval to ELF or other stakeholders. Nor did the Regional Board post the Conditional Approval on its website. ELF only discovered that the Conditional Approval had been issued when reviewing the Executive Officer's report for the December 2021 Regional Board meeting. ELF immediately requested a copy of the Conditional Approval. Staff provided the Conditional Approval to ELF on December 9, 2021. Correspondence regarding the provision of the Conditional Approval to ELF is attached as Exhibit B.

Pursuant to Water Code section 13320, this Petition is filed within 30 days of receipt of the Conditional Approval.[1]

III. STATEMENT OF THE REASONS THE ACTION OR INACTION WAS INAPPROPRIATE OR IMPROPER

The Conditional Approval violates the Nonpoint Source Policy because it relies on non-

[1] If, despite the failure of the Regional Board to provide notice to the aggrieved party of the existence of the action being challenged until December 9, 2021, the State Board determines that this Petition is untimely, ELF requests that the State Board, in the interests of justice, take up the issues in this Petition on its own motion pursuant to Water Code 13320, subdivision (a) and California Code of Regulations, title 23, section 2050.5, subdivision (c).

public data.

A full statement of points and authorities is included in Section VII, below.

IV. HOW THE PETITIONERS ARE AGGRIEVED.

ELF is a California nonprofit organization founded on Earth Day in 1991 that has a longstanding interest in reducing pollution to waters of the state and has a direct interest in access to the data underlying the GWP Values. In furtherance of its mission of improving environmental quality for those most at risk by providing access to information, strategies and enforcement of environmental, toxics, and community right-to-know laws, ELF has requested in the past and intends in the future to request water pollution data such as the data at issue here via Public Records Act requests from regional water boards and other entities. ELF has used this data and intends to use such data in conducting studies, disseminating information to vulnerable populations, NGOs, and researchers, and otherwise performing oversight of the regional boards' regulatory functions. The Conditional Approval deprives ELF and the public of important data which ELF could use to inform affected populations of threats to drinking water, to determine which growers are most responsible for pollution, and to study the agricultural practices that could lead to improved water quality.

ELF has been engaged in the development of the GWP Values since the adoption of State Board Order No. WQ-2018-0002, which established the Groundwater Protection Targets process. ELF has submitted comments objecting to the fact that the GWP Values rely on secret data on at least two occasions. ELF is directly aggrieved by the lack of access to this crucial data.

V. THE ACTION THE PETITIONERS REQUEST THE STATE WATER BOARD TO TAKE

ELF requests that the State Board direct the Regional Board to (1) rescind the Conditional Approval and (2) require that the Groundwater Protection Values be based only on a fully public data set.

In addition, ELF requests that, should the State Board determine that this Petition is not timely, the State Board take up the issues in this Petition on its own motion.

VI. STATEMENT OF POINTS AND AUTHORITIES FOR ANY LEGAL ISSUES RAISED IN THE PETITION

A. Factual and Procedural Background

Nitrogen pollution from irrigated agriculture is a serious, ongoing problem in the Central Valley. Hundreds of thousands of residents lack access to safe, affordable drinking water.

In 2018, the State Water Resources Control Board ("State Board") adopted Order No. WQ 2018-0002 ("ESJ Order").[2] This Order represented an attempt to require irrigated agriculture to cease, within 10 years, discharging nitrogen at rates that cause or contribute to violations of the water quality of objectives for nitrogen.

The ESJ Order required agricultural coalitions in the Central Valley to develop, and for the Regional Board's Executive Officer to approve, targets for "nitrogen loading on a township by township basis." (ESJ Order at p. 66.) These targets are intended "to set a desired target that is intended for all growers… within the township collectively to achieve compliance with the Receiving Water Limitations for groundwater within the time schedule for compliance specified in the General WDRs." (*Ibid.*) In other words, these Groundwater Protection ("GWP") Targets will be the numeric goals for nitrogen loading that growers in any given township will need to achieve in order to cease contributing to water quality exceedances in that township. And although the targets are not intended to be binding and/or enforceable, their calculation will be an important step towards ensuring that operators, regulators, and the public know what growers need to accomplish in order to cease polluting the waters of the state.

The ESJ Order requires that the development of the GWP Targets proceed in three stages. First, the coalitions were required to produce a GWP Formula in 2020. (ESJ Order at p. 66; App. A at p. 22.) Then, the Coalitions were to produce GWP Values in 2021. (*Ibid.*) The GWP Targets are due to be submitted in mid-2022.

The Coalitions submitted the Workplan: Groundwater Protection Formula ("Formula

---

[2] Available at https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2018/wqo2018_0002_with_data_fig1_2_appendix_a.pdf (accessed January 6, 2022).

Workplan") in the summer of 2020. The Formula Workplan is attached as Exhibit C. The Formula Workplan uses an innovative approach. It adopts the Soil and Water Assessment Tool ("SWAT"), a commonly used open-source model, to model nitrogen loading in the Central Valley.[3] (Formula Workplan at p. 6.) The application of the SWAT model to the Central Valley is called the CV-SWAT model.

To run the model, data is collected from the Irrigation and Nutrient Management Plan ("INMP") Summary Reports. (Formula Workplan at p. vi.) The ESJ Order requires that these summary reports be submitted to the agricultural coalitions but does not require them to be submitted to the Regional Board or the public.[4] (ESJ Order at pp. 34-53.) These reports and the data they contain are therefore secret.[5]

The INMP Summary Reports contain field-level data on crops, nitrogen applied, and nitrogen removed via harvest and other processes. (ESJ Order at MRP pp. 34-39.) The Formula Workplan envisioned using this data, in combination with soil data from the Natural Resources Conservation Service, to run the CV-SWAT model upwards of 40,000 times to account for different combinations of soil type, crop, and fertilizer use. (Formula Workplan at p. vi.) From this extensive work, the model will produce a "Root Zone Library": "every possible climate, soil, crop, and management scenario will be modeled to ensure that all scenarios have a percolation and nitrate leaching estimate." (*Id.*)

In the last step, the Formula Workplan envisioned matching each Root-zone Library entry outputted by the model to each INMP Summary report. (*Ibid.*) This process creates a percolation

---

[3] Documentation, executables, and source code for the SWAT model are available at https://swat.tamu.edu/

[4] The ESJ Order does require reporting of anonymized data from the INMP Summary reports. This data, however, does not include location or acreage data and thus cannot be used to verify the GWP Values.

[5] ELF has challenged this program of secrecy in court, in *Environmental Law Foundation v. State Water Resources Control Board*, Sacramento Superior Court No. 34-2018-80002851. The case is currently on appeal before the Third District Court of Appeal, Case No. C093513.

and leaching estimate for every field in the program. These estimates are then aggregated to the township level to produce the township-level GWP Values.

ELF and American Rivers submitted comments on the Formula Workplan in September 2020. A copy of these comments are attached as Exhibit D. Our comments raised issues about the completeness of the Formula, its calibration, and its transparency.

In January 2021, the Executive Officer conditionally approved the Formula Workplan. A copy of this approval is attached as Exhibit E.

In July 2021, the Coalitions submitted the Groundwater Protection Values ("GWP Values.") A copy of the GWP Values is included as Exhibit F.

The GWP Values are the output of the process described in the Formula Workplan. They contain modeled figures for the nitrogen leached from the root zone of crops in every eligible township in the Central Valley. As envisioned, the GWP Values use the data from individual fields, as reported on the confidential INMP Summary Reports, as model inputs. (GWP Values at p. vii.) Then, the results of "thousands of model runs were matched to INMP/NMP Summary Report data to produce scientifically valid estimates (or GWP Values) of nitrate-N load at the bottom of the root-zone."[6] (*Id.* at vii-viii.)

In particular, the GWP Values rely on the "following information for each record: Coalition, County, Parcel, Township-Range, Crop, Acreage, Nitrogen Applied (in lbs/ac), Yield, and Yield Units." (*Id.* at p. 8.) Parcel data was then "spatially associate[d]" between the individual INMP Summary Reports and the soil and climate data for each location. (*Ibid.*) The geographic data is highly detailed, including 30-meter topographical data and climate data at the sub-watershed level. (GWP Values at pp. 11-12.) Detailed soil data is also included. (*Id.* at p. 14.) In sum, even though the output of the GWP Values is at the township scale, the Coalitions relied on detailed, field-level or sub-field-level data to generate more granular values; these more granular values were then aggregated up to the township scale. (See *id.* at p. 26.)

[6] ELF notes and applauds the monumental amount of work that went into the GWP Values process.

ELF submitted comments in September 2021 raising the same transparency issues that it raised in response to the Formula Workplan and that it raises in this Petition. These comments are attached as Exhibit G.

B. Legal Background

The Nonpoint Source Policy is a binding, mandatory policy that the Regional Board must conform to before approving the GWP Values. (Wat. Code §§ 13140, 13146, 13241, 13263; *Monterey Coastkeeper v. State Water Resources Control Bd.* (2018) 28 Cal.App.5th 342.) The Policy states that a Regional Water Quality Control Board "shall ensure" that a nonpoint source pollution control program "meets the requirements of the five key structural elements described below." (Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program (2004) ("Nonpoint Source Policy") at p. 11.)[7] Key Element 4 requires that an "NPS control implementation program shall include sufficient feedback mechanisms so that the RWQCB, dischargers, and the public can determine whether the program is achieving its stated purpose(s), or whether additional or different MPs or other actions are required."[8] (Nonpoint Source Policy at p. 13.) Further, "[r]egardless of which approach is used, all monitoring programs should be reproducible, provide a permanent/documented record and be available to the public." (Nonpoint Source Policy at p. 14.)

C. Discussion

The GWP Values represent a "feedback mechanism" that is designed to inform the public, the dischargers, and the Regional Board whether the ESJ Order is achieving its stated purpose—dischargers' achievement of water quality objectives. (ESJ Order at pp. 15-16.) Specifically, the Values is intended as a step to developing Groundwater Protection Targets that will limit nitrogen loading (albeit in a non-binding fashion) to groundwater based on inputs from irrigated

[7] Available at https://www.waterboards.ca.gov/water_issues/programs/nps/docs/plans_policies/nps_iepolicy.pdf (accessed January 6, 2022).

[8] "NPS" is an abbreviation for "nonpoint source"; "RWQCB" is an abbreviation for Regional Water Quality Control Board. "MP" is an abbreviation for "management practice."

agriculture—nitrogen applied to and removed from fields, management practices, irrigation practices, and any other relevant variables. (ESJ Order at p. 74, MRP at p. 22.)[9]

But the GWP Values fail to meet the Nonpoint Source Policy's requirement that the Regional Board and the public be able to "determine whether the program is achieving its stated purposes." (Nonpoint Source Policy at p. 13-14.) This is because some of the inputs into the model used by the Workplan are secret.

The CV-SWAT model that the GWP Values rely on is a sub-field level model—it uses data with a resolution less than a single agricultural field. (Formula Workplan at p. 10.) And the ESJ Order requires growers to document and report field-level data on irrigation practices, nitrogen application, yield, management practices, and other key data points. (ESJ Order at pp. 34-53.) The GWP Values used this field-level data, as reported to the Coalition in the INMP Summary Reports, as inputs to the CV-SWAT model. (GWP Values at p. 7-8.)

The resulting Root-zone Library and township-level GWP Values are thus based on secret inputs. Because the inputs are secret, neither the Regional Board nor the public can "determine" whether the Values—and the Targets that will ultimately derive from them—are properly calculated. Thus neither the public nor the Regional Board will be able "verify" whether this aspect of the program is working. This violates the Nonpoint Source Policy.

Moreover, the Values function as a monitoring program. The dictionary definition of "monitor" is "to observe, check on, or regulate the performance of." (Webster's New World Dict. (5th College ed. 2014) p. 945.) The Values incorporate raw data on nitrogen applied and removed and combine that data with location, climate, and soil data to produce the best available measurement of discharge from any given field to groundwater. The Nonpoint Source Policy requires that monitoring programs be "available to the public." (Nonpoint Source Policy at p. 14.) Neither the State nor Regional Boards may interpret the Nonpoint Source Policy in such a way as to "amend" or

---

[9] The fact that the targets are nonbinding noes not prevent the Nonpoint Source Policy from controlling here: Key Element 4 applies to "adaptive management" as well as to binding regulatory rules. (Nonpoint Source Policy at pp. 13-14.)

"rewrite" it. (*Monterey Coastkeeper*, *supra*, 28 Cal.App.5th at 370.) Because the Values function as a monitoring program, they must be available to the public, including the model inputs.

And because the GWP values are a monitoring program, they must be "reproducible." "Reproducible" means that a statistical finding can be validated by recreating it. "[R]eproducibility is the sine qua non of science." (*United States v. Hebshie* (D.Mass. 2010) 754 F.Supp.2d 89, 125 [noting that "[d]ocumentation is necessary to test a hypothesis" and rejecting results where there was a lack of documentation].) A "key question" in "determining whether a theory or technique is scientific knowledge . . . [is] whether it can be (and has been) tested." (*Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993) 509 U.S. 579, 593.)

The GWP Values are in no sense reproducible. Because the model inputs are secret, no one but the Coalitions can re-run the model to reproduce the results. This problem occurs at each step of the calculation of the Values. First, in Step 1, individual INMP Summary Reports are aggregated and analyzed. The GWP Values exercise significant discretion over quality control of the individual INMP Summary Reports—including the 13% of acreage that includes nonsensical N application data.[10] (GWP Values at p. 10.)

Second, it is impossible to reproduce the modelling exercise that generated the Root-Zone Library in Step 2. And last, it is impossible to reproduce the aggregation of the modeled results up to the township level in Step 3. (GWP Values at p. 26.)

The Conditional Approval document demonstrates the impossibility of evaluating the GWP Values in all but the broadest terms. The enclosed staff memorandum does not, nor can it, endeavor to reproduce the results of the model. And it acknowledges a significant "knowledge gap" regarding nitrogen in the Central Valley. (Conditional Approval at p. 4.)

Thus, the GWP Values are a black box. The Coalitions take secret data, feed it into their model, and expect the public and the Regional Board to simply accept the results. This plan

---

[10] In addition, the modelers threw out the upper outliers for N application, a questionable move indeed given the known extent of overapplication of nitrogen in the Central Valley. (GWP Values at p. 27.)

facially violates the Nonpoint Source Policy. The public cannot use this feedback mechanism to determine whether the program is working because the data is secret. It is not "reproducible" because the data is secret. And it is not "available to the public." (Nonpoint Source Policy at pp. 13-14.)

The GWP Values' failure to rely on public data in conformance with the Nonpoint Source Policy is an unfortunate outcome, but one that the State Board should have anticipated when it permitted secret data in in the ESJ Order. Fortunately, the ESJ Order also anticipated revisiting the secrecy provisions. (ESJ Order at p. 74.) The State Board should take this opportunity to change course and require that the GWP Values, and the Targets that rely on them, be based on a fully public data set.

VII. STATEMENT THAT COPIES OF THE PETITION HAVE BEEN SENT TO THE REGIONAL WATER BOARD AND TO THE DISCHARGER

Copies of this Petition and exhibits were sent to the Regional Board and counsel for the Coalitions on January 10, 2021.

VIII. STATEMENT THAT THE SUBSTANTIVE ISSUES OR OBJECTIONS RAISED IN THE PETITION WERE RAISED BEFORE THE REGIONAL BOARD, OR AN EXPLANATION OF WHY THE PETITIONER WAS NOT REQUIRED OR WAS UNABLE TO RAISE THESE SUBSTANTIVE ISSUES OR OBJECTIONS BEFORE THE REGIONAL BOARD.

The issues raised in this Petition were raised before the Regional Board on numerous occasions, including on September 11, 2020 (Exhibit D) and September 1, 2021 (Exhibit G).

Respectfully submitted,

Dated: January 10, 2022

ENVIRONMENTAL LAW FOUNDATION

By: Nathaniel Kane

Attorneys for Petitioner Environmental Law Foundation

PROOF OF SERVICE

I, Nathaniel Kane, hereby declare:

I am over the age of 18 years and am not a party to this action. I am employed in the County of Alameda. My business address is Environmental Law Foundation, 1736 Franklin Street, Ninth Floor, Oakland, CA 94612.

On January 10, 2022, I caused to be served the attached:

PETITION FOR REVIEW: In the Matter of Review of the Groundwater Protection Values for Central Valley Water Quality Coalitions

☐ **BY MAIL.** I caused the above identified document(s) addressed to the party(ies) listed below to be deposited for collection at the Public Interest Law Offices or a certified United States Postal Service box following the regular practice for collection and processing of correspondence for mailing with the United States Postal Service. In the ordinary course of business, correspondence is deposited with the United States Postal Service on this day.

☒ **BY E-MAIL.** I caused the above identified document(s) to be sent by electronic transmission to the party(ies) listed below at the address(es) shown.

SEE ATTACHED SERVICE LIST.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct, and that this Declaration was executed at Berkeley, California on January 10, 2022.

Declarant

SERVICE LIST

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
waterqualitypetition@waterboards.ca.gov

Philip Wyels
Assistant Chief Counsel
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
Philip.wyels@waterboards.ca.gov

Patrick Pulupa, Executive Officer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670
Patrick.Pulupa@waterboards.ca.gov

Tess Dunham
Kahn, Soares & Conway, LLP
1415 L Street, Suite 400
Sacramento, CA 95814
tdunham@kscsacramento.com

Exhibit A

Central Valley Regional Water Quality Control Board

27 October 2021

Tess Dunham
Kahn, Soares & Conway, LLP
1415 L Street, Suite 400
Sacramento, CA 95814

CONDITIONAL APPROVAL OF THE GROUNDWATER PROTECTION VALUES FOR CENTRAL VALLEY WATER QUALITY COALITIONS

On 19 July 2021, a document entitled *Groundwater Protection Values* (GWP Values Report) was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley. Development of Groundwater Protection Values is required under applicable Waste Discharge Requirements General Orders (WDRs) for owners and operators of irrigated agricultural lands for the purpose of establishing N loading estimates, expressed as either a nitrate loading number or a concentration of nitrate in water (e.g.,mg/L), which reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. These estimates will in-turn be used to develop appropriate Groundwater Protection Targets reflective of N loading rates necessary to achieve compliance with receiving water limitations within High Vulnerability Areas.

The GWP Values Report was circulated for public comment on 30 July 2021 and reviewed by Central Valley Water Board staff (staff). Based on staff's review of the report, the proposed Groundwater Protection Values appear adequate for use in the development of Groundwater Protection Targets. The proposed Values are approved, conditional upon submittal of Groundwater Protection Values for the remaining Sacramento Valley Coalition area High Vulnerability Townships as described in the enclosed staff memo. The values must be submitted no later than 15 December 2021.

While the model-based process currently appears to be producing valid and useful estimates of N fate, continued scrutiny of the model against new data and available studies is a crucial step in ensuring the development of appropriate Groundwater Protection Targets in the future. For this reason, by 19 July 2026, and in conjunction with proposed updates to the Groundwater Protection Values and Targets, the participating Coalitions shall submit an assessment of model performance with respect to any relevant and available information at the time of submittal.

If you have any questions regarding this letter, please contact Sue McConnell at (916) 464-4798 or by e-mail at sue.mcconnell@waterboards.ca.gov.

Patrick Pulupa
Executive Officer

Enclosure: 21 October 2021 Staff Memorandum

Central Valley Regional Water Quality Control Board

TO: David Sholes, PG 4321
Senior Engineering Geologist
Irrigated Lands Regulatory Program

FROM: Eric Warren, PE
Water Resource Control Engineer
Irrigated Lands Regulatory Program

DATE: 21 October 2021

SUBJECT: REVIEW OF PROPOSED GROUNDWATER PROTECTION VALUES FOR CENTRAL VALLEY WATER QUALITY COALITIONS

On 19 July 2021, a report containing proposed Groundwater Protection Values (GWP Values Report or Report) was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley Region. The methodology used to calculate the proposed GWP Values is described in a separate submittal (GWP Formula), which was conditionally approved by the Executive Officer on 19 January 2021. A copy of the conditional approval letter has been enclosed with this memo for context.

GWP Values are defined within the Irrigated Lands Regulatory Program Waste Discharge Requirements General Orders as township-scale loading estimates which reflect "the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period." Once approved, these values will be used to develop appropriate Groundwater Protection Targets intended to achieve compliance with receiving water limitations within High Vulnerability Areas.

The subject report was circulated for public comment on 30 July 2021. Two comment letters were received during the public review period and considered by Central Valley Water Board staff (staff) in review of the report. The following sections provide a summary of public comments received, staff's assessment of the GWP Values, and staff recommendation.

Public Comments Received

Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability
On 1 September 2021, a joint comment letter was received from the Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability. The letter raised some of the same concerns expressed in their 15 September 2020 comments regarding the Groundwater Protection Formula. Specifically, 1) the accuracy and availability of data used to develop GWP Values; 2) the ability to confirm CV-SWAT model results; 3) identification of community impacts; and 4) the process and timing for updating GWP Values.

Environmental Law Foundation
On 1 September 2021, a comment letter was received from the Environmental Law Foundation. The letter raised concerns regarding the transparency and public accessibility of the field-specific data used to develop the Root-zone Library. These data are processed as an intermediate step in the development of Groundwater Protection Values, which are provided as township-scale loading estimates.

Staff Assessment of the Proposed Groundwater Protection Values

Conditions of GWP Formula Approval Fulfilled
The proposed GWP Values were calculated using a methodology described in the conditionally approved GWP Formula report. The approval letter described the following items to be submitted in conjunction with the proposed GWP Values:

1. Documentation of model inputs and results used to develop the Root-Zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)

2. A sensitivity analysis which identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.

3. A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum the summary should include each of the top five crops by acreage.

4. Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.

5. Descriptions of the specific methods and criteria that will be used to account for post root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.

6. Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.
7. Comparisons, aggregated by township, of grower reported data (N applied, N removed) to model estimates (N applied, N removed, N leached).

The described items were provided in the GWP Values report and adequately meet the conditions of the GWP Formula approval.

Townships Evaluated

Section 2.1.1 of the GWP Values Report describes criteria used to evaluate which townships to develop GWP Values for. For the Sacramento Valley Water Quality Coalition area, proposed GWP Values were developed for "townships with greater than 30 percent of designated High Vulnerability Areas (HVAs) and where the township also had groundwater that measured above 7.5 mg/L in the last 20-year period." No justification was provided in the Report for the proposed assessment criteria; however, the Coalition provided additional information to staff via email on 25 September 2021.

For all other Coalitions, GWP Values were developed "based on whether there is greater than 10 percent of designated HVAs within any given township boundary and for which there is irrigated agriculture with relevant INMP/NMP Summary Reports." The criteria were established as a result of discussions between the Coalitions, Central Valley Water Board staff, and certain Environmental Justice Stakeholders.

Spatial Distribution of N Loading

GWP Values were provided in a tabular format and visually represented in Figure 8 of the GWP Values Report. The townships subject to the greatest estimated loading are located predominantly in the Tulare Lake Basin Area, at the base of the Sierra Nevada range within Fresno, Tulare, and Kern counties, and in the Western Tulare Lake Basin Area. The Tulare Lake Basin Area results appear to correlate with existing water quality data which show a large number of impacted domestic wells. Local soils data additionally indicate a prevalence of coarse-grained sediments in this area. The Western Tulare Lake Basin Area has comparatively limited domestic well data available; however, land use data does show a large proportion of the irrigated acreage contains high N demand nut crops. Twelve of the top 15 townships with the greatest reported N application (by acre-weighted average) are located within the Western Tulare Lake Basin Area. Based on the above considerations, the spatial distribution of N loading produced by the GWP Values appears to correlate with existing groundwater data and other factors that likely influence water quality in these areas.

Analysis of Mass Balance and N Loss Estimates

The GWP Values dataset includes township-specific information such as the amount of irrigated acreage, number of crops grown, and grower-reported N applied and N removed in harvested yield (AR) values. Subtracting the reported N removed from N applied (A-R) produces a rough mass balance that to date has been used in the Irrigated Lands Regulatory Program to estimate the amount of N potentially available for leaching. In general, the rough mass balance (A-R) values modeled in the GWP Values

Report are comparable to grower-reported data. The median difference between grower reported A-R and modelled acre-weighted average N balance (A-R) was -4 lb/ac. The observed correlation between modeled and reported A-R values indicates that representative estimates of N applied and yield are being utilized in the calculation of Groundwater Protection Values.

The primary difference between the proposed GWP Values and grower-reported A-R values is that the GWP Values account for additional fates of N beyond harvested yield (e.g., volatilization, N sequestration in perennial tissue). Based on staff's review of the N loss estimates and supporting literature references provided, the values appear conservative. As examples, the modeled median acre-weighted average N lost due to ammonia volatilization was approximately 2.6% of the N applied, compared to 3.6% reported in Krauter et al. 2006.[1] The modeled acre-weighted average N storage in perennial tissue for almonds in the Tulare Lake Basin Area was 21 lb/ac, compared to 30 to 65 lb/ac reported in Brown et al., 2020.[2]

It should be noted that there is still a significant knowledge gap with respect to N fate within highly-variable California agricultural systems. It is anticipated that additional studies will help to further validate these estimates over time.

Staff Recommendation

Based on the above considerations, staff find that the proposed Groundwater Protection Values are generally adequate to assist in developing appropriate Groundwater Protection Targets. In order to ensure a continued effort to validate the model estimates and underlying parameters, staff recommend a periodic re-assessment of model performance that includes consideration of newly available and relevant data (e.g., pending UC Davis field studies, updated crop-specific coefficients for conversion of yield to nitrogen removed). The assessments should occur in conjunction with the five-year process for review and revision of GWP Targets.

Further work is needed to evaluate the anticipated effects that these estimated loading rates will have on groundwater quality. Prior to submittal of proposed Groundwater Protection Targets, it is expected that the Coalition groups will remain engaged with both staff and interested stakeholders to provide updates on progress toward target development.

---

[1] Krauter, C. F., C. Potter, and S. Klooster. 2006. Ammonia emission related to nitrogen fertilizer application practices, final report, June '06. California Department of Food and Agriculture Fertilizer Research and Education Program (FREP).

[2] Brown, P.H., Saa, S., Muhammad, S., Khalsa, S.D., 2020. Nitrogen Best Management Practices. Available online at: https://www.almonds.com/almond-industry/orchard-management/soil-health-and-nutrients/nutrient-management.

With regard to the proposed assessment criteria for the Sacramento Valley Water Quality Coalition area, staff reviewed the supplemental information provided via email on 25 September 2021. After consideration of the information provided, staff do not find adequate justification for the proposed evaluation criteria. As soon as feasible, the Sacramento Valley Water Quality Coalition should calculate Groundwater Protection Values for the remaining townships within designated High Vulnerability Areas using the same criteria as the other coalitions.

Enclosure: 19 January 2021 Conditional Approval of the Groundwater Protection Formula Workplan for Central Valley Water Quality Coalitions

Central Valley Regional Water Quality Control Board

19 January 2021

Tess Dunham
Kahn, Soares & Conway, LLP
1415 L Street, Suite 400
Sacramento, CA 95814

CONDITIONAL APPROVAL OF THE GROUNDWATER PROTECTION FORMULA WORKPLAN FOR CENTRAL VALLEY WATER QUALITY COALITIONS

On 1 July 2020, a document entitled *Workplan: Groundwater Protection Formula* (GWP Workplan) was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley. Development of a Groundwater Protection Formula is required under applicable Waste Discharge Requirements General Orders (WDRs) for owners and operators of irrigated agricultural lands for the purpose of developing estimates (Groundwater Protection Values), expressed as either a nitrate loading number or a concentration of nitrate in water (e.g.,mg/L), which reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. These estimates will in-turn be used to develop appropriate Groundwater Protection Targets reflective of N loading rates necessary to achieve compliance with receiving water limitations within High Vulnerability Areas.

The GWP Workplan was circulated for public comment on 28 July 2020 and concurrently reviewed by Central Valley Water Board staff (staff). It is my expectation that the Groundwater Protection Formula will continue to be refined over time as additional opportunities for improvement are identified. Based on staff's review of the GWP Workplan, I am approving the submittal with the conditions listed below.

The following items must be submitted in conjunction with the proposed Groundwater Protection Values:

1. Documentation of model inputs and results used to develop the Root-Zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)

2. A sensitivity analysis which identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.
3. A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum the summary should include each of the top five crops by acreage.
4. Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.
5. Descriptions of the specific methods and criteria that will be used to account for post root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.
6. Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.
7. Comparisons, aggregated by township, of grower reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached).

If you have any questions regarding this letter, please contact Sue McConnell at (916) 464-4798 or by e-mail at sue.mcconnell@waterboards.ca.gov.

Patrick Pulupa
Executive Officer

Enclosure: 29 December 2020 staff memorandum

Central Valley Regional Water Quality Control Board

TO: David Sholes, PG
Senior Engineering Geologist
Irrigated Lands Regulatory Program

FROM: Eric Warren, PE
Water Resource Control Engineer
Irrigated Lands Regulatory Program

DATE: 29 December 2020

SUBJECT: **REVIEW OF THE GROUNDWATER PROTECTION FORMULA WORKPLAN FOR CENTRAL VALLEY WATER QUALITY COALITIONS**

On 1 July 2020, a collaborative Workplan for the development of a Groundwater Protection Formula was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley Region. Development of a Groundwater Protection Formula is required under applicable Waste Discharge Requirements General Orders (WDRs) for owners and operators of irrigated agricultural lands for the purpose of developing estimates (Groundwater Protection Values), expressed as either a nitrate loading number or a concentration of nitrate in water (e.g., mg/L) for townships within designated High Vulnerability Areas. The Values need to reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. These estimates will in-turn be used to develop appropriate Groundwater Protection Targets reflective of N loading rates necessary to achieve compliance with receiving water limitations within High Vulnerability Areas.

The Groundwater Protection Formula workplan was circulated for public comment on 28 July 2020 and concurrently reviewed by Central Valley Water Board staff (staff). Three comment letters were received during the public review period. In addition, several meetings have been held with Coalition representatives to provide further clarification on the GWP Formula Workplan and associated CV-SWAT model development. A summary of the Workplan's proposed approach, public comments received, and staff comments are provided in the following sections.

Summary of the Proposed Groundwater Protection Formula Methodology

Model Background
A key component of the proposed Groundwater Protection Formula is the SWAT (Soil and Water Assessment Tool) Model. This model has been under continual development, expansion, validation, and use for over 40 years, including incorporation of other scientific model features and data. SWAT has been used to quantify nitrate loading to surface and groundwater from agricultural and adjacent natural systems.

According to the Groundwater Protection Formula Workplan, SWAT is a process-based model that operates with a daily time-step and represents many physical, chemical, and biological processes. SWAT uses these underlying processes to simulate hydrology and water quality, and to model the environmental effects of land use, land management practices, and climate change. SWAT incorporates climate, soil, water, nutrient and pesticide dynamics, the nitrogen cycle, plant growth, and management. The spatial scale of SWAT can be adapted to larger regional processes or more detailed field-level analyses. This allows for estimation of numerous environmental effects, including nitrate leaching below the root-zone. A version of SWAT has been customized for the Central Valley (CV-SWAT) for the Management Practice Evaluation Program and will be further adapted for the calculation of Groundwater Protection Values. In this application, the most detailed available climatic and (sub-field-level) soils information, is used, with the results for the many small analysis units summed to provide results for whole townships.

General Approach
The proposed Groundwater Protection Formula consists of three key steps: 1) Compile climate, soil, parcel, and Irrigation and Nitrogen Management Plan (INMP) Summary Report data; 2) Develop a “Root-zone Library” based on CV-SWAT estimates for percolation and nitrate leaching under various management scenarios; and 3) Calculate Groundwater Protection Values by matching appropriate Root-zone Library entries to grower reported data and aggregating the results to the township scale.

Data Compilation

Step 1 includes aggregating, analyzing, and summarizing INMP Summary Report data from all participating Central Valley Coalitions. These data will be analyzed to quantify the ranges of applied nitrogen, yield, and their relationship for each crop within High Vulnerability Townships. These datasets will then be used to develop a comprehensive Crop Management and Yield Matrix (Matrix) that reflects the distribution of applied nitrogen and yield for each crop. The Matrix will identify the appropriate management scenarios for CV-SWAT runs that are conducted in Step 2.

Soils data from the Natural Resources Conservation Service as well as historical and current climate data from the California Irrigation Management Information System will also be assembled in CV-SWAT. Parcel data will be used to spatially associate the individual Irrigation and Nitrogen Management Plan Summary Reports with soil and climate conditions at that location.

Root-zone Library Development

The Root-zone Library will consist of percolation and nitrate leaching estimates developed from an automated workflow which uses data from Step 1 to execute numerous (approximately 40,000) CV-SWAT runs. The wide range of modeled scenarios is intended to capture the variability of climate, soil, crop, and management that occurs throughout the Central Valley. Simulating each crop on every soil in every climate adds additional flexibility to account for future land use changes without necessitating additional model runs.

Root-zone Groundwater Protection Value Calculations

Percolation and nitrate leaching estimates from Step 2 will be aggregated to the township-scale to calculate root-zone Groundwater Protection Values for High Vulnerability Townships. This will be done by 1) matching the appropriate Root-zone Library entry to each INMP Summary Report (based on yield, applied nitrogen, soil, climate, and parcel), and b) developing a "calculator" to aggregate the resulting percolation and leaching estimates at the township scale to calculate root-zone-based Groundwater Protection Values. Additional steps to account for additional processes (e.g., vadose zone attenuation and groundwater recharge) may be applied to the root-zone-based Groundwater Protection Values as a post-processing step or be applied when calculating Groundwater Protection Targets.

Public Comments Received

California Rice Commission
On 28 July 2020 a comment letter was submitted by the California Rice Commission. While development of a Groundwater Protection Formula is not a requirement of the Waste Discharge Requirements General Order for Sacramento Valley Rice Growers (R5 R5-2014-0032-02), the letter expressed strong support for the GWP Formula Workplan and noted its utility in managing approximately 12,000 acres of rice grown in other areas of the San Joaquin Valley.

American Rivers and the Environmental Law Foundation
On 11 September 2020 a joint comment letter was submitted by American Rivers and the Environmental Law Foundation. The letter generally supported the CV-SWAT modeling approach but expressed concern regarding 1) the completeness of the Groundwater Protection Formula, 2) the modeling approach for crop rotations and land use changes, and 3) the transparency and public accessibility of the Groundwater Protection Formula.

Completeness of the Groundwater Protection Formula

In regard to completeness of the Groundwater Protection Formula, the commenters noted that the calibration of the model is currently ongoing, and comparisons against literature values or outputs from other models such as HYDRUS have not been provided in the Workplan. The letter also expressed concern regarding the lack of information regarding how the described post root-zone processes would be accounted for during the calculation of Groundwater Protection Values.

Modeling Approach for Crop Rotations and Land Use Changes

The comment letter stated that the proposed Groundwater Protection Formula does not contain a mechanism for accounting for crops that are frequently rotated and suggested incorporating simulations to represent scenarios where land use may frequently change. It also noted the availability of a more recent 2016 land use dataset published by the Department of Water Resources.

Transparency and Public Accessibility of the Groundwater Protection Formula

The last issue raised by the commenters was regarding the lack of public access to the data input files used within the model, and the inability for the public to reproduce the model results. Items specifically identified as unavailable were grower reported nitrogen application data, adjusted land use data, and calibrated parameter values for each chapter of the described Root-Zone Library.

<u>Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability</u>

On 15 September 2020 a joint comment letter was received from the Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability. The letter supported the use of the CV-SWAT model but raised questions regarding 1) how model calibration will be continuously improved; 2) how the Groundwater Protection Formula relates to Groundwater Protection Values and Targets; and 3) how local impacts within a township may be identified and mitigated.

Model Calibration

The commenters noted that there is currently a lack of information available to calibrate the proposed model and agreed with prior comments submitted by American Rivers and the Environmental Law Foundation suggesting the results be compared to other model results, such as HYDRUS, for at least five of the most common crop types. An additional request was made for more information regarding how the modeling process can be continuously improved over time (e.g., the development of field data necessary to confirm model outputs) and how the described work will continue beyond the 2024 completion of the MPEP.

How the Groundwater Protection Formula Relates to Groundwater Protection Values and Targets

The commenters also noted that the Groundwater Protection Formula Workplan identifies post-processing modifications to calculated Groundwater Protection Values may be made by individual Coalitions to account for factors that may influence the concentration of nitrate reaching groundwater (e.g., vadose zone attenuation and recharge). An expanded description of what site-specific information may be developed and how the information will be used was requested prior to calculation of Groundwater Protection Values, along with an additional opportunity for public comment.

Clarification was requested regarding whether the Groundwater Protection Formula Workplan is proposing to modify the WDRs point of compliance with receiving water limitations from first-encountered groundwater to the bottom of the root-zone.

How Local Impacts Within a Township May Be Identified and Mitigated

As part of Groundwater Protection Value and Target development, the commenters requested additional discussion regarding how tools used in this process may potentially help to identify and prioritize impacted communities for protection.

Summary of Staff Comments

Staff have several comments on the proposed Groundwater Protection Formula, some of which are duplicative to those raised by public commenters. These issues, along with recommendations for addressing them, are discussed in the following sections.

<u>Modeling Approach for Crop Rotations and Land Use Changes</u>
With regards to crop rotations, and to a similar extent irrigation method, it is difficult to capture the yearly variability exhibited by some farms. For example, in a given year a grower may make a management decision to attempt a second harvest or change their irrigation method based on the availability of surface water allocations. The described methodology in the Groundwater Protection Formula Workplan contains a number of general assumptions (e.g., each field is assigned a single crop type and each crop is assigned the predominant irrigation method) which potentially reduce its ability to reflect the variability of management scenarios and corresponding leaching. Staff acknowledge that accounting for the full breadth of management scenarios is likely infeasible in the context of data availability and the time/cost involved in expanding the model capabilities. However, it is our expectation that the Groundwater Protection Formula will continue to be refined over time as additional opportunities for improvement are identified.

<u>Model Calibration</u>
While the applicable WDRs do not specify a specific metric or threshold for the accuracy of Groundwater Protection Values, the workplan should provide some assessment of the Groundwater Protection Formula's ability to estimate the average concentration of

nitrate expected to reach groundwater in evaluated areas. Without documented comparisons between model outputs and other sources of percolation and nitrate leaching estimates (e.g., field studies, grower reported N Applied/Yield data, HYRDUS) it is difficult to have confidence in the model's ability to reasonably estimate township-scale leaching. The Groundwater Protection Formula Workplan is also lacking a sensitivity analysis that would allow staff or other interested parties to evaluate how the fate of N is influenced by various parameters within the model. These issues need to be resolved prior to approval of Groundwater Protection Values.

Transparency and Public Accessibility of the Groundwater Protection Formula
Staff agree there is a need for public transparency regarding the model. To this end, documentation of the parameter definitions and input values used to develop the root-zone library needs to be submitted once complete. Additionally, township-level summaries comparing aggregated grower-reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached) should be submitted.

Adjustment of Groundwater Protection Values
The Groundwater Protection Formula Workplan identifies potential key processes that may be considered by individual Coalitions in calculation or adjustment of the final Groundwater Protection Values (e.g., vadose zone attenuation and groundwater recharge). Insufficient information was provided for staff to understand how this process may be implemented, but the Groundwater Protection Formula Workplan did include a commitment to provide clear explanations and supporting documentation for any post-processing calculations conducted during the submittal of proposed Groundwater Protection Values.

The intent of the Groundwater Protection Formula is to develop estimates of N loading to groundwater, as opposed to from the root-zone (although the later may be substituted for the former as a conservative estimate in most instances). Staff agree that submittal and review of the proposed post-processing methodology and criteria is a necessary step prior to use of such a methodology in calculating Groundwater Protection Values or Targets.

Recommendations
Staff generally support the use of the CV-SWAT model and methodology described in the Groundwater Protection Formula Workplan. However, certain aspects of the model development remain in-progress. Staff recommend the following items to be submitted in conjunction with the proposed Groundwater Protection Values:

1. Documentation of model inputs and results used to develop the Root-Zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)
2. A sensitivity analysis which identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.

3. A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum the summary should include each of the top five crops by acreage.
4. Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.
5. Descriptions of the specific methods and criteria that will be used to account for post root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.
6. Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.
7. Comparisons, aggregated by township, of grower reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached).

Exhibit B

From:	McConnell, Sue@Waterboards
To:	Nathaniel Kane
Cc:	Michael Claiborne; Ngodoo Atume; jclary@cleanwater.org; Lowell Chow; kyle.jones@communitywatercenter.org; Pulupa, Patrick@Waterboards; Justine Massey; Warren, Eric@Waterboards
Subject:	RE: Conditional Approval of Groundwater Protection Values
Date:	Thursday, December 9, 2021 5:16:31 PM
Attachments:	image001.jpg Conditional Approval GWP Values Report.pdf

Hi Nat,

Attached is the conditional approval document. I apologize that we inadvertently neglected to cc you and the other commenters.

Please let me know if you have any questions about this.

Sue

SUE MCCONNELL, PE
IRRIGATED LANDS REGULATORY PROGRAM
CENTRAL VALLEY WATER BOARD
11020 SUN CENTER DR #200
RANCHO CORDOVA, CA 95670-6114

CELL PHONE: 916.709.6105
sue.mcconnell@waterboards.ca.gov

From: Nathaniel Kane <nkane@envirolaw.org>
Sent: Thursday, December 9, 2021 4:36 PM
To: Pulupa, Patrick@Waterboards <Patrick.Pulupa@waterboards.ca.gov>; Warren, Eric@Waterboards <Eric.Warren@waterboards.ca.gov>; McConnell, Sue@Waterboards <Sue.McConnell@waterboards.ca.gov>
Cc: Michael Claiborne <mclaiborne@leadershipcounsel.org>; Ngodoo Atume <natume@cleanwater.org>; jclary@cleanwater.org; Lowell Chow <lchow@envirolaw.org>; kyle.jones@communitywatercenter.org; Justine Massey <justine.massey@communitywatercenter.org>
Subject: Conditional Approval of Groundwater Protection Values

EXTERNAL:

Dear Eric, Sue, and Patrick,

I saw from the EO report for today's meeting that the Groundwater Protection Values were conditionally approved back in October. Unlike with the GWP Formula, I didn't receive anything through email, Lyris or otherwise. And I don't see it on your website.

Could one of you forward the conditional approval document?

Thank you,

Nat

Nathaniel Kane
Executive Director
Environmental Law Foundation
1222 Preservation Park Way, Suite 200
Oakland, CA 94612
(510) 208-4555
nkane@envirolaw.org
He/Him/His

Exhibit C

Workplan: Groundwater Protection Formula

Prepared for:
Buena Vista Coalition
Cawelo Water District Coalition
East San Joaquin Water Quality Coalition
Grassland Drainage Area Coalition
Kaweah Basin Water Quality Association
Kern River Watershed Coalition Authority
Kings River Watershed Coalition Authority
Sacramento Valley Water Quality Coalition
San Joaquin County and Delta Water Quality Coalition
Tule Basin Water Quality Coalition
Westlands Water Quality Coalition
Westside San Joaquin River Watershed Coalition
Westside Water Quality Coalition

Prepared by:
Formation Environmental, LLC

In collaboration with:
PlanTierra, LLC
MLJ Environmental

JULY 1, 2020

TABLE OF CONTENTS

FIGURES

TABLES

LIST OF ABBREVIATIONS

APN	Assessor's Parcel Number
CIG	Conservation Innovation Grant
CIMIS	California Irrigation Management Information System
CREAMS	Chemicals, Runoff, and Erosion from Agricultural Management Systems
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SWAT	Central Valley Soil & Water Assessment Tool
ET	Evapotranspiration
GIS	Geographic Information System
GQMPs	Groundwater Quality Management Plans
gSSURGO	Gridded Soil Survey Geographic Database
GWP	Groundwater Protection
HRU	Hydrologic Response Unit
HUMUS	Hydrologic Unit Model of the United States
HVA	High Vulnerability Area
HVT	High Vulnerability Township
INMP	Irrigation and Nitrogen Management Plan
IPNI	International Plant Nutrition Institute
lb/ac	pounds per acre
LTILRP	Long-term Irrigated Lands Regulatory Program
mg/L	Milligrams per Liter
MPEP	Management Practices Evaluation Program
NRCS	Natural Resources Conservation Service
QA/QC	Quality Assurance/Quality Control
SSJV	Southern San Joaquin Valley
SWAT	Soil & Water Assessment Tool
UC	University of California
USDA-ARS	United States Department of Agriculture – Agricultural Research Service

EXECUTIVE SUMMARY

Waste Discharge Requirement General Orders that apply to members of third-party groups (often referred to as the Long-term Irrigated Lands Regulatory Program, or LTILRP) requires third-parties to submit a Groundwater Protection (GWP) Formula by July 1, 2020, to the Executive Officer of the Central Valley Regional Water Quality Control Board (CVRWQCB). The Central Valley Water Quality Coalitions have come together to develop one GWP Formula that all the Coalitions would then use to develop GWP Values and Targets, as required.[1] The Central Valley Water Quality Coalitions include the following:

- Buena Vista Coalition
- Cawelo Water District Coalition
- East San Joaquin Water Quality Coalition
- Grassland Drainage Area Coalition
- Kaweah Basin Water Quality Association
- Kern River Watershed Coalition Authority
- Kings River Watershed Coalition Authority
- Sacramento Valley Water Quality Coalition
- San Joaquin County and Delta Water Quality Coalition
- Tule Basin Water Quality Coalition
- Westlands Water Quality Coalition
- Westside San Joaquin River Watershed Coalition
- Westside Water Quality Coalition

The GWP Formula presented in this Workplan will be used to generate GWP Values for high vulnerability townships (HVTs), and such Values will be part of Groundwater Quality Management Plans (GQMPs). GWP Values may be expressed as either a nitrate loading number or a concentration of nitrate in water (e.g., mg/L), and are aggregated to the township scale for HVTs. GWP Values need to reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period.

The GWP Formula as proposed in this Workplan focuses first on soil, crop, and root-zone processes. Other key processes that also need to be considered (e.g., vadose zone attenuation and groundwater recharge) that impact the concentration of nitrogen transport will be addressed as GWP Values and Targets are calculated for HVTs.

The GWP Formula presented here consists of three key steps: 1) compile and uses daily climatic, detailed soil, parcel, and Irrigation and Nitrogen Management Plan (INMP) data as reported by growers to the Coalitions in their INMP Summary Reports, 2) evaluate detailed data using robust, scientifically valid equations and methods encompassed in the Central Valley Soil & Water Assessment Tool (CV-SWAT) to estimate percolation and nitrate leaching, and 3) aggregate the results to the township scale to provide root-zone-based GWP Values before considering additional processes. This approach builds off recent work associated with other components of the LTILRP Management Practice Evaluation Program (MPEP), by using an adapted version of the CV-SWAT model. For use in the GWP Formula, the CV-SWAT model has been further augmented to use grower-reported INMP Summary Report data. Results from thousands of model runs will be matched to INMP Summary Report data. Results will then be compiled on a township

[1] Reference to all Coalitions for this submittal does not include the California Rice Commission on behalf of rice growers in the Sacramento Valley. The GWP provisions are not in the California Rice Commission's Third Party Order and thus are not applicable to rice growers in the Sacramento Valley.

basis to estimate percolation and nitrate leaching in HVTs. Figure ES-1 provides an overview of the GWP Formula and the steps described as follows:

- **Step 1 – Aggregate Data.** Integration of INMP Summary Report data is critical to the development of GWP Values. Step 1 includes aggregating, analyzing, and summarizing INMP Summary Report data from all participating Central Valley Coalitions. INMP Summary Report data will be analyzed to quantify the range of applied nitrogen, yields, and their relationship for each crop within HVTs. These datasets will then be used to develop a comprehensive Crop Management and Yield Matrix (Matrix) that reflects the distribution of applied nitrogen and yield for each crop. The Matrix will identify the appropriate management scenarios for CV-SWAT runs that are conducted in Step 2. Best available soils data from the Natural Resources Conservation Service (NRCS) as well as historical and current climate data from the California Irrigation Management Information System (CIMIS) will also be assembled in CV-SWAT. Parcel data will be used to spatially associate the individual INMP Summary Reports with soil and climate conditions at that location.

- **Step 2 – Develop Root-zone Library.** The methods to develop the Root-zone Library are defined as the equations and workflow that use the data from Step 1 to produce root-zone GWP Values. The comprehensive root-zone physical processes in SWAT (and further calibrated in the CV-SWAT model) provide the robust, scientifically valid equations for the GWP Formula. An innovative automated workflow will be used to execute numerous (~40,000) CV-SWAT runs to account for the diversity in INMP Summary Report data and management (i.e., the Matrix from Step 1). Every possible climate, soil, crop, and management scenario will be modeled to ensure that all scenarios have a percolation and nitrate leaching estimate. This will be achieved by treating land use as a single crop for all acreage in the CV-SWAT model runs, therefore simulating each crop on every soil in every climate. The workflow will reflect agronomically based scenarios with estimates of percolation, and nitrate leaching will be summarized and compiled to produce township-specific GWP Values (Step 3). A Root-zone Library will catalog model outputs (Figure ES-2). Figure ES-2 provides a description and infographic of the Root-zone Library.

- **Step 3 – Calculate Root-zone GWP Values.** Percolation and nitrate leaching estimates from Step 2 will be compiled and aggregated to the township scale to calculate root-zone GWP Values for HVTs. This will be done by 1) matching the appropriate Root-zone Library entry (from the CV-SWAT model) to each INMP Summary Report (based on yield, applied nitrogen, soil, climate, and parcel) and 2) developing a “calculator” to aggregate the resulting percolation and leaching estimates at the township scale to calculate root-zone-based GWP Values (Figure ES-3). The resulting root-zone-based GWP Values at this step include the site-specific root-zone processes influenced by climate, soil, crop, and management. Additional steps that bring in other processes (e.g., vadose zone attenuation and groundwater recharge) may be applied to the root-zone-based GWP Values as a post-processing step or be applied when calculating GWP Targets.

Upon approval of the GWP Formula described in this Workplan, the Coalitions will move forward to implement the steps as described. Within six months of Executive Officer approval of the GWP Formula, the Coalitions will submit GWP Values for HVTs.

FIGURE ES-1. INFOGRAPHIC OF GROUNDWATER PROTECTION FORMULA

The GWP Formula includes three steps. Step 1 includes aggregation and analysis of daily climatic, detailed soil, parcel, and Irrigation and Nitrogen Management Plan (INMP) Summary Report data. Step 1 also includes development of a Matrix that reflects the reported distribution of applied nitrogen and yield for each crop. Step 2 includes evaluating those data using the Central Valley Soil & Water Assessment Tool (CV-SWAT) to estimate percolation and nitrate leaching for each management scenario. Model output will be cataloged in a Root-zone Library. Step 3 includes aggregation of the results to the township scale to provide root-zone-based GWP Values. This will be done by 1) matching the appropriate Root-zone Library entry (from the CV-SWAT model) to each INMP report (based on yield, applied N, soil, climate, and parcel) and 2) developing a "calculator" to aggregate the resulting percolation and leaching estimates to the township scale.

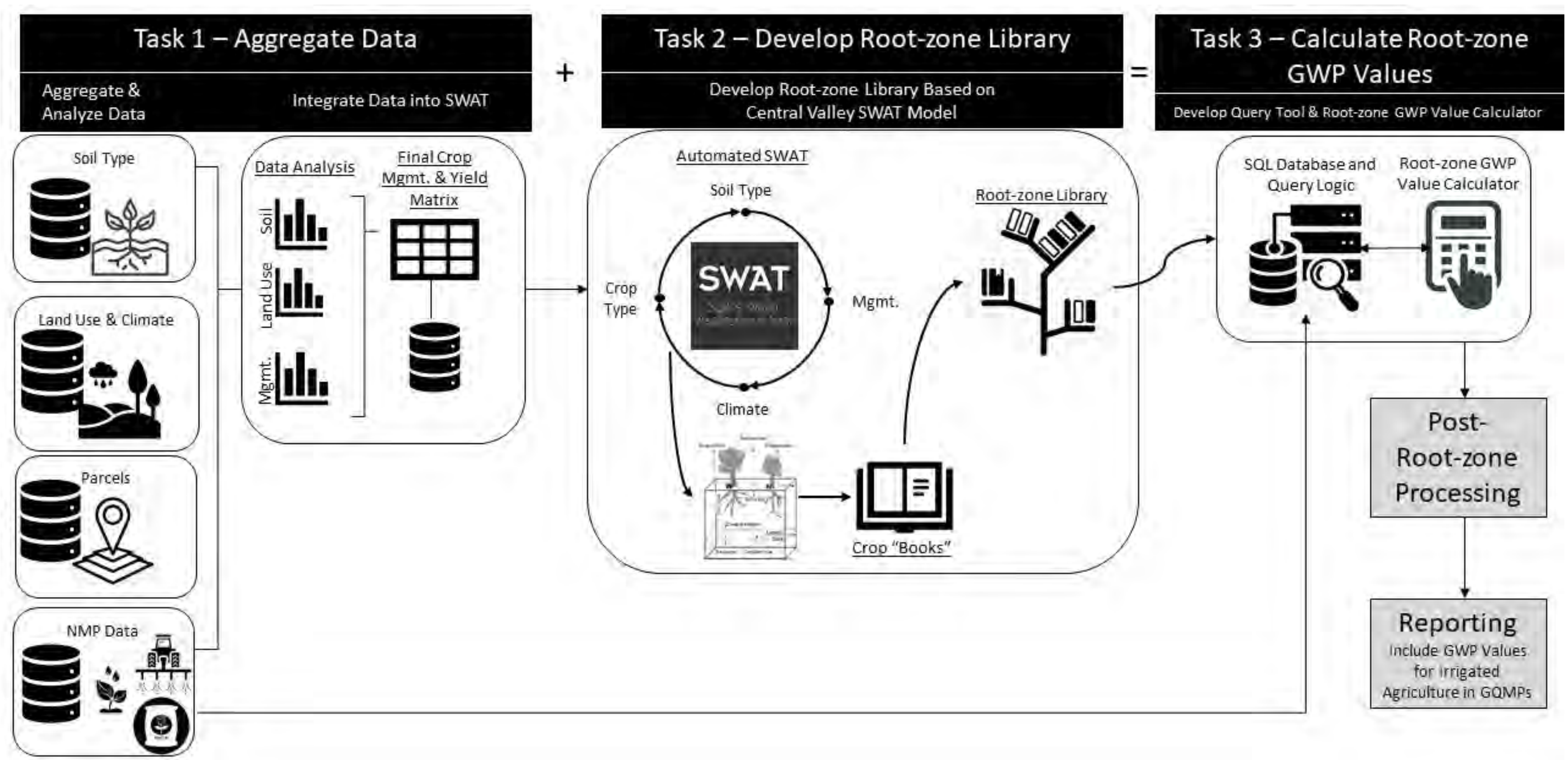
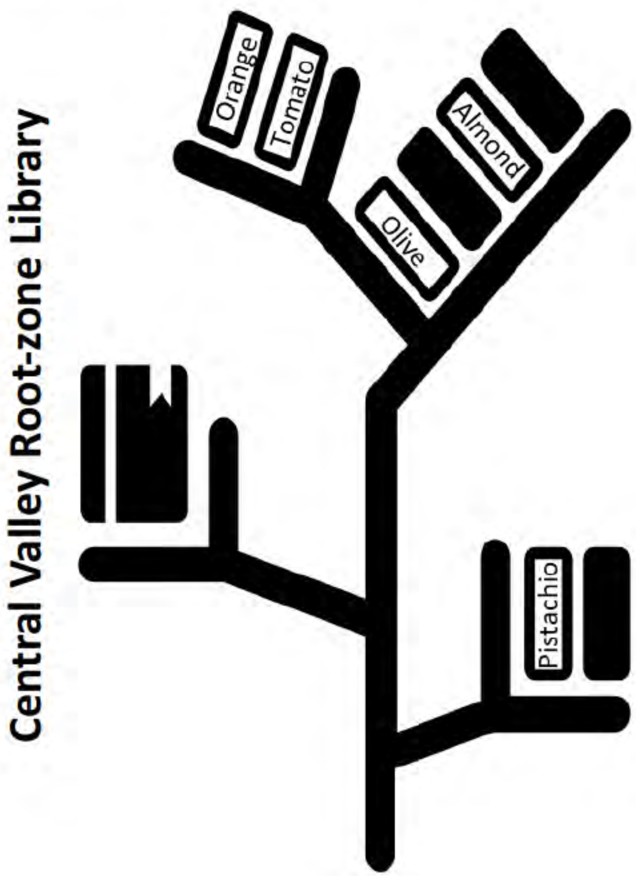


FIGURE ES-2. INFOGRAPHIC OF THE ROOT-ZONE LIBRARY DEVELOPMENT IN STEP 2

The Root-zone Library will be developed in Step 2 using the CV-SWAT model. It includes unique model runs for Central Valley crops, including model runs that account for soil and climate conditions, and management information from INMP Summary Reports. The Root-zone Library will include a unique estimate of percolation and nitrate leaching using CV-SWAT results based on crop, soil, climate, applied nitrogen, and yield, which can then be used to match INMP Summary Reports for each HVT.



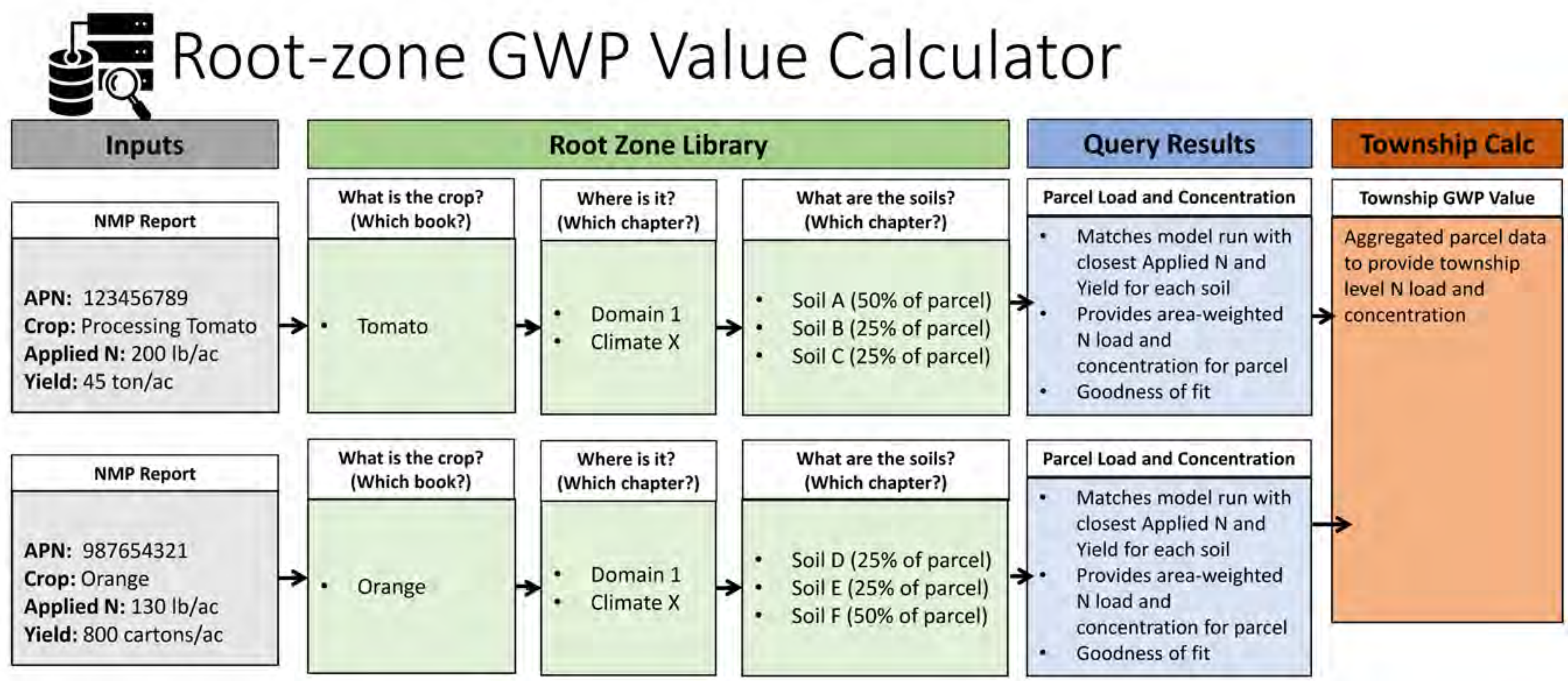
Books: Each crop is a book in the Root-zone Library. The Library will contain an anticipated 70-80 books.

Chapters: Each chapter within a book is a unique combination of soil and climate characteristics. Each book will have 6,000+ chapters.

Pages: Each page represents a unique management scenario using the final Crop Management Matrix. The Matrix will incorporate applied nitrogen and yield from INMP Summary Reports. Each chapter will have 400+ pages that estimate percolation and leaching based on unique crop, soil, climate, applied nitrogen, and yield, which in turn are then used to develop root-zone-based GWP Values for HVTs.

FIGURE ES-3. INFOGRAPHIC OF THE ROOT-ZONE GWP VALUE CALCULATOR AND QUERY WORKFLOW IN STEP 3

Percolation and nitrate leaching estimates from Step 2 will be aggregated to the township scale in Step 3. This will be done by 1) matching the appropriate Root-zone Library entry (from the CV-SWAT model) to each INMP Summary Report (based on yield, applied nitrogen, soil, and climate, parcel) and 2) developing a "calculator" to aggregate the resulting percolation and leaching estimates to the township scale to report root-zone-based GWP Values. With this approach, the resulting root-zone-based GWP Values include the site-specific root-zone processes influenced by climate, soil, crop, and management.



1 INTRODUCTION

This document describes the proposed GWP Formula for all third-party Coalitions[2] that are assisting in the implementation of the Central Valley LTILRP. As required by the CVRWQCB General Orders for the LTILRP, the Coalitions are required to propose a GWP Formula to the Executive Officer by July 1, 2020. This document includes the following sections:

- Section 1, Introduction, describes the General Order requirements for the GWP Formula, the third parties (i.e., water quality coalitions) participating in this approach, the Soil & Water Assessment Tool (SWAT), and how the SWAT model is being adapted for the GWP Formula.
- Section 2, Approach for Groundwater Protection Formula, describes the three steps of the GWP Formula approach, including 1) use of daily climatic, detailed soil, parcel, and INMP Summary Report data, 2) evaluation of those data using the robust, scientifically valid equations and methods encompassed in CV-SWAT to estimate percolation and nitrate leaching, and 3) aggregation of the results to the township scale to provide root-zone-based GWP Values for HVTs.
- Section 3, Schedule, describes the project schedule, including the main milestones for each step.
- Section 4, Team Qualifications, provides biographies for key team members in the following areas of expertise: soils and agronomy, SWAT modeling, and data management/automation.
- Section 5, References, includes the cited materials herein.

1.1 GENERAL ORDER REQUIREMENTS

The General Orders require the development of a GWP Formula, which is then to be used to calculate GWP Values (and subsequently GWP Targets) for HVTs. Specifically, the purpose of the GWP Formula is to generate GWP Values, expressed as either nitrate loading numbers or concentrations of nitrate in water (e.g., mg/L), reflecting the influence of total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. A proposed GWP Formula must be submitted to the CVRWQCB by July 1, 2020. The CVRWQCB's Executive Officer will approve the proposed GWP Formula with any revisions after opportunity for public review and comment.

After approval, the Central Valley Coalitions will use the GWP Formula described in this document to compute root-zone-based GWP Values for each HVT. Subsequent to calculation of root-zone-based GWP Values, the Coalitions may then further adjust the GWP Values to reflect other processes that are township-based (e.g., groundwater recharge, vadose zone attenuation). Any post-processing calculations to the root-zone-based GWP Values will be clearly documented, explained, and supported with

[2] Reference to all Coalitions for this submittal does not include the California Rice Commission on behalf of rice growers in the Sacramento Valley. The GWP provisions are not in the California Rice Commission's Third Party Order and thus are not applicable to rice growers in the Sacramento Valley.

appropriate reference materials at the time of GWP Value submission. We currently anticipate that each Coalition will submit its own GWP Values for its HVTs to properly incorporate such values into individual Coalition GQMPs. After developing the township GWP Values, Coalitions will then individually compute GWP Targets the following year, and such GWP Targets will be submitted to the Executive Officer of the CVRWQCB for review and approval, after an opportunity for public review and comment. The GWP Targets will apply on a township basis and are intended to achieve compliance with receiving water limits (i.e., water quality objectives). Approved GWP Targets will be implemented through the GQMPs, and may be phased in over time per each Coalition's GQMP.

As already noted above, the proposed GWP Formula approach in this Workplan accounts only for root-zone processes associated with irrigated agriculture in HVTs (Figure 1). Other scientifically supported processes (e.g., vadose zone attenuation and groundwater recharge) that impact the concentration of nitrate transported to groundwater may also be considered. The Coalitions will consider these other processes as they develop the final GWP Values and Targets.

1.2 COALITIONS

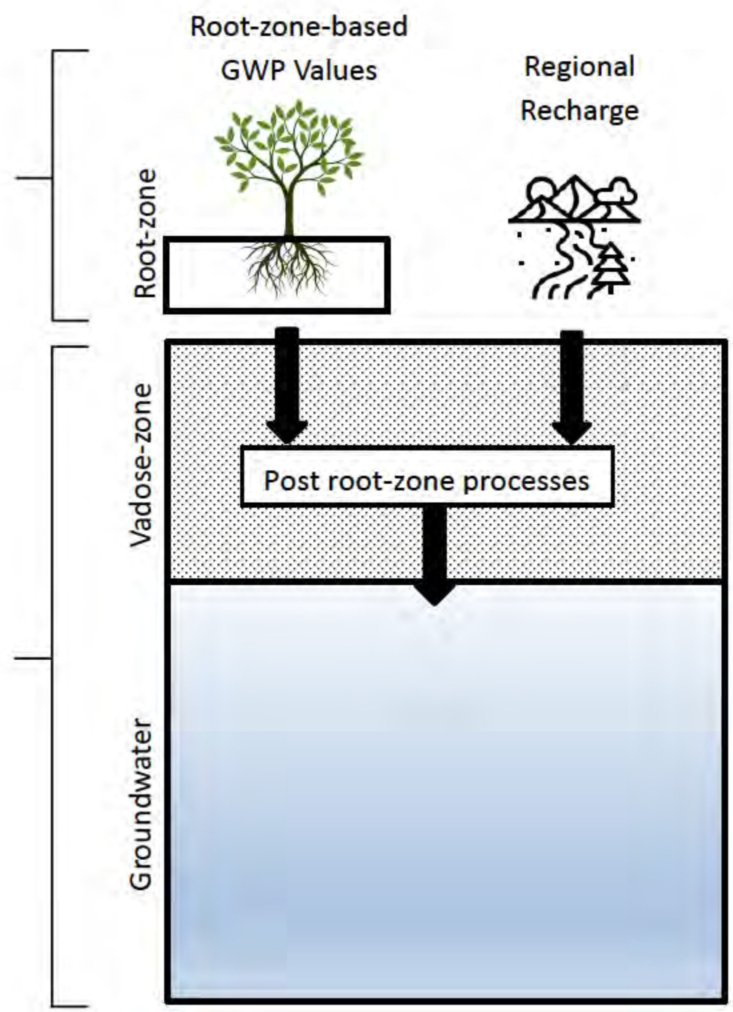
Thirteen water quality Coalitions are participating in this approach for development of the GWP Formula, which is all Coalitions but the California Rice Commission. As noted above, the California Rice Commission is not subject to this requirement. Figure 1 shows the participating Coalitions, which are also listed below. The study area for the GWP Formula is all HVTs within the boundaries of the Coalitions (Figure 2).

1. Buena Vista Coalition
2. Cawelo Water District Coalition
3. East San Joaquin Water Quality Coalition
4. Grassland Drainage Area Coalition
5. Kaweah Basin Water Quality Association
6. Kern River Watershed Coalition Authority
7. Kings River Watershed Coalition Authority
8. Sacramento Valley Water Quality Coalition
9. San Joaquin County and Delta Water Quality Coalition
10. Tule Basin Water Quality Coalition
11. Westlands Water Quality Coalition
12. Westside San Joaquin River Watershed Coalition
13. Westside Water Quality Coalition

FIGURE 1. SUMMARY OF GROUNDWATER PROTECTION FORMULA, VALUES, AND TARGET

Root-zone-based GWP Values: Calculated using the proposed Root-zone GWP Formula for irrigated agriculture in HVTs as described in this Workplan.

GWP Township Targets: Account for other scientifically supported variables (post root-zone processes) that influence the potential average concentration of nitrate in water expected to reach groundwater (e.g., vadose zone attenuation, regional recharge conditions).



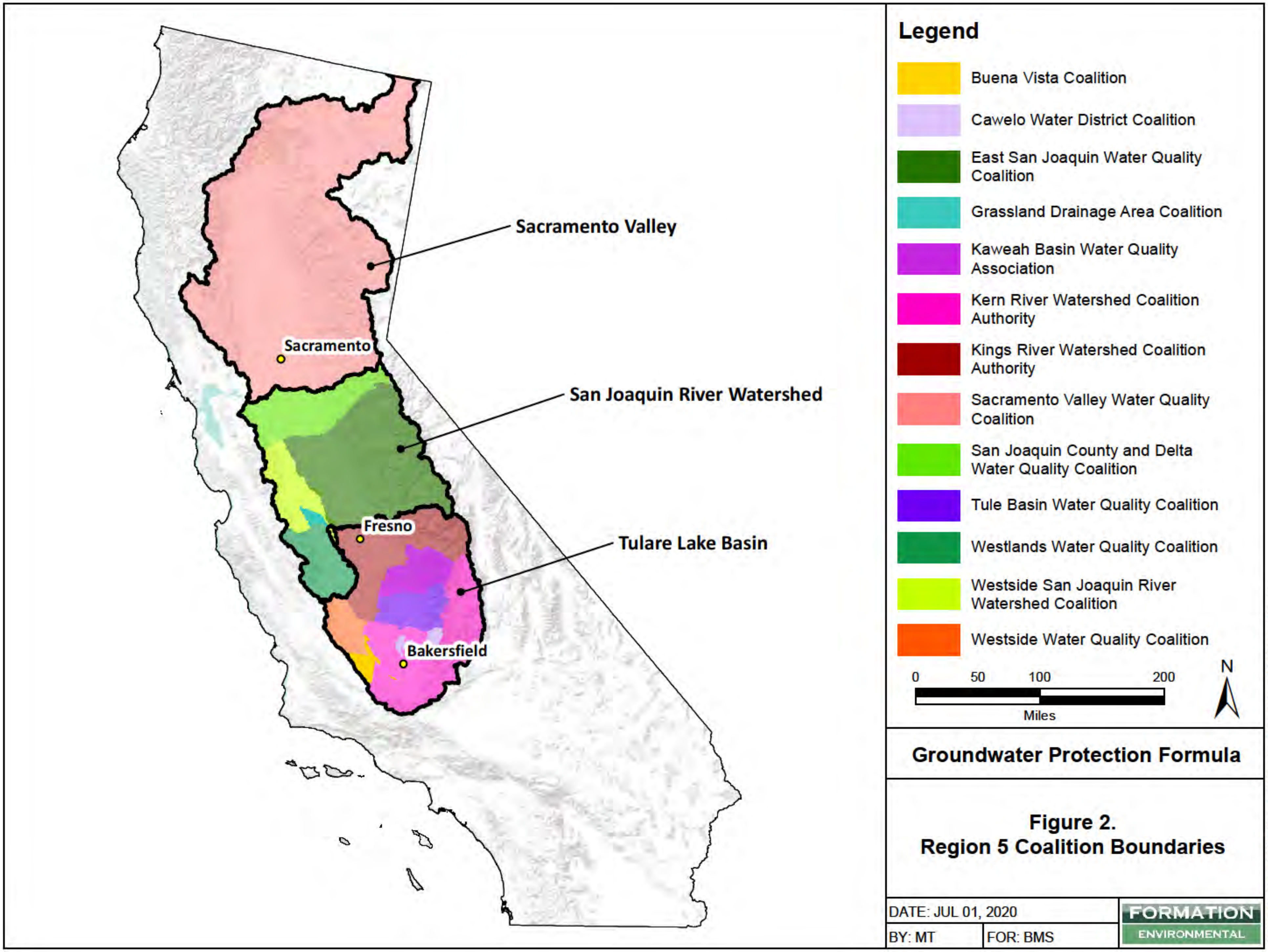


Figure 2.
Region 5 Coalition Boundaries

N:\GWP\GWPF_CV\MXD\Fig_1_Regional5_Participating_Coalitions_v5.mxd

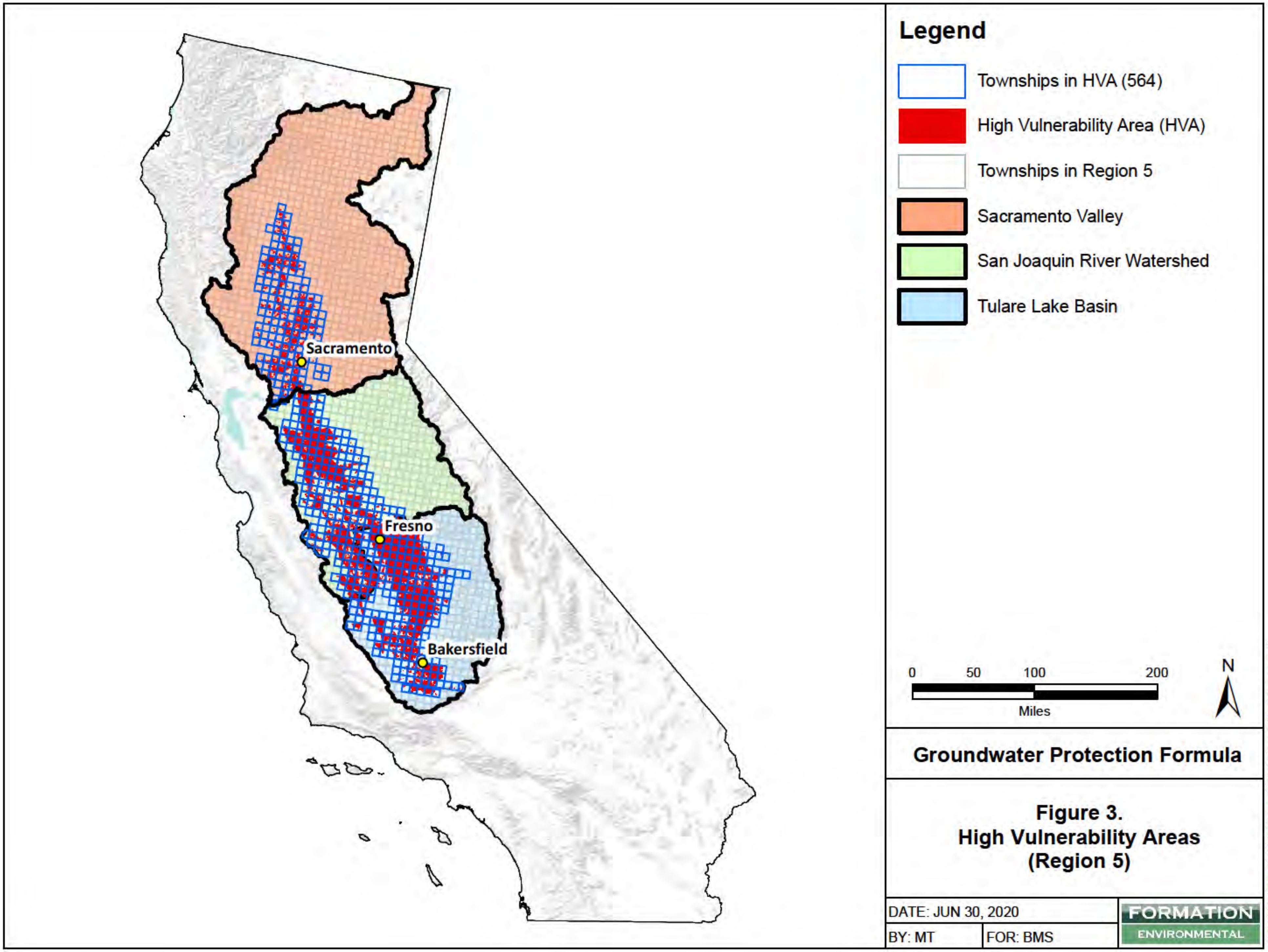


Figure 3.
High Vulnerability Areas (Region 5)

1.3 SOIL AND WATER ASSESSMENT TOOL

The SWAT model is a foundational component of the proposed approach to the GWP Formula. As such, the GWP Formula leverages a significant body of scientific work completed over a 40+ year period. To provide context on this scientific work, the following sections provide a brief overview of the SWAT model, including development of the Central Valley SWAT (CV-SWAT) model and adaptation of the CV-SWAT model (previously completed as part of the MPEP) for the GWP Formula.

1.3.1 OVERVIEW OF SWAT

The SWAT model is a product of over 40 years of continued model development conducted by the United States Department of Agriculture – Agricultural Research Service (USDA-ARS), Texas A&M AgriLife Research Agency, and numerous public and private collaborators. SWAT is internationally accepted, with nearly 4,000 related papers and peer-reviewed journal articles to-date.[3] Features of several previously developed models have been incorporated, including the Chemicals, Runoff, and Erosion from Agricultural Management Systems Model (CREAMS), which was developed by USDA-ARS in direct response to the Clean Water Act (Figure 4). Since its development, SWAT has been continually reviewed, validated, and expanded to reflect current scientific knowledge and to address a wide range of environmental concerns (Gassman et al. 2007; Neitsch et al. 2009). Part of this development included a Geographic Information System (GIS) component (Arc SWAT), which formed the basis for CV-SWAT and facilitates spatial assignment of data and results that are needed for the GWP Formula.

SWAT Use. Numerous federal, state, and local agencies routinely use SWAT to evaluate the environmental effects of land use, land management practices, cropping systems, and climate change on the quality and quantity of surface and groundwater. Specifically, it has been used to quantify nitrate loading to surface and groundwater from agricultural and adjacent natural systems. These studies range from small-scale assessments (0.6 square miles) (Bauwe et al. 2019) to large-scale evaluations of areas such as the entire Mississippi River Basin (1,240,000 square miles) (White et al. 2014). Beyond this, SWAT was also utilized in the HUMUS model (Hydrologic Unit Model of the United States) to simulate hydrologic and/or pollutant effects of agricultural and municipal water-use for the conterminous United States (Srinivasan et al. 1998). These studies often entail evaluation of multiple scenarios to understand how land use and/or management affect hydrology and water quality, and to identify management practices that minimize loss of pollutants to the greater environment.

SWAT Processes. SWAT is a process-based model that operates at the daily time-step and represents numerous physical, chemical, and biological processes. SWAT uses these underlying processes to simulate hydrology, water quality, and model the environmental effects of land use, land management practices, and climate change. SWAT incorporates climate (e.g., solar radiation and precipitation), soil/water (storage, flow), nutrient and pesticide dynamics (fate and transport), surface runoff (e.g., erosion), the nitrogen cycle (phases and transformations), plant growth (water and nutrient uptake, yield), and management (Figure 5). The spatial granularity at which SWAT operates is flexible and can be adapted for landscape-level processes, and also for more detailed analyses (e.g., modeling at the sub-field level). The

[3] https://www.card.iastate.edu/swat_articles/

integrative and comprehensive nature of SWAT allows for robust estimation of numerous environmental effects, including nitrate leaching below the root-zone.

While many processes affect the fate and transport of nitrate from agricultural systems, those related to the plant root-zone are significant (IPNI, n.d.). Transport through the root-zone is constrained by soil properties and the depth to which plant roots extend. Within it, layer-specific soil physical properties like water-holding capacity and hydraulic conductivity affect rates at which water and nutrients are stored and transported. This affects the “residence time” and likelihood of nutrients and water being taken up by the crop. SWAT also accounts for chemical and biological properties of soils and their constituents. For instance, soil nitrogen is modeled in three phases: mineral (e.g., nitrate), labile organic matter nitrogen (including crop residues), and nitrogen in stable organic matter, each of whose chemistry, mobility, and susceptibility to decomposition differ. Soil chemical properties and organic matter content affect nutrient cycling and N mineralization and immobilization processes, which in turn affect the amount of nitrate potentially available for leaching. Other nitrogen cycle components, such as nitrification, denitrification, and ammonia volatilization, are simulated in the SWAT’s root-zone processes and are affected by soil conditions. For example, the degree of moisture saturation is a major determinant of oxygen availability and strongly affects denitrification rates (Figure 5). Post-processes below the root-zone are not accounted for in SWAT. However, numerous applications have coupled SWAT with groundwater models to account for processes that occur below the root-zone.

Beyond considering soil information, SWAT has plant-specific (customizable) crop-growth models that influence root-zone processes. Crop growth is a function of solar radiation. As crops grow, their root systems develop and take up water and nutrients, removing them from the soil. The capacity of these crops to take up these constituents is proportional to crop needs, which depend on crop type and growth stage. Crop root distribution and depth and water (i.e., transpiration) and nutrient demands reflect each crop’s biology and physiology. Mature crops are harvested, resulting in removal of nitrogen from the system. Remaining residues are returned to the soil as organic matter and are recycled through decomposition. Crops can be stressed by unfavorable levels of temperature, water, and/or nutrients, reducing their productivity and uptake of water and nutrients. In all, there are over 40 parameters that are specified to define crop characteristics. SWAT’s crop models integrate with other root-zone processes for a detailed representation and analysis of agricultural systems.

Management. SWAT allows for detailed specification of a wide variety of management practices, which is then used to evaluate their effects on water quality. In terms of land preparation, a range of tillage practices and crop planting dates are specified. These operations also affect organic nutrient cycling and crop-growth dynamics. Nutrient and irrigation practices are also defined. In addition to fertilizer type (e.g., urea, ammonium nitrate, anhydrous ammonia), both fertilizer and irrigation rate, timing, and mode of application are also specified. Nitrogen inputs including chemical fertilizer, manures and composts, biological nitrogen fixation by legume crops (e.g., beans, alfalfa, clovers, and other leguminous crops), and nitrate in applied irrigation water, are all incorporated into SWAT processes. This means that explicit management information can be integrated into SWAT to evaluate and quantify the effect of management on percolation and nitrate leaching.

FIGURE 4. TIMELINE OF SWAT DEVELOPMENT (BLUE, BELOW) AND DEVELOPMENT OF CV-SWAT FOR USE IN THE IRRIGATED LANDS REGULATORY PROGRAM (YELLOW AND GREY, BELOW)

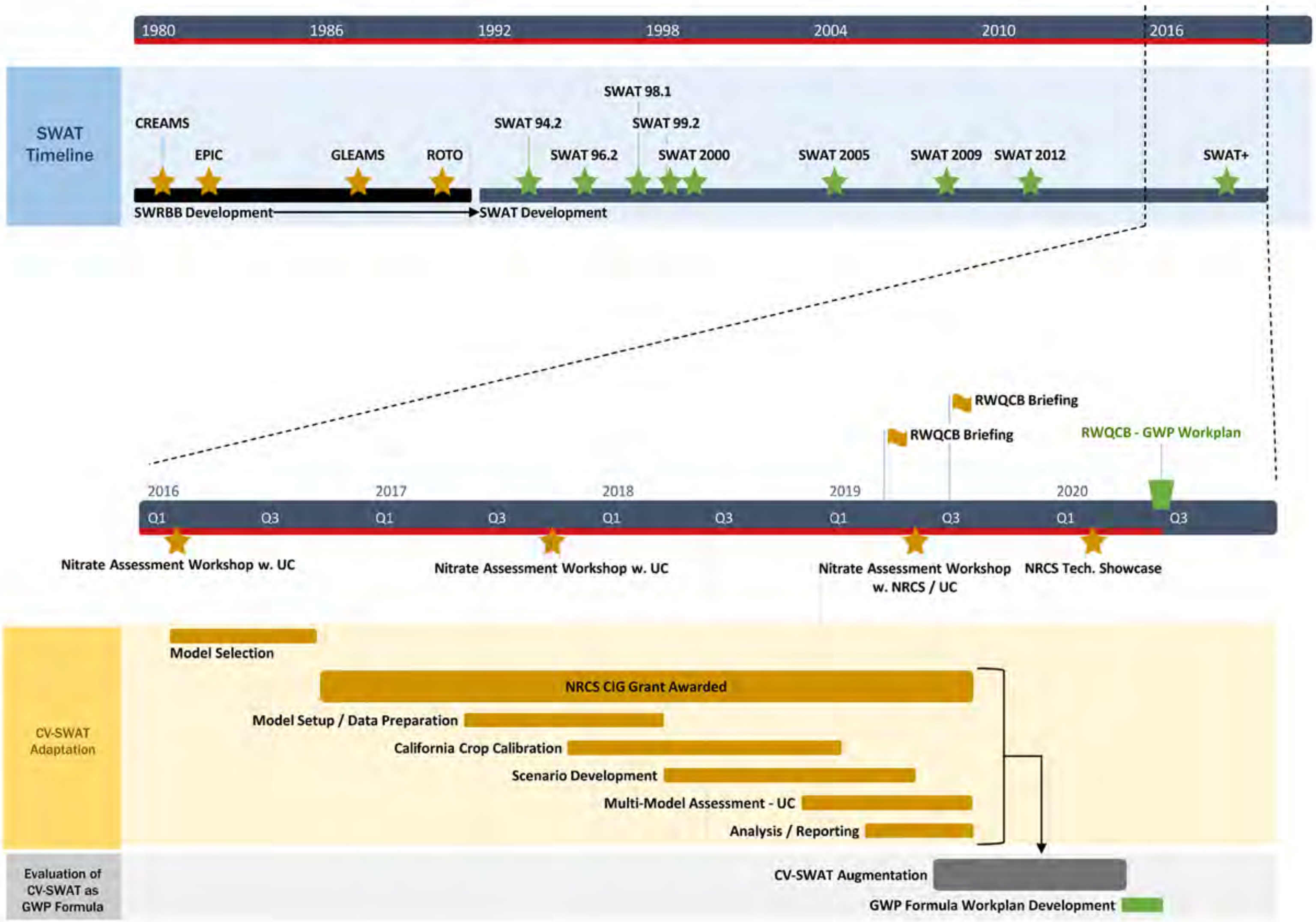
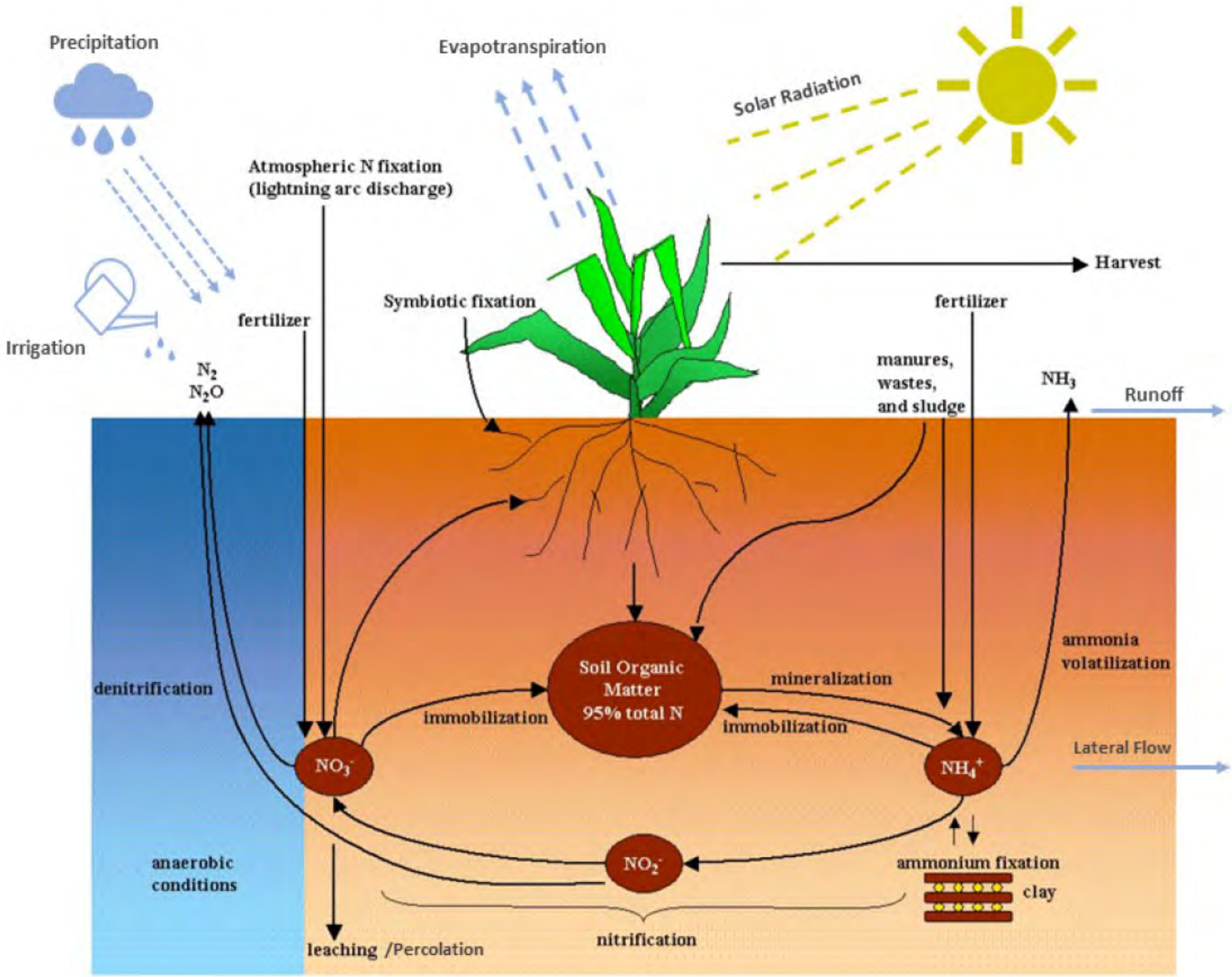


FIGURE 5. SCHEMATIC OF PROCESSES SIMULATED IN SWAT (ADAPTED FROM NEITSCH ET AL. 2009)



1.3.2 CENTRAL VALLEY SWAT MODEL FOR MANAGEMENT PRACTICE EVALUATION PROGRAM

When the LTILRP was adopted for the various third-party areas, it included a requirement for an MPEP. The GWP Formula, Values, and Targets provisions were not yet part of the General Orders at that time. To meet the MPEP provisions as first adopted, numerous options were considered to assess the effectiveness of agricultural management practices and their potential influence on groundwater quality. The General Orders allow the MPEP to be implemented on a coalition-by-coalition basis, or by combining efforts among coalitions. Based primarily on geography, MPEP requirements are currently being implemented through two MPEP committees: the Northern MPEP Group Coordinating Committee (Northern MPEP) and the Southern San Joaquin Valley (SSJV) MPEP Committee. The two committees communicate and coordinate activities on a regular basis.

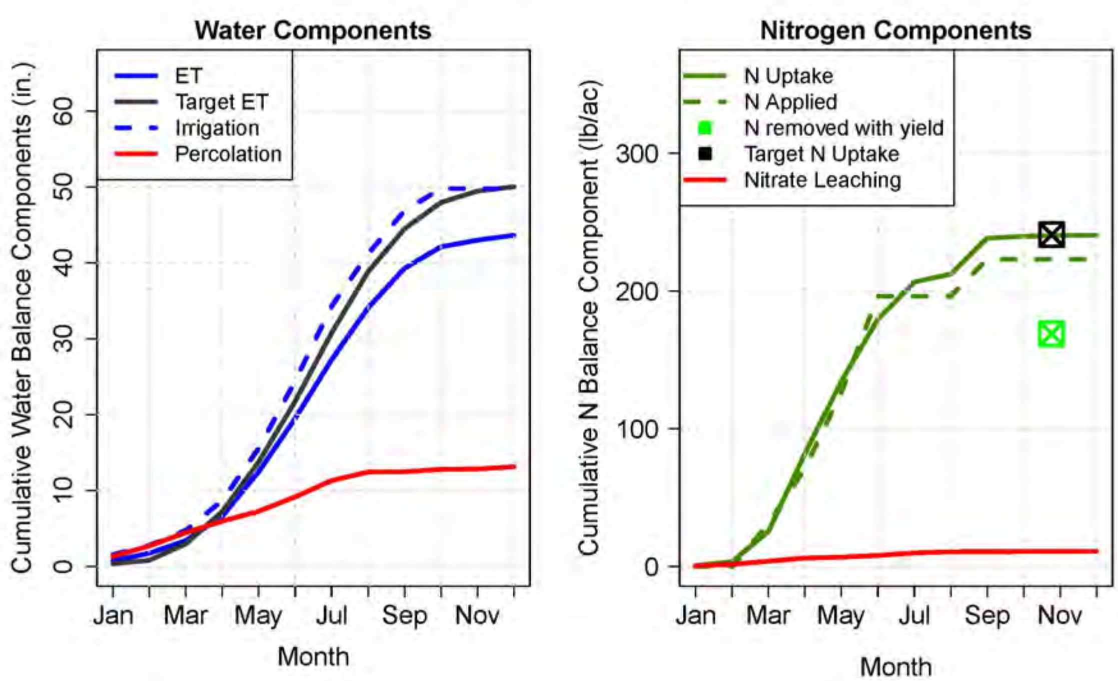
At the onset of the MPEP, the SSJV MPEP Committee opted to use a modeling approach for meeting the MPEP requirements (MPEP Team 2019). After evaluating a variety of models, the SSJV MPEP selected SWAT as the preferred model due to its ability to model large landscapes over long periods of time in a granular fashion. In addition, SWAT's root-zone processes were known to be comprehensive, process-based (Section 1.3.1), and include the ability to specify detailed management scenarios in order to evaluate their effects on percolation and nitrate leaching just below the root-zone.

Unique, intensive cropping systems are common in California's Central Valley. In these cropping systems, water and nutrient demands and resulting yields are often greater than in other parts of the world. It is necessary to calibrate SWAT components to local conditions to increase accuracy in modeling results. Accordingly, the SSJV MPEP Committee took the lead in adapting SWAT for the Central Valley to evaluate the performance of management practices at the landscape-level (MPEP Team 2019). SWAT adaptations for the Central Valley included augmenting the model to represent the diverse cropping systems, soils, management practices, yields, and climates unique to the region. This effort was supported in part by a $2 million Conservation Innovation Grant (CIG) from the Natural Resources Conservation Service (NRCS). Significant time and resources were invested including collaborative input from NRCS staff, University of California (UC) research and extension staff, CVRWQCB staff, as well as private crop consultants to develop, calibrate, execute, and evaluate what is now referred to as the Central Valley SWAT Model (CV-SWAT).

CV-SWAT Model Development. The Central Valley's irrigated lands were segmented into three domains: the Sacramento River Valley, San Joaquin River Basin, and Tulare Lake Basin watersheds. Available CIMIS) climate data dating back to 1985 and the NRCS PEDON database for soil were used. A refined crop map based on the 2014 California Department of Water Resources (DWR) crop map was incorporated, along with National Land Cover Database and Dairy Program data for other lands, to specify land cover. In all, over 67,000 unique modeling units (called "Hydrologic Response Units" in SWAT, or HRUs) resulted from the combination of these databases, representing roughly 205,000 fields, meaning that about one modeling unit exists for every three fields within the Central Valley. However, a given HRU may exist in more than one location, and a given field may contain multiple HRUs depending on soil and topographic information. Therefore, HRUs can be considered *sub-field* modeling units.

CV-SWAT Model Calibration. Over 40 crop models were calibrated to region-specific conditions, representing roughly 200 crops grown. These crops comprise the vast majority (~95%) of Central Valley irrigated lands. This effort is critical in that California agriculture is unique due to intensive management and high yields. Furthermore, having well-calibrated crop models is essential to accurately depicting water and nutrient dynamics in these systems and thus creating better estimates of percolation and nitrate leaching (Nair et al. 2011). Calibration was performed by evaluating the most relevant crop-specific datasets and obtaining expert opinions (from UC researchers, farm advisors, and Extension Specialists, consultants, and other industry experts) to develop expected in-season water and nutrient budgets as well as biomass accumulation and yield targets (Figure 6). This was an iterative process in which over 1,000 models were run, analyzed, and refined to best reflect current knowledge and available, crop-specific information. In addition, independent of crop model calibration, crop-specific management suites including tillage, planting, harvesting, and irrigation and fertilization mode, rate, and timing, were selected based on industry standards and current best management practices for each crop. These management scenarios constitute the model "baselines" and serve as the benchmark to which alternative management scenarios are compared.

FIGURE 6. EXAMPLE OF CROP MODEL CALIBRATION TO TARGET IN-SEASON WATER AND NUTRIENT DYNAMICS



Management Scenario Evaluation. SWAT can consider any number of management scenarios. Additional management scenarios were evaluated in CV-SWAT to understand the relative effects of management on percolation and nitrate leaching across the landscape. These results are informative to growers and advisors regarding the effects of climate, soil, and management at specific field locations, and can be used to understand the potential sensitivities of each field to management. However, the scenarios in the CV-SWAT model are generic with respect to management and do not reflect individual fields' specific suites of practices. Nevertheless, the CV-SWAT model provides the framework in which more site-specific scenarios can be evaluated to serve as a robust estimate of percolation and nitrate leaching for discrete management units. Accordingly, CV-SWAT is suitable for providing estimates of percolation and nitrate leaching at the township-level based on INMP Summary Reports as a part of this GWP Formula.

1.3.3 EVALUATION AND TESTING OF CV-SWAT FOR GROUNDWATER PROTECTION FORMULA

The GWP Formula requires the use of data and methods to estimate GWP Values resulting in township-scale leaching estimates for irrigated agriculture in HVTs (Section 1.1). Accordingly, this meant that the CV-SWAT model needed to be evaluated and tested to determine if it could be adapted for use as the GWP Formula. This evaluation needed to include consideration of how to incorporate INMP Summary Report data in the CV-SWAT model to estimate percolation and nitrate leaching at an aggregated township level. The evaluation of CV-SWAT for use as the GWP Formula provides the basis for the approach to the GWP Formula in this Workplan, and included the following steps:

Step 1 – Aggregate Data. Integration of INMP Summary Report data is critical to the development of GWP Values. Therefore, the use of INMP Summary Reports in combination with the best available soil and climate data was first evaluated.

To determine the number of CV-SWAT modeling scenarios needed, township-based INMP Summary Report data were analyzed to quantify the range of nitrogen application rates and yields that may exist across the Central Valley landscape. With this, the number of CV-SWAT model runs required was quantified in a Matrix by adjusting both management (nitrogen application and irrigation rates) and outcome (yield) in a stepwise fashion to obtain a range of nitrogen application rates, yields, etc. The combination of these datasets and analysis provided management information (i.e., “data”) in the form of a Matrix for the “methods” component of the formula.

Step 2 – Develop Root-zone Library. Next, methods were defined as the equations and workflow that use the data from Step 1 to produce a hypothetical township-based estimate of percolation and nitrate leaching from INMP Summary Report information. Comprehensive root-zone physical processes in SWAT (and further calibrated in the CV-SWAT model) provide the robust, scientifically valid equations for the GWP Formula. In addition, SWAT is designed to incorporate actual management information. However, it is necessary to transition CV-SWAT from the generic modeling completed previously to more site-specific simulations informed by INMP Summary Reports (Step 1). This includes specifying rates and timing of nitrogen application to reflect INMP Summary Report data. For information not included in INMP Summary Reports (e.g., how and when fertilizer and irrigation is applied), region-specific common practices from growers (e.g., split fertilizer applications and high-frequency/low-volume irrigation events for nut trees) were used.

To account for the numerous scenarios in the Matrix (Step 1), an automation procedure was developed to create a SWAT output library (i.e., Root-zone Library). The Root-zone Library is comprised of numerous simulations that estimate percolation and nitrate leaching estimates based on the INMP Summary Reports. This was tested by iterating off of the California-specific baseline model parameters of the CV-SWAT model (Section 1.3.2). The workflow included adjusting the crop model parameters in the CV-SWAT model in a stepwise fashion. Test model runs were carried out at the daily timestep for 30-year periods, and results were summarized, evaluated, and QA/QC’d. It was determined that 426 scenarios were sufficient for simulating the range of management and outcomes for a generic township. The tested workflow described above resulted in agronomically defensible scenarios from which township-based estimates of percolation and nitrate leaching could be produced to calculate root-zone-based GWP Values (Step 3).

Step 3 – Calculate Root-Zone GWP Values. Calculation of root-zone-based GWP Values on a township basis was then tested by taking the percolation and nitrogen leaching estimates from Step 2 above and aggregating them to a township scale. This was done by 1) matching the appropriate Root-zone Library entry (from the CV-SWAT model) to INMP Summary Reports (based on yield, applied nitrogen, soil, and climate, parcel) and 2) developing a “calculator” to aggregate the resulting percolation and leaching estimates to a township scale to calculate root-zone-based GWP Values. The resulting root-zone-based GWP Values include the site-specific root-zone processes influenced by climate, soil, crop, management, and data from INMP Summary Reports.

Summary. The CV-SWAT model was successfully tested and augmented to develop a comprehensive Root-zone Library from which root-zone-based GWP values were calculated. This included integration of INMP Summary Report data and all possible combinations of climate, soil, crop, and management. The root-zone-based GWP Values generated from this approach reflect robust estimates of what is occurring on the landscape. This also created a framework from which the Coalitions can assess the relative impact of management changes on root-zone results by viewing alternatives from the Root-zone Library that match different management scenarios.

2 APPROACH FOR GROUNDWATER PROTECTION FORMULA

Based on the evaluation and testing described in Section 1.3.3, Coalitions put forward the proposed approach described in this Workplan as the GWP Formula that would then be used to generate root-zone-based GWP Values for irrigated agriculture in HVAs (on a township basis). The proposed GWP Formula consists of three overarching steps: Aggregate Data, Develop Root-zone Library, and Calculate Root-zone-based GWP Values. This formula will result in an extensive Root-zone Library, which will contain modeling results from every plausible combination of climate, soil, crop, and management based on INMP Summary Report data. Entries in the Root-zone Library (and their associated leaching and percolation values) will be matched to INMP Summary Reports to provide leaching estimates to generate aggregated root-zone-based GWP Values for HVTs. As noted above, the Coalitions may also consider further adjusting the GWP Values to reflect other processes (e.g., groundwater recharge, vadose zone attenuation). Calculations will be clearly documented, explained, and supported with appropriate reference. We currently anticipate that each Coalition will submit their own GWP Values for their HVTs so that such values can be properly incorporated into individual Coalition GQMPs.

The three primary steps for the GWP Formula are further described in the following sections and illustrated in Figure ES-1.

STEP 1. AGGREGATE DATA

Integration of actual INMP data is critical to the development of accurate root-zone-based GWP Values. Step 1 includes aggregating INMP reports and parcel data from the Coalitions and considering the best available soil and climate data.

In Step 1, the following data will be aggregated and analyzed:

- **Climate and Soil Data.** Daily climatic data from 156 CIMIS stations from 1985-2014 (where available) were compiled and QA/QC'd for use in the CV-SWAT model. This long-term record captures both the spatial and temporal variability present across the Central Valley, including regional and inter-annual differences in precipitation that affect leaching and recharge. These data will be expanded to include CIMIS data up through 2019.

  Detailed soil data are essential for generating spatially accurate estimates of percolation and leaching in the CV-SWAT model. The NRCS PEDON dataset will be used for the GWP Formula. In general, these data are detailed and representative of site-specific Central Valley soil conditions. However, a subset of soil mapping units was identified as uncharacteristically shallow relative to other NRCS soil datasets. Shallow soils inhibit the plant's ability to develop deeper roots and reduce the vertical distance through which water and nitrate need to travel to be leached. If soil depths are specified shallower than they really are, this artificially inflates leaching estimates. To remedy this, soil data will be evaluated relative to alternative published soil information (e.g., NRCS gSSURGO) to provide the most accurate soil depths possible.

- **Parcel Data.** Aggregation of parcel data is required to spatially link INMP reports to discrete areas on the land surface and then associate the appropriate soil and climate data. This effort will involve working with the Coalitions to compile the parcel datasets they use for INMP data management. Where gaps exist, parcel data will be downloaded from County Assessors Offices. QA/QC will ensure that Assessor Parcel Numbers (APNs) listed in INMP reports have an associated spatial delineation so they can be properly linked to the correct climate and soil type(s). Inconsistencies and unmatched INMP reports will be investigated and resolved to the extent feasible. Once compiled, parcel data will be spatially related to both climate and soil information. A GIS intersection of parcels with soil mapping unit polygons will indicate soils present in each parcel along with the relative extents of each unit. This will provide the criterion to match each report to an entry in the Root-zone Library (Step 2) (Figure ES-3).

- **INMP Data.** Aggregation and analysis of grower-reported INMP and Assessor's Parcel data are integral components of the GWP Formula. They will define which crops were farmed where, how they were managed, and how they yielded. The INMP data will inform development of a comprehensive Matrix.

  INMP data for 2016, 2017, and 2018 will be compiled from the Coalitions. Analysis of three years' worth of data will provide a broader picture of the range of crops, management, and yield levels reported across the landscape. However, 2018 data alone will be used for calculating Root-zone

GWP Values. Modeling of the potentially broader range of crops, management, and yields may provide efficiencies in future years when GWP Values are updated, as well as provide the Coalitions with a more developed Root-zone Library for understanding the effects of management on environmental outcomes.

INMP data will be QC'd with a series of algorithms that identify and flag records containing questionable values for applied nitrogen and/or yield. These algorithms will be based on agronomic expertise and crop biological potential and will include crop-specific upper limits informed by analysis of the three years of INMP data. For INMP records that are flagged for review, questionable data will be clarified, validated, or corrected with the Coalitions where feasible. With respect to yield, if clarifications are not available, area-weighted values for that Coalition will provide a best estimate of actual yield. In addition, some INMP records may have low reported applied nitrogen relative to the reported yield. In these situations, efforts will be made to clarify the record.

- **Develop Crop Management and Yield Matrix.** The Matrix will be developed based on the QA/QC'd INMP data (nitrogen application rates and yields). The Matrix will identify the appropriate management scenarios to be simulated in the CV-SWAT model. It is anticipated that all crops will be simulated 400+ times to generate a sufficient range of management scenarios to reflect reported management/yield outcomes.
- **Nitrogen Application Rates.** The QA/QC'd INMP dataset will be used to determine the range of nitrogen applications to be modeled in CV-SWAT. Assuming a normal distribution of the data, the nitrogen application range will be ±2 standard deviations from the area-weighted mean 2016-2018 nitrogen application rate. This is expected to cover approximately 95% of future INMP records. For perennials, a conservative lower limit will be used to reflect management of young plantings. Based on preliminary analysis of major crops (Table 1), a broad range of nitrogen application rates will be modeled.
- **Yields.** A similar approach will be used to determine the desired range of modeled crop yields. For annual crops, the targeted yield range will be based off ±2 standard deviations from the area-weighted mean. The same is true for the upper limit target for perennials. However, the lower yield limit will be set to zero to account for non-bearing perennials. For all crops, yield x nitrogen rate histograms will be developed to determine the number of model runs required per nitrogen rate to accommodate the range of reported yields.

TABLE 1. POTENTIAL MODELING RANGES FOR NITROGEN APPLICATION RATES AND TARGETED YIELDS FOR 10 MAJOR CROPS BASED ON 2016 AND 2017 INMP REPORTS [a]

Crop	Reported Acres	INMP Records	Area-Weighted Nitrogen Applied (lb/ac)	Area-Weighted Yield (lb/ac)	Modeled Nitrogen Application Range (lb/ac)	Targeted Yield Range (lb/ac) [b]
Almonds	1,257,774	16,743	201	2,017	54 – 345	0 – 4,142
Pistachios	353,363	3,483	158	2,776	42 – 275	0 – 5,959
Wine Grapes	256,010	3,058	60	18,192	0 – 135	0 – 36,544
Walnuts	243,238	5,430	72	20,760	19 – 265	0 – 7,228
Table Grapes	199,472	3,833	130	29,198	3 – 141	0 – 39,504
Oranges	197,312	6,839	130	29,198	40 – 237	0 – 53,728
Processing Tomatoes	179,101	1,827	150	3,496	109 – 305	28,432 – 158,452
Cotton	168,930	2,016	209	95,486	72 – 280	640 – 2,366
Corn Silage	100,850	1,542	203	44,545	75 – 330	15,867 – 72,367
Wheat Grain	41,240	575	189	5,281	18 – 284	2,294 – 8,465

a. These data will be re-evaluated and refined as needed based on the integration of QA/QC'd 2018 INMP data.

b. Perennial crops will be modeled to reflect all growth stages, including juvenile plantings exhibiting low to no yield.

STEP 2. DEVELOP ROOT-ZONE LIBRARY

The methods for developing the Root-zone Library are defined as the equations and workflow that use the data from Step 1 to produce a robust estimate of percolation and nitrate leaching for each INMP report. Comprehensive root-zone physical processes in SWAT (and further calibrated in the CV-SWAT model) provide the scientifically valid equations for the GWP Formula. Step 2 incorporates the Matrix into the CV-SWAT model and develops the Root-zone Library by running the CV-SWAT model for each scenario in each crop's Matrix. Accordingly, it is anticipated that the Root-zone Library will be comprised of over 40,000 unique CV-SWAT model runs. An automation procedure will be used to create the Root-zone Library. This workflow will result in agronomically defensible scenarios from which site-specific estimates of percolation and nitrate leaching can be drawn. Township-level summaries will represent these root-zone-based GWP Values (see Step 3).

Step 2 includes the following activities:

- **Define CV-SWAT Model Domains.** Given the magnitude of the modeling effort (i.e., 40,000+ simulations), it is important to facilitate efficient generation of the Root-zone Library without sacrificing spatial resolution. To achieve this, careful consideration of the domain boundaries is needed to ensure that all HVTs are included and to avoid misappropriating computation and storage resources by modeling areas outside the scope of the GWP process. The spatial domains will be the Sacramento Valley, San Joaquin River Watershed, and the Tulare Lake Basin. These domains represent the diverse crops, management practices, climate, and soils of the Central Valley, as well as the hydrological divisions. In addition, these domains are reasonable spatial extents for SWAT modeling purposes.

- **Integrate Land Use.** Land use changes over time, so a wide range of climate, soil, crop, and management combinations will be modeled to generate a broad range of entries to the Root-zone Library, accommodating as many future INMP combinations as practicable. This will be achieved by analyzing a single crop planted across the whole model domain in each model run, producing results for each crop on every soil and climate. An added benefit of this approach is modeling efficiency because the number of HRUs in each run is reduced substantially to include only unique combinations of climate and soil.

- **Calibrate Crop Models.** Crop models are calibrated to parameterize the SWAT model for a given set of local conditions to reduce output uncertainty. Existing crop models developed for CV-SWAT will be incorporated for use in the GWP Formula and serve as an advanced starting point for crop model calibration. This is a critical step. Considerable effort has already been invested to improve and adapt crop models to diverse California cropping systems (see 1.3.2 and MPEP Team 2019). Most of the major crops planted on most of the Central Valley acreage are well calibrated. However, a subset of the crop models that comprise a small percentage of the Central Valley irrigated acreage still needs to be refined. More specifically, "Phase 1" crops are those with models that are already well calibrated for Central Valley conditions, covering roughly 89% of the irrigated acreage for HVAs (based on the 2016 DWR Land Use Map[4]) (Table 2). These calibrations will be QA/QC'd before finalization. "Phase 2" crops need additional calibration and represent the remaining 11% of the Central Valley irrigated acreage (Table 2). Calibration of these crop models is needed to accurately produce root-zone GWP Values in townships where these more minor crops are locally important.

[4] Since the trend for most of these crops is toward expanded acreage, an even larger proportion of the total acreage will be represented in Phase 1.

TABLE 2. CROP MODEL STATUS AND CROP ACREAGE FOR HVA[5] CENTRAL VALLEY LANDS[6]

Crop Model Status	Crop (DWR 2016)	Acres	Acreage (%)	Cumulative Acreage (%)
Phase 1 (89%)	Almonds	687,366	23.0	23.0
	Grapes	368,592	12.3	35.3
	Walnuts	230,018	7.7	42.9
	Corn, Sorghum, and Sudan	178,221	6.0	48.9
	Citrus	172,078	5.7	54.6
	Pistachios	169,087	5.6	60.3
	Alfalfa and Alfalfa Mixtures	149,555	5.0	65.3
	Wheat	144,412	4.8	70.1
	Tomatoes	130,362	4.4	74.5
	Cotton	69,976	2.3	76.8
	Peaches/Nectarines	64,320	2.1	78.9
	Plums, Prunes, and Apricots	53,584	1.8	80.7
	Melons, Squash, and Cucumbers	35,797	1.2	81.9
	Onions and Garlic	34,925	1.2	83.1
	Beans (Dry)	33,129	1.1	84.2
	Cherries	25,714	0.9	85.1
	Sunflowers	23,465	0.8	85.8
	Carrots	21,516	0.7	86.6
	Olives	18,285	0.6	87.2
	Pomegranates	13,376	0.4	87.6
	Safflower	11,994	0.4	88.0
	Miscellaneous Deciduous	10,155	0.3	88.4
	Lettuce/Leafy Greens	10,047	0.3	88.7
	Cole Crops	5,801	0.2	88.9
	Peppers	4,271	0.1	89.0
Phase 2 (11 %)	Young Perennials	120,486	4.0	93.1
	Miscellaneous Grain and Hay	69,654	2.3	95.4
	Potatoes and Sweet Potatoes	25,017	0.8	96.2
	Miscellaneous Truck Crops	15,766	0.5	96.7
	Flowers, Nursery and Christmas Tree Farms	7,492	0.3	97.0
	Pears	4,684	0.2	97.2
	Bush Berries	4,177	0.1	97.3
	Kiwis	3,375	0.1	97.4
	Apples	2,339	0.1	97.5
	Mixed Pasture	66,505	2.2	99.7
	Miscellaneous Grasses	7,873	0.3	100.0

[5] https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/water_quality/coalitions_submittals/
[6] https://data.cnra.ca.gov/dataset/statewide-crop-mapping

Crop Model Status	Crop (DWR 2016)	Acres	Acreage (%)	Cumulative Acreage (%)
	Strawberries	655	0.0	100.0
	Miscellaneous Subtropical Fruits	158	0.0	100.0
	Greenhouse	153	0.0	100.0
	Avocados	58	0.0	100.0
	Dates	26	0.0	100.0
	Miscellaneous Field Crops	13	0.0	100.0

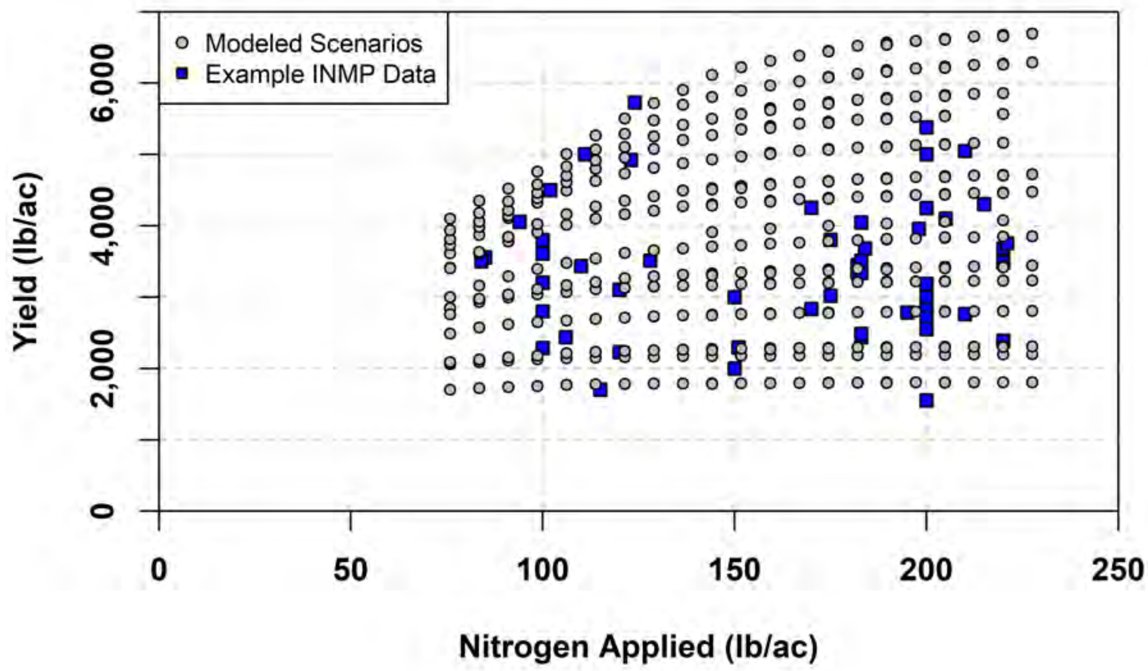
The Root-zone Library will contain the results of the GWP Formula for all combinations of climate, soil, crop, and management that will be used to match with INMP data to generate root-zone-based GWP Values. It will be created from the *data* (from Step 1. Aggregate Data) and the *methods* (from Step 2. Develop Root-zone Library) to produce estimates of percolation and nitrate leaching by capturing the root-zone processes in each unique scenario. The number of Root-zone Library entries is anticipated to exceed 40,000 records to reflect the wide range in variability of management and outcomes observed across the Central Valley. The steps to develop the Root-zone Library are outlined below:

- **Execute Automated SWAT Model Runs.** The crop models will be simulated for all combinations of climate, soil, crop, and management in each of the domains based on the Matrix. Accordingly, total model runs will exceed 40,000. To complete a set of computations of this magnitude, the model runs will be automated on a high-performance Linux computing cluster and Windows servers. Runs for the Matrices for the Phase 1 and Phase 2 crops will be automated after crop model calibration is complete.

- **QA/QC Automated Results.** CV-SWAT model output will be reviewed to ensure the following: 1) the automation procedure was successfully executed and created usable outputs for each model run, and 2) the range of inputs captured the variability reported in the INMPs, specifically with respect to yield and applied nitrogen x yield relationships (Figure 7).

- **Finalize Root-zone Library.** Model outputs will be stored in a SQL database. The database will contain model results (including leaching and percolation) for each climate, soil, crop, management, and yield combination from the Matrices. Once generated, the library will only need to be updated when new crops or management by yield combinations arise in future years.

FIGURE 7. EXAMPLE OF SWAT MODEL MANAGEMENT (NITROGEN APPLIED) AND OUTCOMES (YIELD) TO CAPTURE GROWER-REPORTED VALUES



STEP 3. CALCULATE ROOT-ZONE GWP VALUES

Percolation and nitrate leaching estimates from Step 2 above will be matched to INMP records and aggregated to the township scale. The resulting root-zone GWP Values will be based on grower-reported management data and the site-specific root-zone processes influenced by climate, soil, crop, management, and crop model inputs. Other factors that influence GWP Values such as sub-root-zone nitrate attenuation and recharge from other land areas and water bodies will be documented and incorporated into the calculation post-calculation of Root-zone GWP Values. Calculation of Root-zone GWP Values includes the following tasks:

DEVELOP QUERY TOOL AND ROOT-ZONE GWP VALUE CALCULATOR

This step includes integration of the Root-zone Library with INMP data to calculate root-zone-based GWP Values at the township level. This will be done with a database query tool and Root-zone GWP Value Calculator. Query tool inputs include APN, crop type, applied nitrogen, and yield. These data will be linked (via the APN) to the relevant domain, climate, crop, and soil in the Root-zone Library (Figure ES-3). The general workflow for the query process is outlined in Figure ES-3. The query results will provide parcel nitrate loads and concentrations from model runs in the Root-zone Library associated with the closest record of applied nitrogen and yield. The Root-zone GWP Value Calculator will aggregate the parcel data to calculate nitrate load and concentration values from irrigated agriculture for each HVT.

To set up the query tool, parcel data from Step 1 will be used. A GIS intersection between parcel and soil datasets will be used to relate soils to APNs, and to determine their relative extents (% of acreage within each parcel). Parcels will also be spatially related to CIMIS stations for climatic information used in model runs.

OTHER GWP VALUE COMPONENTS

The GWP Formula as proposed in this Workplan focuses first on soil, crop, and root-zone processes. Other key processes that impact the concentration of nitrogen transported to groundwater (e.g., vadose zone attenuation and groundwater recharge) will be addressed while GWP Values and Targets are calculated for HVTs.

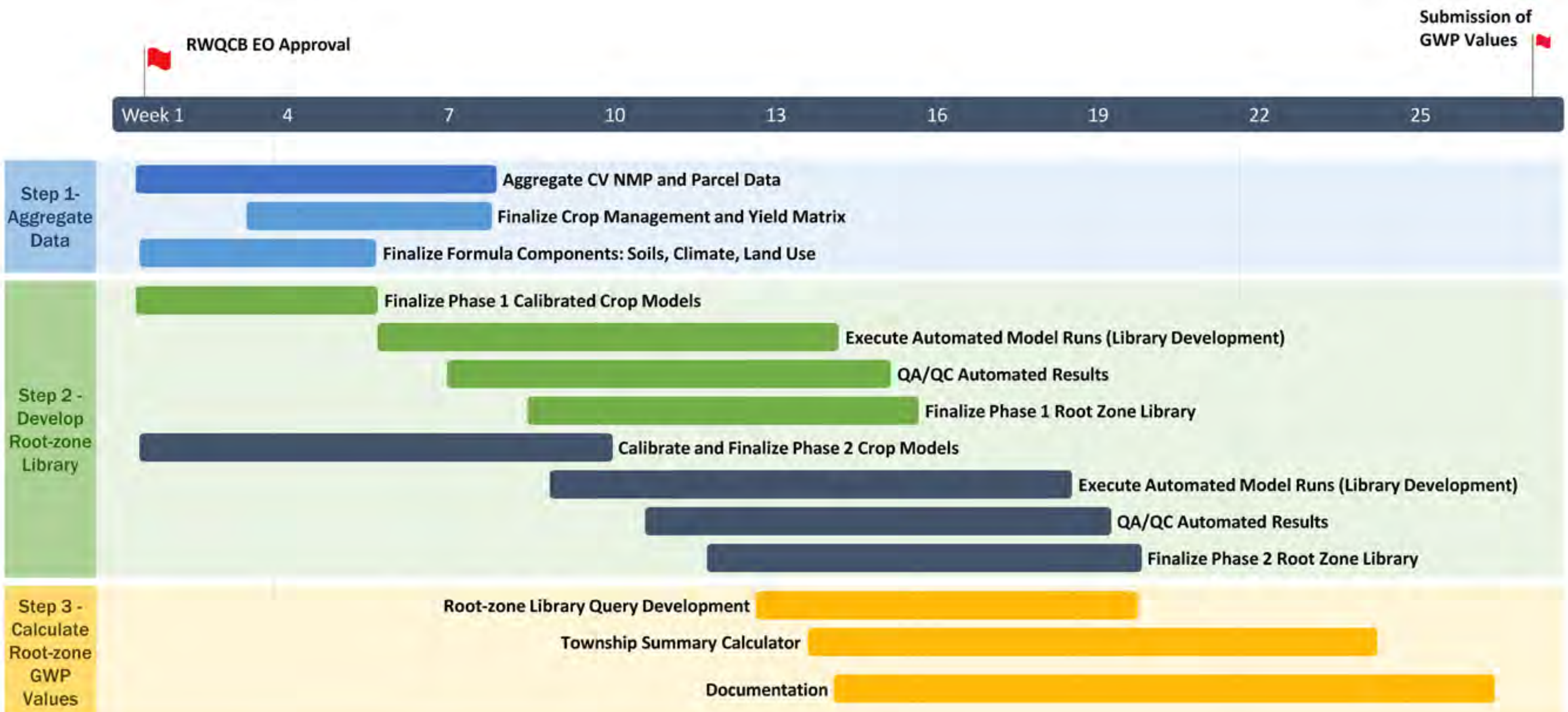
SUMMARY

The Central Valley Water Quality Coalitions have come together to develop a GWP Formula for development of GWP Values and Targets, as required by the LTILRP. The GWP Values must be expressed as either nitrate loading numbers or concentrations of nitrate in water (e.g., mg/L). The GWP Formula presented in this Workplan will be used to estimate percolation and nitrate leaching for HVTs. Accordingly, the proposed GWP Formula addresses the requirements of the LTILRP.

3 SCHEDULE

The project schedule shows the main subtasks for each of the key steps (Figure 8).

FIGURE 8. SCHEDULE TO DEVELOP AND IMPLEMENT THE GWP FORMULA



4 TEAM QUALIFICATIONS

This section provides biographies for key team members in the following areas of expertise: soils and agronomy, SWAT modeling, and data and automation.

Soil Scientists/Agronomists
Mr. Brian Schmid: Mr. Schmid is a Managing Partner of Formation Environmental with over 16 years of experience providing technical and programmatic leadership on large, complex, multi-disciplinary agricultural and water resource projects. This includes management of science, technology, and regulatory strategy projects totaling more than $25M over the last 5 years. Mr. Schmid has extensive programmatic experience leading diverse teams on large, complex, multi-disciplinary projects, many of which involve water quality, air quality, regulatory strategy, and advanced scientific modeling techniques. Mr. Schmid is an agronomist (plant scientist) and soil scientist by training and specializes in the application of remotely sensed data and modeling techniques to quantify land surface conditions pertaining to crop identification, evapotranspiration mapping, wetland vegetation, agricultural production, soil science, and precision agriculture. This includes providing strategic guidance, consulting expert, and testifying expert services for several confidential projects involving water resource and land management throughout the Western United States and South America.
Mr. Kenneth Miller: Mr. Miller is a Soil Scientist and Agronomist. His training is focused in plant biology and physiology as well as soils and biogeochemistry. As a graduate student at the University of California, Davis, he studied the influences of soil physical, chemical, and biological properties on nutrient cycling in California agroecosystems. At Formation, Mr. Miller applies his agronomic training and expertise to support model development, calibration, and analysis of the CV-SWAT model, evaluation of grower-reported management information, and outreach to refine nutrient management strategies with respect to minimizing nutrient losses. Mr. Miller is the Project Manager.
Dr. Timothy Hartz: Dr. Hartz is a Crop Specialist with more than 35 years working with horticultural industries as an academic, a consultant, and a production manager in private industry. He was an Extension Specialist for the University of California, where he worked closely with the vegetable and strawberry industries on a range of production issues as an Extension Specialist for the University of California. His work has focused on soil fertility, drip irrigation management, and environmental water quality protection. Dr. Hartz was instrumental in refinement of the crop models for the CV-SWAT model.
Dr. John Dickey: Dr. Dickey is a Principal Soil Scientist and Agronomist with over 30 years of experience. His expertise includes the fate of salts, trace elements, and nutrients in surface and subsurface return flows; water and soil quality analyses for irrigation; and analysis, reclamation, and revegetation of saline, sodic, and saline/sodic soils. Dr. Dickey is the Program Manager for the SSJV MPEP, which is focused on the identification and implementation of management practices protective of groundwater quality, particularly related to nitrate leaching. Dr. Dickey brings experience in environmental science consulting in the western United States, as well as in agricultural research, extension, production, and consulting in California, Indiana, Burkina Faso, and China.

Soil and Water Assessment Tool
Dr. George Paul: Dr. Paul is a Senior Agricultural Engineer with Formation Environmental, with more than 15 years of experience in field measurements and numerical modeling of soil, vegetation, and hydrologic processes. As an expert in evapotranspiration research, he has incorporated improvements to major remote-sensing-based surface energy balance algorithms. He developed the daily actual evapotranspiration (ETa) datasets for Oklahoma, Kansas, Texas, and California, which are extensively used for water management and ecological applications. He has supported the DWR in statewide water planning efforts, and with developing water conservation objectives and metrics. Dr. Paul is the lead modeler in the SSJV MPEP, for which he is responsible for hydrological model development, calibration, and validation to simulate agricultural nitrate leaching in the Central Valley, California.
Dr. Yohannes Yimam: Dr. Yimam has more than 13 years of experience in soil-, water-, plant-, and atmosphere-related data analysis, research, and development work. He is an expert in the development, application, calibration, and validation of prominent crop-growth, ecological, hydrological, land-surface, meteorological, and air-quality models. He also has advanced experience in analysis of large datasets, digital soil and crop mapping, geostatistics, GIS, and remote sensing data. Dr. Yimam has also been managing and leading multi-agency and multi-disciplinary projects for the last five years. He applies his expertise in root-zone modeling using SWAT for assessing agronomic conditions in the Central Valley, California.
Dr. Essayas Ayana: Dr. Ayana has more than 13 years of experience in hydrologic modeling and integration of satellite observation to water resources management. As a hydrologic modeler, he evaluated best management practices for sediment and nutrient-loading reduction for the Tarrant Regional Water District in Texas. Dr. Ayana built hydrologic models for large river basins including the upper Mississippi, Missouri, Rio Grande, Ohio, and Tennessee river basins, and he conducted sediment and nutrient loading response of the basins under natural and anthropogenic drivers.
Data and Automation
Mr. Chuan-Shin Chong: Mr. Chong is a Senior Remote-Sensing Developer with over 16 years of experience. He specializes in developing analytical solutions through remote-sensing and geospatial techniques. Mr. Chong is an expert in manipulating large datasets, automated image analysis techniques, and database management. He has utilized various types of remotely sensed data, including multispectral, hyperspectral, LiDAR, and thermal products in both pixel and object-based remote-sensing analysis techniques. Mr. Chong works closely with agronomists, soil scientists, and engineers to develop solutions for complex problems, including automation of CV-SWAT model runs on Formation's High Performance Compute Cluster.
Dr. Michael Johnson (MLJ Environmental): Dr. Johnson is the president and managing partner of MLJ Environmental. Dr. Johnson has spent the last 25 years performing monitoring and research on water quality issues in California and has been involved in water quality issues throughout the Central Valley. Dr. Johnson has extensive experience developing innovative tools to assist in identifying sources of discharge and is the technical program manager and technical lead for several agricultural coalitions in the Central Valley.
Ms. Melissa Turner (MLJ Environmental): Ms. Turner has managed the monitoring and reporting programs for several Central Valley agricultural coalitions as part of the Irrigated Lands Regulatory Program since 2004. As a senior project manager at MLJ Environmental, she has overseen the development and management of databases and their associated data for over 15 years, starting with the development of the University of California Regional Data Center (later renamed to the Central Valley Regional Data Center). She manages staff at MLJ tasked with database design and implementation, data management, quality control/ verification, software development, and data analysis.

Ms. Lisa McCrink (MLJ Environmental): Ms. McCrink manages the Nitrogen Management Plan Summary Report (NMP SR) data for two agricultural coalitions and assists with data management and analysis for an additional four. She has extensive experience working with growers on reporting nitrogen applied and yield information and ensuring that accurate data are analyzed and reported. As a Database Programmer, she is responsible for maintaining and updating database designs, performing quality control checks, writing new code as needed using MS Access, Visual Basic and/or SQL, and developing new systems to improve data analysis. Ms. McCrink's responsibilities require her to have a comprehensive understanding of the LTILRP requirements to ensure that data management, reporting, and analysis are in compliance with those regulations.

5 REFERENCES

Bauwe, A., P. Kahle, and B. Lennartz. 2019. Evaluating the SWAT Model to Predict Streamflow, Nitrate Loadings and Crop Yields in a Small Agricultural Catchment. Advances in Geosciences, 48, 1-9, DOI: https://doi.org/10.5194/adgeo-48-1-2019.

Gassman, P. W., M. R. Reyes, C. H. Green, and J. G. Arnold. 2007. The Soil and Water Assessment Tool: Historical Development, Applications, and Future Research Directions. Transactions of the ASABE, 2007 American Society of Agricultural and Biological Engineers, ISSN 0001-2351, 50:4, 1211-1250.

IPNI (International Plant Nutrition Institute). n.d. Nitrate Leaching. Nitrogen Notes. Series supported by grant from California Department of Food & Agriculture and through partnership with the Western Plant Health Association. Series available at www.ipni.net/publications.

MPEP Team. 2019. Assessment of Management Practice Performance in the Central Valley Using the Soil and Water Assessment Tool. Prepared for the Southern San Joaquin Valley MPEP Committee. September.

Nair, S. S., K. W. King, J. D. Witter, B. L. Sohngen, and N. R. Fausey. 2011. Importance of Crop Yield in Calibrating Watershed Water Quality Simulation Tools. Journal of the American Water Resources Association. 47:6, 1285-1297.

Neitsch, S. L., J. G. Arnold, J. R. Kiniry, and J. R. Williams. 2009. Soil and Water Assessment Tool, Theoretical Documentation, Version 2009. Texas Water Resources Institute Technical Report No. 406. Grassland, Soil and Water Research Laboratory – Agricultural Research Service. Blackland Research Center. Texas Agricultural Experiment Station.

Srinivasan, R., J. G. Arnold, and C. A. Jones. 1998. Hydrologic Modelling of the United States with the Soil and Water Assessment Tool. International Journal of Water Resources Development, 14:3, 315-325, DOI: 10.1080/07900629849231

White, M. J., C. Santhi, N. Kannan, J. G. Arnold, D. Harmel, L. Norfleet, P. Allen, M. DiLuzio, X. Wang, J. Atwood, E. Haney, and M. Vaughn Johnson. 2014. Nutrient Delivery from the Mississippi River to the Gulf of Mexico and Effects of Cropland Conservation. Journal of Soil and Water Conservation. 69:1, 26-40.

Exhibit D

ENVIRONMENTAL LAW FOUNDATION

American Rivers
RIVERS CONNECT US®

September 11, 2020

Eric Warren
Central Valley Regional Water Quality Control Board
1685 E Street
Fresno, CA 93706
Eric.Warren@waterboards.ca.gov
Submitted via email

Re: Comments on Workplan: Groundwater Protection Formula, submitted by multiple Central Valley coalitions, July 1, 2020

Dear Mr. Warren,

We appreciate the significant effort put into development of the CV-SWAT model for use in the MPEP, and its innovative application in support of the Groundwater Protection Formula. This application utilizes the best available science and data, and takes advantage of the substantial amount of work conducted under the Conservation Innovation Grant, Fertilizer Research and Education Program grants, and other grant programs, as well as collaborations with research institutions such as University of California. We also appreciate the time taken by the coalitions and consultants to present the approach and answer questions.

Overall the proposed SWAT modeling approach is well designed and carefully constructed with great attention to detail. The Root-zone Library concept is a creative way to utilize the SWAT model to produce spatially explicit output with high resolution on a sub-field level. However, we do have some concerns regarding the completeness of the "formula", as well as some details of the approach. In addition, the lack of public accessibility of some input data, namely the field-specific nitrogen application rates that are utilized in the model, is problematic because it prevents interested parties from conducting a full evaluation of the approach, and because it does not comply with regulatory requirements for transparency, reproducibility, and public accessibility. The following sections describe our concerns.

Completeness of the Proposed "Formula"

The Workplan proposes to use the CV-SWAT model as the basis of the Groundwater Protection Formula. While this appears to be a solid approach in concept, as a "formula" it is incomplete at this stage. Given that additional time had already been granted to extend the deadline for this deliverable, the lack of completeness is disappointing.

As noted in the Workplan, calibration of the model is still continuing, and as such the model input values for various parameters have not been provided and will likely continue to change as additional calibration is conducted. The SWAT model is commonly used as a watershed model to evaluate surface water processes such as pollutant transport. For these types of applications in California, there is often sufficient data to allow for extensive calibration, as well as use of metrics such as Nash Sutcliffe efficiency to evaluate the adequacy of calibrations. For example, when used to simulate pesticide transport in Central Valley watersheds, there are often existing data sets from various monitoring programs with frequent measurements over an extended period and at multiple locations in the watershed to allow for adequate calibration of flow rates, sediment transport, and particulate and dissolved pesticide concentrations. Because these kinds of data sets are currently lacking for the SWAT model outputs used in the root zone modeling approach, a soft calibration approach was used to compare output values to the range of reported values for certain parameters. While some of this information is presented in the Sept 2019 report, the results for N root zone leaching and comparison to literature values have not been included in any reports, although the project team states that they have done an evaluation and will provide a more complete comparison when they submit the GWP values.

In view of the paucity of data for calibration, it is especially important that the SWAT model output be compared to output from other models. The project team has long maintained that they would be doing some site-specific comparisons of SWAT and Hydrus model results, but this comparison has not been forthcoming. This information would be extremely useful in evaluating the adequacy of the SWAT model. While an assessment of SWAT and Hydrus outputs has been conducted for one crop (processing tomatoes), the project team appears reluctant to provide this information because the manuscript is in the peer review process.

Of larger concern is the lack of any information about how the post root zone processes would be accounted for in calculation of the final GWP Values. As stated on page 1, "Subsequent to calculation of root-zone-based GWP Values, the Coalitions may then further adjust the GWP Values to reflect other processes that are township-based (e.g., groundwater recharge, vadose zone attenuation). Any post-processing calculations to the root-zone-based GWP Values will be clearly documented, explained, and supported with appropriate reference materials at the time of GWP Value submission." This would allow for no prior review of the approach used for these "adjustments".

In order to avoid further delays, we request that if the Board approves the Workplan and requires the Coalitions to submit the proposed GWP values within 6 months, additional requirements should include:

1. The Coalitions prepare an addendum to be submitted within 2 months, that includes a complete comparison of SWAT output N values in root zone leachate with reported values from the literature. The addendum should also include a complete list of ongoing and planned studies that will generate additional data on N root zone leachate concentrations, with details such as name of researchers, project descriptions and planned completion dates.

2. Given the lack of existing calibration data, the project team should be required to complete a comparison of SWAT results with other model results, such as Hydrus, for at least five of the most common crop types. This should be completed within the 6 month period and submitted along with the proposed GWP values.

3. At the same time that GWP values are submitted, the coalitions should be required to submit and make publicly accessible the complete input files for all parameters used in the SWAT model, based on the current state of calibration.

4. As additional data become available in the future, additional model calibration should be completed on a periodic basis, with results and proposed parameterization changes submitted to the Board and made publicly available along with revised input files.

5. Because no methods for adjusting the values for post root zone processes have been included in the proposed "formula", the submitted values should not include any adjustments for post root zone processes. In other words, the SWAT output values for N leaving the root zone should be assumed to be the same as the values of N entering the groundwater. In the future, the values could potentially be adjusted after an appropriate public review of the proposed methods.

Modeling Approach for Crop Rotations and Land Use Changes

The Root Zone Library would work best when crop types and management practices do not change frequently, because each "page" keeps the same crop type and management scenario constant for the entire 30 year simulation period. This makes more sense for permanent crops, than for row crops that are frequently rotated. For rotation scenarios, it appears that there is no mechanism to account for residual nitrogen in the root zone that carries over from one crop to the next. One solution to this would be to include some SWAT simulations that incorporate some of the more common crop rotations used in the region, rather than keeping crops constant from year to year or season to season over the entire simulation period. However, this would not account for changing management practices (such as reducing N application rates) or land use over time.

In addition, although the simulation for each "chapter" will be run for a 30 year period, it is not specified what N root zone leachate value in the output will be used. Will the values be averaged over the 30 year period to be representative of the longer term? Or will values for specific years be selected based on climatic conditions that best represent current years? This needs to be clarified.

The current version of the CV-SWAT model uses the 2014 DWR land use data, with some adjustments made as described in the Sept 2019 MPEP report. However, 2016 land use data has been available for some time, and it is not clear if or when this will be incorporated into the CV-SWAT model.

Transparency and Public Accessibility of the "Formula"

While we approve of the general concept of using the CV-SWAT model as the basis of the GWP formula, its use is problematic due to lack of transparency. While SWAT is an open source tool available to anyone to use, not all of the inputs to the CV-SWAT model are being provided. We request that data input files be provided by the Coalitions at the same time that the values are submitted. This should include, for example, the adjusted land use data as well calibrated parameter values for each "chapter" combination. And in order for anyone to reproduce the CV-SWAT model results, it would also need to include the field-specific nitrogen application rates that are used as input to the model.

As a parallel example, when the SWAT model is used to simulate pesticide concentrations in surface water in California watersheds, it utilizes actual reported agricultural pesticide application data as input. These data are reported by users and made publicly available online by the Department of Pesticide Regulation, with a daily temporal resolution and a spatial resolution of 1 square mile (township section), covering approximately the last 30 years. In combination with the water quality data made available on multiple online databases, it is possible for any modeler or researcher around the world to reproduce published model results, as well as to build alternative models and compare results using the same input data. This has generated an enormous amount of research and has been extremely useful for generation of new knowledge and information that can be utilized for better management of pesticides with respect to surface water pollution, not just in California but around the world. In the case of the CV-SWAT model proposed for use in the GWP formula, it will not be possible to reproduce the model without access to the nitrogen application data at the same spatial resolution as is used for the GWP values. This hampers evaluation of the CV-SWAT model as well as the ability to for outside experts and other researchers to suggest future improvements.

The Nonpoint Source Policy is a binding, mandatory policy that the Regional Board must conform to before approving this Workplan. (Wat. Code §§ 13140, 13146, 13241, 13263; *Monterey Coastkeeper v. State Water Resources Control Bd.* (2018) 28 Cal.App.5th 342.) The Policy states that a Regional Water Quality Control Board "shall ensure" that a nonpoint source pollution control program "meets the requirements of the five key structural elements described below." (Policy for the Implementation and Enforcement of the Nonpoint Source

Pollution Control Program (2004). (Nonpoint Source Policy) at p. 11.)[1] Key Element 4 requires that an "NPS control implementation program shall include sufficient feedback mechanisms so that the RWQCB, dischargers, and the public can determine whether the program is achieving its stated purpose(s), or whether additional or different MPs or other actions are required."[2] (Nonpoint Source Policy at p. 13.). Further, "[r]egardless of which approach is used, all monitoring programs should be reproducible, provide a permanent/documented record and be available to the public." (Nonpoint Source Policy at p. 14.)

This Workplan represents a "feedback mechanism" that is designed to inform the public, the dischargers, and the Regional Board whether the ESJ Order is achieving its stated purpose—dischargers' achievement of water quality objectives. (ESJ Order at pp. 15-16.) Specifically, the Workplan is intended to develop a "Groundwater Protection Value" that measures loading to groundwater based on inputs from irrigated agriculture—nitrogen applied to and removed from fields, management practices, irrigation practices, and any other relevant variables. (Monitoring and Reporting Program to Order No. R5-2012-0116, as modified by Order No. WQO-2018-002, at p. 22. ("MRP").) This value will then be used to generate Groundwater Protection Targets that will limit nitrogen loading (albeit in a non-binding fashion) by township. (*Ibid.*, Order No. WQO- 2018-002 at p. 74 ("ESJ Order").)[3]

But the Workplan fails to meet the Nonpoint Source Policy's requirement that the Regional Board and the public be able to "determine whether the program is achieving its stated purposes." (Nonpoint Source Policy at p. 13-14.) This is because some of the inputs into the model used by the Workplan are secret.

The CV-SWAT model that the Workplan relies on is a sub-field level model—it uses data with a resolution less than a single agricultural field. (Workplan at p. 10.) And the ESJ Order requires growers to document and report field-level data on irrigation practices, nitrogen application, yield, management practices, and other key data points. (ESJ Order at pp. 34-53.) The Workplan envisions using this field-level data, as reported to the Coalition in the INMP Summary Reports, as inputs to the CV-SWAT model. (Workplan at p. v.)

But the ESJ Order requires only that growers report that data to the Coalition, which may keep it secret. The Order only requires public reporting of a much more limited set of data (ESJ Order at pp. 47-53.) For the public and for reporting to the Board, the ESJ Order masks the location of

---

[1] https://www.waterboards.ca.gov/water_issues/programs/nps/docs/plans_policies/nps_iepolicy .pdf

[2] "NPS" is an abbreviation for "nonpoint source"; "RWQCB" is an abbreviation for Regional Water Quality Control Board. (CVRBESJ040126.) "MP" is an abbreviation for "management practice." (CVRBESJ040132.)

[3] Key Element 4 applies to "adaptive management" as well as to binding regulatory rules. (Nonpoint Source Policy at pp. 13-14.)

individual fields, and reports data on nitrogen applied and removed only on an aggregated basis, not a per-field basis. (ESJ Order at pp. 47-53.) And while the ESJ Order does require public reporting of one dataset that includes actual A and R figures tied to location, that dataset contains severe limitations: it is aggregated by township, lacks location-specific management practice information, and lacks irrigation information.

Thus the Workplan is a black box. The Coalition takes secret data, feeds it into its own model, and expects the public and the Regional Board to simply accept the results. This plan facially violates the Nonpoint Source Policy. The public cannot use this feedback mechanism to determine whether the program is working because the data is secret. It is not "reproducible" because the data is secret. And it is not "available to the public." (Nonpoint Source Policy at pp 13-14.)

The Regional Board's Executive Officer should reject this plan for violating the Nonpoint Source Policy. The only way for this plan to comply with the Policy would be for the Regional Board to exercise its power to request all of the individual data and make it publicly available, as the ESJ Order gives it the power to do. (E.g. ESJ Order at 28, 33, 50.)

We appreciate the opportunity to comment on this workplan, and would be happy to discuss any questions you might have.

Sincerely,

Lisa Hunt, PhD, PE
Director of California River Restoration Science
American Rivers
2150 Allston Way, Suite 320
Berkeley CA 94704
Mobile: 510-292-3218

Nathaniel Kane
Staff Attorney
Environmental Law Foundation
1222 Preservation Park Way, Suite 200
Oakland, CA 94612
(510) 208-4555
nkane@envirolaw.org

Exhibit E

Central Valley Regional Water Quality Control Board

19 January 2021

Tess Dunham
Kahn, Soares & Conway, LLP
1415 L Street, Suite 400
Sacramento, CA 95814

CONDITIONAL APPROVAL OF THE GROUNDWATER PROTECTION FORMULA WORKPLAN FOR CENTRAL VALLEY WATER QUALITY COALITIONS

On 1 July 2020, a document entitled *Workplan: Groundwater Protection Formula* (GWP Workplan) was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley. Development of a Groundwater Protection Formula is required under applicable Waste Discharge Requirements General Orders (WDRs) for owners and operators of irrigated agricultural lands for the purpose of developing estimates (Groundwater Protection Values), expressed as either a nitrate loading number or a concentration of nitrate in water (e.g.,mg/L), which reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. These estimates will in-turn be used to develop appropriate Groundwater Protection Targets reflective of N loading rates necessary to achieve compliance with receiving water limitations within High Vulnerability Areas.

The GWP Workplan was circulated for public comment on 28 July 2020 and concurrently reviewed by Central Valley Water Board staff (staff). It is my expectation that the Groundwater Protection Formula will continue to be refined over time as additional opportunities for improvement are identified. Based on staff's review of the GWP Workplan, I am approving the submittal with the conditions listed below.

The following items must be submitted in conjunction with the proposed Groundwater Protection Values:

1. Documentation of model inputs and results used to develop the Root-Zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)

2. A sensitivity analysis which identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.
3. A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum the summary should include each of the top five crops by acreage.
4. Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.
5. Descriptions of the specific methods and criteria that will be used to account for post root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.
6. Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.
7. Comparisons, aggregated by township, of grower reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached).

If you have any questions regarding this letter, please contact Sue McConnell at (916) 464-4798 or by e-mail at sue.mcconnell@waterboards.ca.gov.

Patrick Pulupa
Executive Officer

Enclosure: 29 December 2020 staff memorandum

Central Valley Regional Water Quality Control Board

TO: David Sholes, PG
Senior Engineering Geologist
Irrigated Lands Regulatory Program

FROM: Eric Warren, PE
Water Resource Control Engineer
Irrigated Lands Regulatory Program

DATE: 29 December 2020

SUBJECT: **REVIEW OF THE GROUNDWATER PROTECTION FORMULA WORKPLAN FOR CENTRAL VALLEY WATER QUALITY COALITIONS**

On 1 July 2020, a collaborative Workplan for the development of a Groundwater Protection Formula was submitted to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on behalf of third-party groups (Coalitions) approved to represent owners and operators of irrigated lands within the Central Valley Region. Development of a Groundwater Protection Formula is required under applicable Waste Discharge Requirements General Orders (WDRs) for owners and operators of irrigated agricultural lands for the purpose of developing estimates (Groundwater Protection Values), expressed as either a nitrate loading number or a concentration of nitrate in water (e.g., mg/L) for townships within designated High Vulnerability Areas. The Values need to reflect the total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. These estimates will in-turn be used to develop appropriate Groundwater Protection Targets reflective of N loading rates necessary to achieve compliance with receiving water limitations within High Vulnerability Areas.

The Groundwater Protection Formula workplan was circulated for public comment on 28 July 2020 and concurrently reviewed by Central Valley Water Board staff (staff). Three comment letters were received during the public review period. In addition, several meetings have been held with Coalition representatives to provide further clarification on the GWP Formula Workplan and associated CV-SWAT model development. A summary of the Workplan's proposed approach, public comments received, and staff comments are provided in the following sections.

Summary of the Proposed Groundwater Protection Formula Methodology

Model Background

A key component of the proposed Groundwater Protection Formula is the SWAT (Soil and Water Assessment Tool) Model. This model has been under continual development, expansion, validation, and use for over 40 years, including incorporation of other scientific model features and data. SWAT has been used to quantify nitrate loading to surface and groundwater from agricultural and adjacent natural systems.

According to the Groundwater Protection Formula Workplan, SWAT is a process-based model that operates with a daily time-step and represents many physical, chemical, and biological processes. SWAT uses these underlying processes to simulate hydrology and water quality, and to model the environmental effects of land use, land management practices, and climate change. SWAT incorporates climate, soil, water, nutrient and pesticide dynamics, the nitrogen cycle, plant growth, and management. The spatial scale of SWAT can be adapted to larger regional processes or more detailed field-level analyses. This allows for estimation of numerous environmental effects, including nitrate leaching below the root-zone. A version of SWAT has been customized for the Central Valley (CV-SWAT) for the Management Practice Evaluation Program and will be further adapted for the calculation of Groundwater Protection Values. In this application, the most detailed available climatic and (sub-field-level) soils information, is used, with the results for the many small analysis units summed to provide results for whole townships.

General Approach

The proposed Groundwater Protection Formula consists of three key steps: 1) Compile climate, soil, parcel, and Irrigation and Nitrogen Management Plan (INMP) Summary Report data; 2) Develop a “Root-zone Library” based on CV-SWAT estimates for percolation and nitrate leaching under various management scenarios; and 3) Calculate Groundwater Protection Values by matching appropriate Root-zone Library entries to grower reported data and aggregating the results to the township scale.

Data Compilation

Step 1 includes aggregating, analyzing, and summarizing INMP Summary Report data from all participating Central Valley Coalitions. These data will be analyzed to quantify the ranges of applied nitrogen, yield, and their relationship for each crop within High Vulnerability Townships. These datasets will then be used to develop a comprehensive Crop Management and Yield Matrix (Matrix) that reflects the distribution of applied nitrogen and yield for each crop. The Matrix will identify the appropriate management scenarios for CV-SWAT runs that are conducted in Step 2.

Soils data from the Natural Resources Conservation Service as well as historical and current climate data from the California Irrigation Management Information System will also be assembled in CV-SWAT. Parcel data will be used to spatially associate the individual Irrigation and Nitrogen Management Plan Summary Reports with soil and climate conditions at that location.

Root-zone Library Development

The Root-zone Library will consist of percolation and nitrate leaching estimates developed from an automated workflow which uses data from Step 1 to execute numerous (approximately 40,000) CV-SWAT runs. The wide range of modeled scenarios is intended to capture the variability of climate, soil, crop, and management that occurs throughout the Central Valley. Simulating each crop on every soil in every climate adds additional flexibility to account for future land use changes without necessitating additional model runs.

Root-zone Groundwater Protection Value Calculations

Percolation and nitrate leaching estimates from Step 2 will be aggregated to the township-scale to calculate root-zone Groundwater Protection Values for High Vulnerability Townships. This will be done by 1) matching the appropriate Root-zone Library entry to each INMP Summary Report (based on yield, applied nitrogen, soil, climate, and parcel), and b) developing a “calculator” to aggregate the resulting percolation and leaching estimates at the township scale to calculate root-zone-based Groundwater Protection Values. Additional steps to account for additional processes (e.g., vadose zone attenuation and groundwater recharge) may be applied to the root-zone-based Groundwater Protection Values as a post-processing step or be applied when calculating Groundwater Protection Targets.

Public Comments Received

<u>California Rice Commission</u>
On 28 July 2020 a comment letter was submitted by the California Rice Commission. While development of a Groundwater Protection Formula is not a requirement of the Waste Discharge Requirements General Order for Sacramento Valley Rice Growers (R5 R5-2014-0032-02), the letter expressed strong support for the GWP Formula Workplan and noted its utility in managing approximately 12,000 acres of rice grown in other areas of the San Joaquin Valley.

<u>American Rivers and the Environmental Law Foundation</u>
On 11 September 2020 a joint comment letter was submitted by American Rivers and the Environmental Law Foundation. The letter generally supported the CV-SWAT modeling approach but expressed concern regarding 1) the completeness of the Groundwater Protection Formula, 2) the modeling approach for crop rotations and land use changes, and 3) the transparency and public accessibility of the Groundwater Protection Formula.

Completeness of the Groundwater Protection Formula

In regard to completeness of the Groundwater Protection Formula, the commenters noted that the calibration of the model is currently ongoing, and comparisons against literature values or outputs from other models such as HYDRUS have not been provided in the Workplan. The letter also expressed concern regarding the lack of information regarding how the described post root-zone processes would be accounted for during the calculation of Groundwater Protection Values.

Modeling Approach for Crop Rotations and Land Use Changes

The comment letter stated that the proposed Groundwater Protection Formula does not contain a mechanism for accounting for crops that are frequently rotated and suggested incorporating simulations to represent scenarios where land use may frequently change. It also noted the availability of a more recent 2016 land use dataset published by the Department of Water Resources.

Transparency and Public Accessibility of the Groundwater Protection Formula

The last issue raised by the commenters was regarding the lack of public access to the data input files used within the model, and the inability for the public to reproduce the model results. Items specifically identified as unavailable were grower reported nitrogen application data, adjusted land use data, and calibrated parameter values for each chapter of the described Root-Zone Library.

<u>Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability</u>

On 15 September 2020 a joint comment letter was received from the Clean Water Action, Community Water Center, and Leadership Counsel for Justice and Accountability. The letter supported the use of the CV-SWAT model but raised questions regarding 1) how model calibration will be continuously improved; 2) how the Groundwater Protection Formula relates to Groundwater Protection Values and Targets; and 3) how local impacts within a township may be identified and mitigated.

Model Calibration

The commenters noted that there is currently a lack of information available to calibrate the proposed model and agreed with prior comments submitted by American Rivers and the Environmental Law Foundation suggesting the results be compared to other model results, such as HYDRUS, for at least five of the most common crop types. An additional request was made for more information regarding how the modeling process can be continuously improved over time (e.g., the development of field data necessary to confirm model outputs) and how the described work will continue beyond the 2024 completion of the MPEP.

How the Groundwater Protection Formula Relates to Groundwater Protection Values and Targets

The commenters also noted that the Groundwater Protection Formula Workplan identifies post-processing modifications to calculated Groundwater Protection Values may be made by individual Coalitions to account for factors that may influence the concentration of nitrate reaching groundwater (e.g., vadose zone attenuation and recharge). An expanded description of what site-specific information may be developed and how the information will be used was requested prior to calculation of Groundwater Protection Values, along with an additional opportunity for public comment.

Clarification was requested regarding whether the Groundwater Protection Formula Workplan is proposing to modify the WDRs point of compliance with receiving water limitations from first-encountered groundwater to the bottom of the root-zone.

How Local Impacts Within a Township May Be Identified and Mitigated

As part of Groundwater Protection Value and Target development, the commenters requested additional discussion regarding how tools used in this process may potentially help to identify and prioritize impacted communities for protection.

Summary of Staff Comments

Staff have several comments on the proposed Groundwater Protection Formula, some of which are duplicative to those raised by public commenters. These issues, along with recommendations for addressing them, are discussed in the following sections.

<u>Modeling Approach for Crop Rotations and Land Use Changes</u>
With regards to crop rotations, and to a similar extent irrigation method, it is difficult to capture the yearly variability exhibited by some farms. For example, in a given year a grower may make a management decision to attempt a second harvest or change their irrigation method based on the availability of surface water allocations. The described methodology in the Groundwater Protection Formula Workplan contains a number of general assumptions (e.g., each field is assigned a single crop type and each crop is assigned the predominant irrigation method) which potentially reduce its ability to reflect the variability of management scenarios and corresponding leaching. Staff acknowledge that accounting for the full breadth of management scenarios is likely infeasible in the context of data availability and the time/cost involved in expanding the model capabilities. However, it is our expectation that the Groundwater Protection Formula will continue to be refined over time as additional opportunities for improvement are identified.

<u>Model Calibration</u>
While the applicable WDRs do not specify a specific metric or threshold for the accuracy of Groundwater Protection Values, the workplan should provide some assessment of the Groundwater Protection Formula's ability to estimate the average concentration of

nitrate expected to reach groundwater in evaluated areas. Without documented comparisons between model outputs and other sources of percolation and nitrate leaching estimates (e.g., field studies, grower reported N Applied/Yield data, HYRDUS) it is difficult to have confidence in the model's ability to reasonably estimate township-scale leaching. The Groundwater Protection Formula Workplan is also lacking a sensitivity analysis that would allow staff or other interested parties to evaluate how the fate of N is influenced by various parameters within the model. These issues need to be resolved prior to approval of Groundwater Protection Values.

Transparency and Public Accessibility of the Groundwater Protection Formula
Staff agree there is a need for public transparency regarding the model. To this end, documentation of the parameter definitions and input values used to develop the root-zone library needs to be submitted once complete. Additionally, township-level summaries comparing aggregated grower-reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached) should be submitted.

Adjustment of Groundwater Protection Values
The Groundwater Protection Formula Workplan identifies potential key processes that may be considered by individual Coalitions in calculation or adjustment of the final Groundwater Protection Values (e.g., vadose zone attenuation and groundwater recharge). Insufficient information was provided for staff to understand how this process may be implemented, but the Groundwater Protection Formula Workplan did include a commitment to provide clear explanations and supporting documentation for any post-processing calculations conducted during the submittal of proposed Groundwater Protection Values.

The intent of the Groundwater Protection Formula is to develop estimates of N loading to groundwater, as opposed to from the root-zone (although the later may be substituted for the former as a conservative estimate in most instances). Staff agree that submittal and review of the proposed post-processing methodology and criteria is a necessary step prior to use of such a methodology in calculating Groundwater Protection Values or Targets.

Recommendations
Staff generally support the use of the CV-SWAT model and methodology described in the Groundwater Protection Formula Workplan. However, certain aspects of the model development remain in-progress. Staff recommend the following items to be submitted in conjunction with the proposed Groundwater Protection Values:

1. Documentation of model inputs and results used to develop the Root-Zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)
2. A sensitivity analysis which identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.

3. A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum the summary should include each of the top five crops by acreage.
4. Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.
5. Descriptions of the specific methods and criteria that will be used to account for post root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.
6. Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.
7. Comparisons, aggregated by township, of grower reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached).

Exhibit F

Groundwater Protection Values

Prepared for:
Buena Vista Coalition
Cawelo Water District Coalition
East San Joaquin Water Quality Coalition
Grassland Drainage Area Coalition
Kaweah Basin Water Quality Association
Kern River Watershed Coalition Authority
Kings River Watershed Coalition Authority
Sacramento Valley Water Quality Coalition
San Joaquin County and Delta Water Quality Coalition
Tule Basin Water Quality Coalition
Westlands Water Quality Coalition
Westside San Joaquin River Watershed Coalition
Westside Water Quality Coalition

Prepared by:
Formation Environmental, LLC

FORMATION
ENVIRONMENTAL

In Collaboration with:
PlanTierra, LLC
MLJ Environmental

JULY 19, 2021

TABLE OF CONTENTS

Tables

Figures

Appendices

LIST OF ABBREVIATIONS

ac	acres
APN	Assessor's Parcel Number
AWA	Acre-Weighted Average
BIOE	Radiation Use Efficiency
BIO_LEAF	Fraction of Perennial Biomass Returned as Residue; this only applies to perennial crops
BLAI	Optimal Leaf Area Index
C°	Degrees Celsius
CalETa	California Actual Evapotranspiration
CDN	General Rate Factor
CEC	Cation Exchange Capacity
CIMIS	California Irrigation Management Information System
CMN	Rate Factor (default value for CMN in SWAT is 0.0003)
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SWAT	Central Valley Soil & Water Assessment Tool
DEM	Digital Elevation Model
ET	Evapotranspiration
GIS	Geographic Information System
GQMPs	Groundwater Quality Management Plans
gSSURGO	Gridded Soil Survey Geographic Database
GWP	Groundwater Protection
HRU	Hydrologic Response Unit
HVA	High Vulnerability Area
HVSTI	Harvest Index
INMP	Irrigation and Nitrogen Management Plan
lbs	pounds
lbs/ac	pounds per acre
LTILRP	Long-term Irrigated Lands Regulatory Program

m	meter
mg/L	milligrams per liter
MPEP	Management Practices Evaluation Program
MAP	Mono Ammonium Phosphate
N	Nitrogen
N_2O	Nitrous Oxide
NMP	Nitrogen Management Plan
NRCS	Natural Resources Conservation Service
QC	Quality Control
QA/QC	Quality Assurance/Quality Control
SDNCO	Soil Moisture Content at Which Denitrification Begins in SWAT
SWAT	Soil & Water Assessment Tool
UC	University of California
URAN	Urea Ammonium Nitrate

EXECUTIVE SUMMARY

Waste Discharge Requirement General Orders that apply to members of third-party groups (often referred to as the Long-term Irrigated Lands Regulatory Program, or LTILRP) require third-parties on behalf of their members to submit Groundwater Protection (GWP) Values for high-priority townships by July 19, 2021, to the Executive Officer of the Central Valley Regional Water Quality Control Board (CVRWQCB). The third-party groups (i.e., Central Valley Water Quality Coalitions) developed a single GWP Formula to generate GWP Values for all high-priority townships (i.e., GWP Townships).[1] The Central Valley Water Quality Coalitions include the following:

- Buena Vista Coalition
- Cawelo Water District Coalition
- East San Joaquin Water Quality Coalition
- Grassland Drainage Area Coalition
- Kaweah Basin Water Quality Association
- Kern River Watershed Coalition Authority
- Kings River Watershed Coalition Authority
- Sacramento Valley Water Quality Coalition
- San Joaquin County and Delta Water Quality Coalition
- Tule Basin Water Quality Coalition
- Westlands Water Quality Coalition
- Westside San Joaquin River Watershed Coalition
- Westside Water Quality Coalition

The GWP Values are generated using the GWP Formula process that was conditionally approved by the CVRWQCB on January 19, 2021. The approved GWP Formula consists of three key steps:

- Step 1: Compile and use daily climatic, detailed soil, parcel, Irrigation and Nitrogen Management Plan (INMP), and Nitrogen Management Plan (NMP) data as reported by growers to the Coalitions in their INMP and NMP Summary Reports (hereafter referred to as “INMP/NMP Summary Reports”).

- Step 2: Evaluate detailed data using robust, scientifically valid equations and methods encompassed in the Central Valley Soil & Water Assessment Tool (CV-SWAT) to estimate percolation and nitrate transport and fate within the root-zone.

- Step 3: Aggregate the results to the township scale to provide root-zone-based GWP Values for high-priority townships. Notably, subsequent steps will consider additional scientifically supported processes affecting nitrogen transport and fate in the vadose-zone and groundwater systems as part of the GWP Targets process.

This approach for generating GWP Values builds off recent work associated with other components of the LTILRP Management Practice Evaluation Program (MPEP), by using an adapted version of the CV-SWAT model. As a part of the GWP Formula, the CV-SWAT model was further augmented to integrate grower-reported INMP/NMP Summary Report data, as applicable.[2] Results from thousands of model runs were

[1] Reference to all Coalitions for this submittal does not include the California Rice Commission on behalf of rice growers in the Sacramento Valley. The GWP provisions are not in the California Rice Commission’s Third-Party Order and thus are not applicable to rice growers in the Sacramento Valley.

[2] To generate GWP Values, 2019 INMP or NMP Summary Report data were used. As of 2019, the East San Joaquin Water Quality Coalition was collecting INMP Summary Report data and all other Coalitions were collecting NMP Summary Report data. For the purposes of generating GWP Values, the necessary data and information were available from both INMP and NMP Summary Reports.

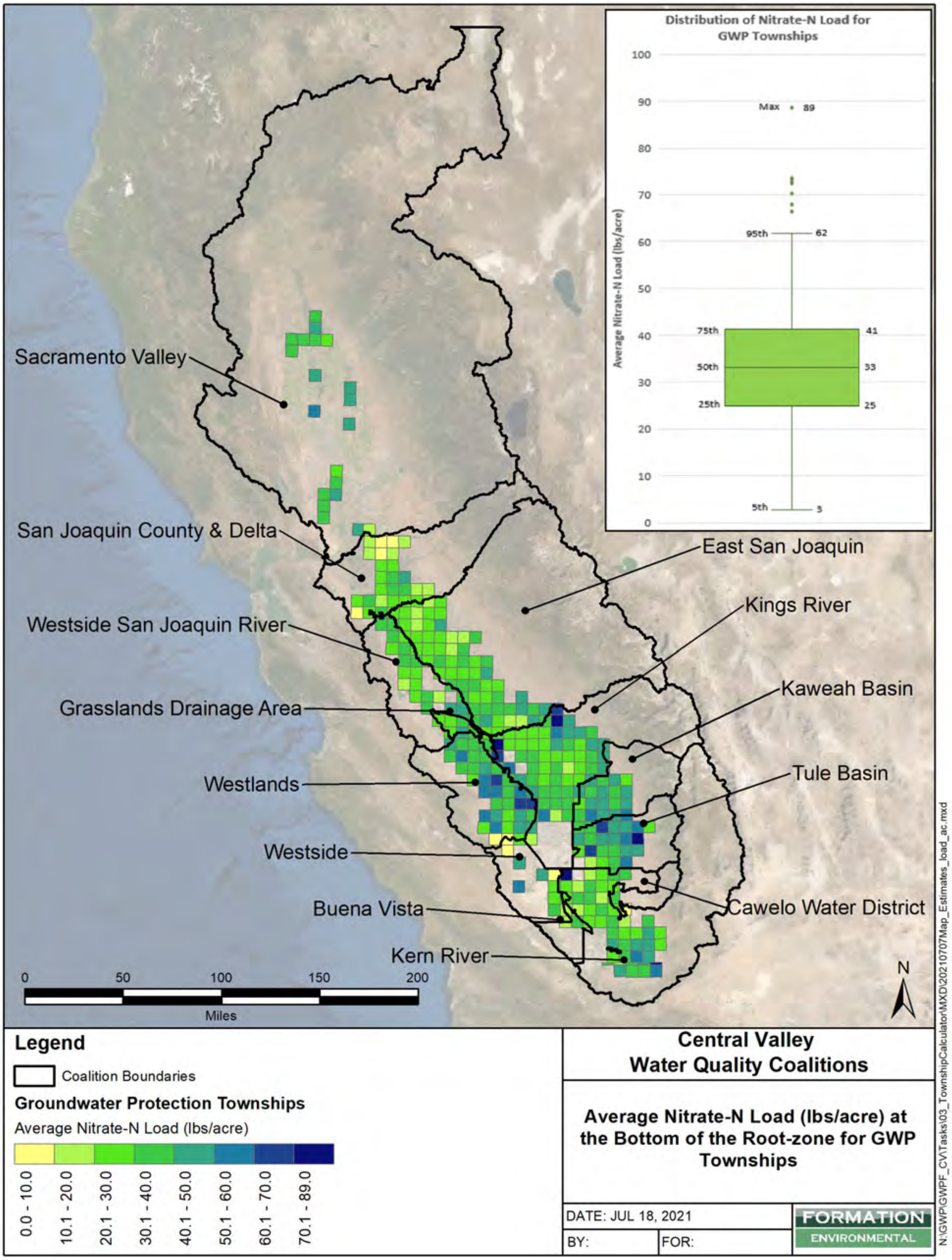
matched to INMP/NMP Summary Report data to produce scientifically valid estimates (or GWP Values) of nitrate-N load at the bottom of the root-zone.

Nitrate-N load (reported as GWP Values) expresses the mass of nitrate-N at the bottom of the root-zone in total pounds (lbs) and average pounds per acre (lbs/ac) for each high priority township. Nitrate-N concentration expresses mass dissolved into water percolating below the root-zone in units of mass per unit volume (milligrams per liter—mg/L). Both nitrate-N load and concentration are helpful for understanding the potential influence of irrigated agriculture on groundwater quality. However, Nitrate-N load more accurately reflects the agronomic efficiency of N use, whereas concentration is strongly influenced by other factors such as (but not limited to) water use efficiency, climatic conditions, and recharge from other parts of the landscape. As such, concentration is a function of not only Nitrate-N load, but also the amount of water percolating below the root zone. This means that the same nitrate-N load for any given GWP Township can have different estimates of concentration due to differences in estimated percolation.

More importantly, as growers continue to adopt more efficient irrigation infrastructure and management practices to conserve water, the depth (or amount) of percolating water will decline, resulting in increased nitrate-N concentrations at the bottom of the root-zone. This means that as irrigation becomes more efficient, the nitrate-N concentration will likely increase at the bottom of the root-zone, even as the agronomic N use efficiency increases through management practice implementation. Therefore, to avoid confounding water quality protection with water conservation, the root-zone-based GWP Values discussed in this report focus on nitrate-N load at the bottom of the root-zone. While initial estimated nitrate-N concentrations for the bottom of the root-zone on a township basis are provided in this report (as requested by the CVRWQCB), they do not necessarily reflect impacts to groundwater quality. Estimated nitrate-N concentrations on a township basis will be updated as part of the GWP Targets process when other components of the water cycle (e.g., regional recharge, targeted recharge) and attenuation of nitrate in the vadose-zone are fully considered. The purpose of GWP Targets is to set a desired target that is intended to achieve compliance with receiving water limitations.

The root-zone-based GWP Values for high-priority townships (hereafter referred to as GWP Townships) are presented in the report in a series of detailed tabular summaries. Figure ES-1 provides a spatial map summary of the nitrate-N loads as detailed in Appendix 1. As a part of the GWP Formula conditional approval, the CVRWQCB's Executive Officer requested that specific (additional) information be submitted to the CVRWQCB along with the GWP Values. Therefore, this report includes significant documentation on the overall methods, CV-SWAT model calibration, model sensitivity analysis, reported N losses by crop, overall water and N budget results, comparisons of CV-SWAT results to other models, and comparisons of CV-SWAT results to literature values. A cross-walk of where each of these items is located within the document is described in Section 1.

FIGURE ES-1. DISTRIBUTION OF AVERAGE NITRATE-N LOAD



1 INTRODUCTION

This document provides the GWP Values for high-priority townships for the participating third-party Coalitions[3] that are assisting in the implementation of the Central Valley LTILRP. The Coalitions are required to deliver GWP Values on behalf of their members to the Executive Officer by July 19, 2021, which is six months from the Executive Officer's conditional approval of the GWP Formula. This document includes the following sections:

- Section 1, Introduction, describes the General Order requirements for the GWP Values, as well as the third-parties (i.e., water quality coalitions) participating in computing the GWP Values using the conditionally approved GWP Formula.
- Section 2, Implementation of the GWP Formula, summarizes the GWP Formula and describes implementation of the GWP Formula, including: Step 1) use of daily climatic, detailed soil, parcel, and INMP/NMP Summary Report data, Step 2) evaluation of those data using the robust, scientifically valid equations and methods encompassed in CV-SWAT to estimate percolation and nitrate leaching, and Step 3) aggregation of the results to the township scale to provide root-zone-based GWP Values for GWP Townships.
- Section 3, Groundwater Protection Values, describes root-zone-based GWP Values calculated for 323 townships representing over 3.5 million acres of irrigated agriculture.
- Section 4, Comparison of CV-SWAT and Reported Literature, provides comparisons of other sources of percolation and nitrate leaching estimates (i.e., HYDRUS) to the CV-SWAT model estimates.
- Section 5, Comparisons of CV-SWAT and Hydrus, provides comparison of CV-SWAT results to reported literature values for an annual crop (potato) and a perennial crop (almond).
- Section 6, Team Qualifications, provides the qualifications of the team.
- Section 7, References, includes the cited materials herein.

1.1 GENERAL ORDER REQUIREMENTS

The General Orders require the development of a GWP Formula, which is then to be used to calculate GWP Values for high-priority townships[4] (i.e., GWP Townships). The GWP Values are to be included in each Coalition's Groundwater Quality Management Plans (GQMPs). Once GWP Values are included in GQMPs, the Coalitions are then required to develop GWP Targets for each township for which a GWP

[3] Reference to all Coalitions for this submittal does not include the California Rice Commission on behalf of rice growers in the Sacramento Valley. The GWP provisions are not in the California Rice Commission's Third-Party Order and thus are not applicable to rice growers in the Sacramento Valley.

[4] High-priority areas are those areas where the Executive Officer determines that irrigated agriculture may be causing or contributing to exceedances of water quality objectives or a trend of degradation that may threaten applicable beneficial uses (Order WQ 2018-0002, p. 66).

Value has been computed. The purpose of the GWP Targets is to set a desired target for achieving compliance with receiving water limitations.

The primary purpose of the GWP Formula is to generate GWP Values, expressed as either nitrate-N loading numbers or concentrations of nitrate in water (e.g., mg/L), reflecting the influence of total applied nitrogen, total removed nitrogen, recharge conditions, and other relevant and scientifically supported variables that influence the potential average concentration of nitrate in water expected to reach groundwater in a given township over a given time period. The Central Valley Coalitions submitted a proposed GWP Formula to the CVRWQCB on July 1, 2020 (Central Valley Coalitions 2020). The CVRWQCB's Executive Officer conditionally approved the GWP Formula on January 19, 2021, and requested that additional information be submitted to the CVRWQCB along with the GWP Values (Table 1).

The Central Valley Coalitions used the approved GWP Formula to compute root-zone-based GWP Values for each GWP Township (Figure 1). These GWP Values reflect discharge estimates from the bottom of the root-zone, and do not consider post-root-zone processes (e.g., groundwater recharge, vadose zone attenuation) that may affect the concentration of leachate that reaches groundwater. These additional processes will be considered during the development of GWP Targets. Coalitions are required to submit GWP Targets to the Executive Officer of the CVRWQCB for review and approval by July 19, 2022. Approved interim and final GWP Targets will be achieved through implementation of Coalition GQMPs, and may be phased in over time.

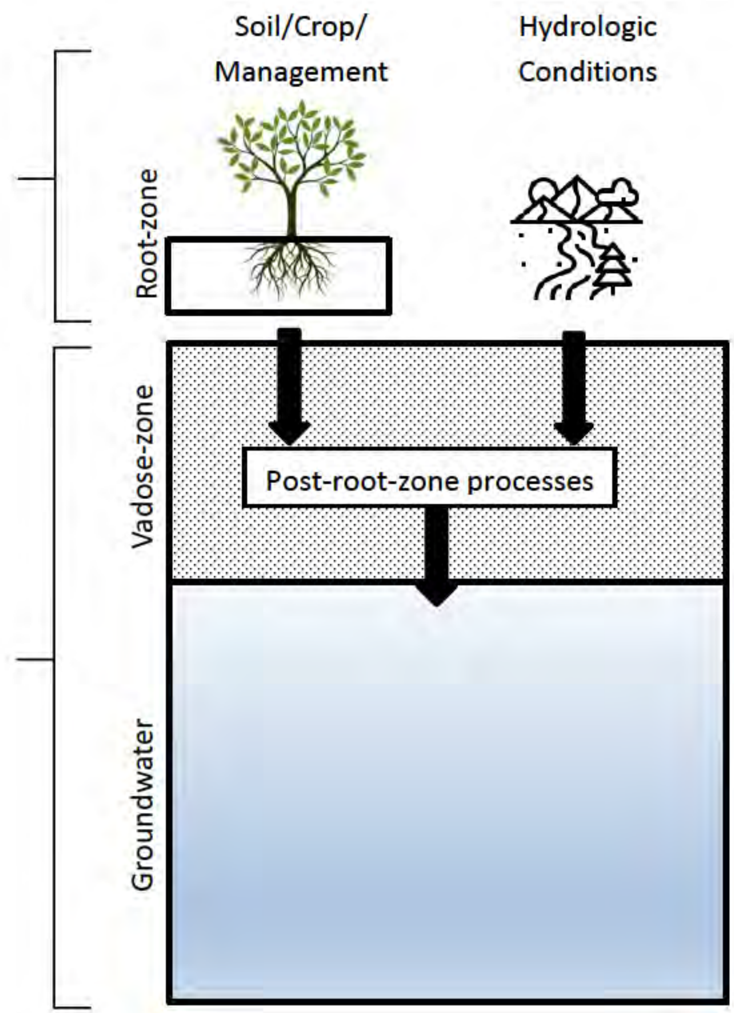
TABLE 1. ADDITIONAL INFORMATION REQUESTED BY THE CVRWQCB TO BE SUBMITTED WITH THE GWP VALUES

Item	Information Request	Document Section
1	Documentation of model inputs and results used to develop the Root-zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.).	Section 2.2.1, Section 2.2.2, Appendices 3, 4, 5
2	A sensitivity analysis that identifies the model parameters exhibiting the largest influence on N losses (e.g., volatilization, sequestration, runoff) for each of the top five crops by acreage.	Appendix 6
3	A summary for each of the three model domains describing the range of estimated N losses by crop. At a minimum, the summary should include each of the top five crops by acreage.	Section 3.3
4	Summaries of overall water budget (precipitation, runoff, ET by crop, irrigation, percolation) and N mass balance (applied, uptake, runoff, deposition, denitrification, volatilization, storage, leached) by township.	Section 3.2 and Appendix 2
5	Descriptions of the specific methods and criteria that will be used to account for post-root-zone processes (if any). Any proposal would be subject to public review and EO approval prior to use.	Will be developed as part of GWP Targets
6	Comparisons of other sources of percolation and nitrate leaching estimates (e.g., field studies, HYDRUS) to model estimates.	Sections 4 and 5
7	Comparisons, aggregated by township, of grower-reported data (N applied, N removed) to model estimates (N applied, N Removed, N Leached).	Section 3.2 and Appendix 2

FIGURE 1. SUMMARY OF GROUNDWATER PROTECTION FORMULA, VALUES, AND TARGET

Root-zone-based GWP Values: Calculated using the approved Root-zone GWP Formula for irrigated agriculture in GWP Townships.

GWP Township Targets: Account for other scientifically supported variables (post-root-zone processes) that influence the potential average concentration of nitrate in water expected to reach groundwater (e.g., vadose zone attenuation, regional recharge conditions).

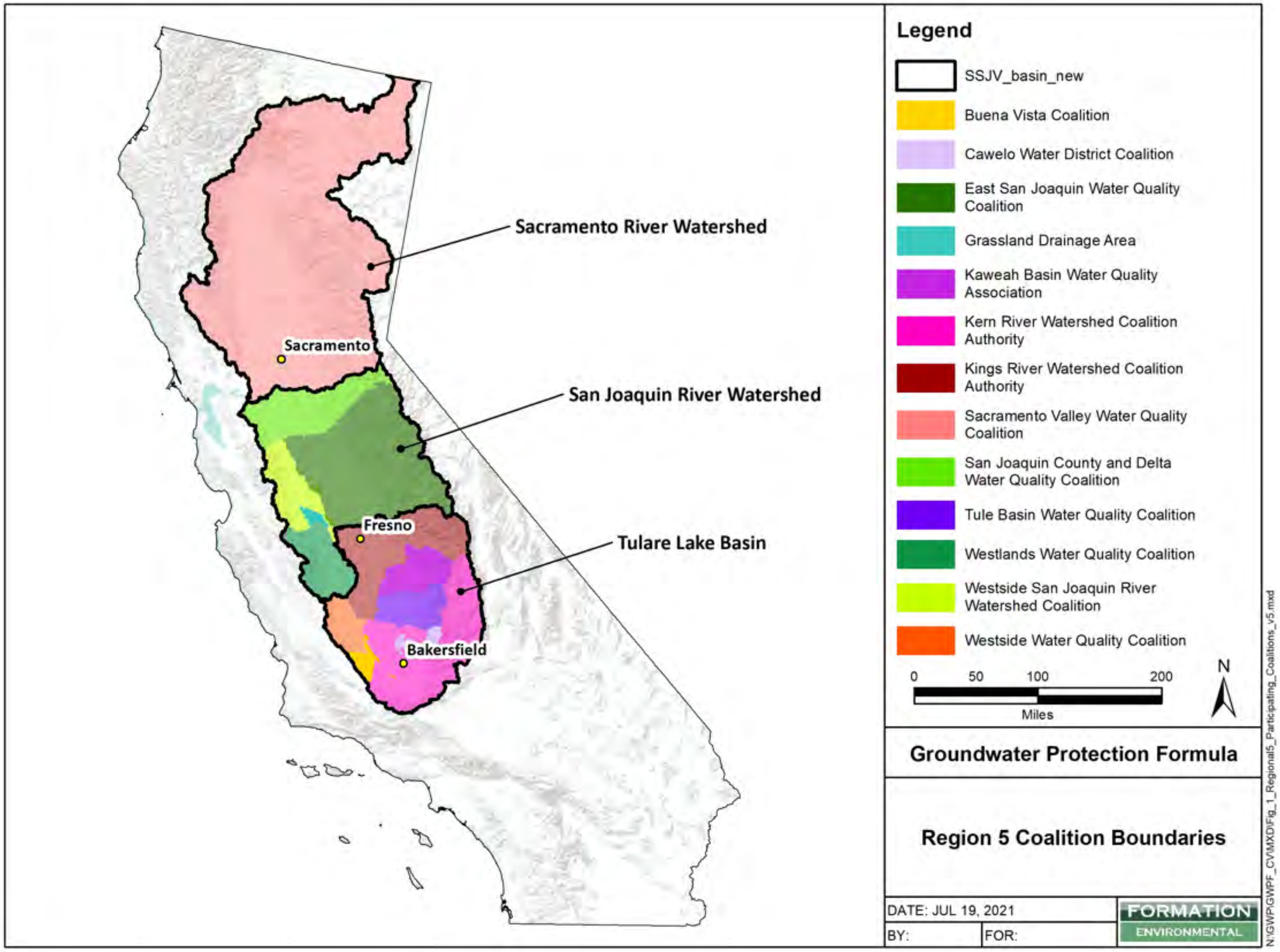


1.2 Coalitions

Thirteen water quality Coalitions participated in developing and implementing the GWP Formula to compute GWP Values, which is all Coalitions but the California Rice Commission. The California Rice Commission is not subject to this requirement. Figure 2 shows the participating Coalitions, which are also listed below.

1. Buena Vista Coalition
2. Cawelo Water District Coalition
3. East San Joaquin Water Quality Coalition
4. Grassland Drainage Area Coalition
5. Kaweah Basin Water Quality Association
6. Kern River Watershed Coalition Authority
7. Kings River Watershed Coalition Authority
8. Sacramento Valley Water Quality Coalition
9. San Joaquin County and Delta Water Quality Coalition
10. Tule Basin Water Quality Coalition
11. Westlands Water Quality Coalition
12. Westside San Joaquin River Watershed Coalition
13. Westside Water Quality Coalition

FIGURE 2. MAP OF COALITIONS



2 IMPLEMENTATION OF THE GWP FORMULA

The development of the GWP Formula is described in detail in the GWP Formula Workplan that was submitted on July 1, 2020 (Central Valley Coalitions 2020), and is not repeated here. The conditionally approved GWP Formula consists of three key steps: Step 1) compile and use daily climatic, detailed soil, parcel, and INMP/NMP data as reported by growers to the Coalitions in their INMP/NMP Summary Reports, Step 2) evaluate detailed data using robust, scientifically valid equations and methods encompassed in the CV-SWAT to estimate percolation and nitrate transport and fate within the root-zone, and Step 3) aggregate the results to the township scale to provide root-zone-based GWP Values. Subsequent steps in the GWP Targets process will consider additional scientifically supported processes affecting nitrogen transport and fate in the vadose-zone and groundwater systems.

2.1 STEP 1. AGGREGATE DATA

Step 1 included aggregating data to identify GWP Townships and analyzing all INMP/NMP Summary Report data to quantify the range of applied nitrogen, yields, and their relationship for each crop within GWP Townships.

2.1.1 GWP TOWNSHIPS

During the 2019 crop year, growers who farmed in High Vulnerability Areas (HVAs) were required to submit either INMP Summary Reports (East San Joaquin Water Quality Coalition) or NMP Summary Reports (all other Coalitions) (referred to as INMP/NMP Summary Report data). The HVAs are determined independently by each Central Valley Coalition and submitted and approved as a part of the Groundwater Assessment Reports, which are updated every five years. The State Water Resources Control Board Order WQ 2018-0002 requires the development of a GWP Formula, Values and Targets for high-priority townships or areas. High-priority areas are those areas where the Executive Officer determines that irrigated agriculture may be causing or contributing to exceedances of water quality objectives or a trend of degradation that may threaten applicable beneficial uses. (Order WQ 2018-0002, p. 66-67.) For the purposes of this Report, high-priority townships (i.e., GWP Townships) for 12 of the 13 coalitions were identified based on whether there is greater than 10 percent of designated HVAs within any given township boundary and for which there is irrigated agriculture with relevant INMP/NMP Summary Reports. This threshold was developed through discussions between the Central Valley Coalitions (except for the Sacramento Valley Coalition), the CVRWQCB, and certain Environmental Justice stakeholders. The Sacramento Valley Coalition has used a different methodology to identify high priority townships that are appropriate for the Sacramento Valley. The Sacramento Valley Coalition methodology consists of townships with greater than 30 percent of designated HVAs and where the township also had groundwater that measured above 7.5 mg/L in the last 20-year period.

A total of 538 townships in the Central Valley have at least some HVA acreage within the township boundary. Of the 538 townships with HVAs, only 484 had irrigated agriculture requiring an INMP/NMP Summary Report for the 2019 crop year. Of these 484 townships, 84 were excluded because they did not have at least 10 percent of HVAs. An additional 78 townships within the Sacramento Valley area were excluded based on the Sacramento Valley Water Quality Coalition’s independent criteria identified above.

In total, GWP Values were calculated for 322 townships (Table 2). This includes 303 GWP Townships based on greater than 10 percent HVA within a Coalition boundary for 12 coalitions and 19 GWP Townships for the Sacramento Valley Water Quality Coalition). Some townships "straddle" coalitions such that those townships have HVA acreage in two or more coalitions. No attempt was made to apportion values on a coalition basis; that is, a single township value was calculated and both coalitions were assigned to that value. This avoided situations where HVA acreage would be split between coalitions resulting in neither coalition having 10 percent HVA in the township.

There were INMP/NMP reports related to Townships with 0% HVA that totaled 40,767 acres. This is likely due to some growers providing information on all of their farmed parcels, even if some of those parcels are located outside of HVAs. These data were excluded from the selection of Groundwater Protection Townships and therefore the calculation of Groundwater Protection Values because they were not associated with any HVA. These acres explain to difference in Table 2 INMP/NMP acreage (HVA only) and Table 3 INMP/NMP acreage (all data provided from the 13 participating Central Valley Coalitions).

Table 2. Summary of Groundwater Protection Townships Based on the High-Vulnerability Area (HVA) Threshold of 10 Percent or Independent Criteria

Category	Description	Number of Townships	Number of Reported Parcels	Total Reported Acres
Townships Included	Greater than 10% HVA	303	51,798	2,820,372
	Meet independent Sacramento Valley criteria	19	3,319	191,737
	Total Townships Included	**322**	**55,117**	**3,012,109**
Townships Excluded	Less than 10% HVA area	84	2,169	202,226
	Did not meet independent Sacramento Valley criteria	78	5,174	322,997
	Total Townships Excluded	**198**	**7,726**	**525,223**
Townships Requiring 2019 INMP/NMP Summary Reports		484	62,460	3,537,331

2.1.2 2019 INMP/NMP Summary Reports

Integration of INMP/NMP Summary Report data is critical to the development of the GWP Values. Step 1 of the GWP Formula implementation included aggregating, analyzing, and summarizing INMP/NMP Summary Report data from all participating Central Valley Coalitions.

- **Aggregating INMP/NMP Data.** All Coalitions provided INMP/NMP Summary Report data for the 2019 crop year. Growers reported nitrogen applied and yield as a ratio (A/Y) using the NMP Summary Report template approved by the CVRWQCB on June 14, 2013, except for growers in the East San Joaquin Water Quality Coalition. Beginning in the 2019 crop year, growers in the East San Joaquin Water Quality Coalition were required to use the INMP Summary Report template approved by the CVRWQCB on October 19, 2018. Overall, there were 62,843 parcels with INMP/NMP Summary Reports covering 3,578,100 acres of HVA (Table 3).

  Each Coalition maintains their own data management system for storing and processing grower-reported data to ensure that the data are complete and meet quality control criteria. As part of the process to combine the individual datasets, the Coalitions provided the following information for each record: Coalition, County, Parcel, Township-Range, Crop, Acreage, Nitrogen Applied (in lbs/ac), Yield, and Yield Units. If applicable, the Coalitions also provided additional optional information collected, including irrigation type and crop age (or year planted) that could be used to distinguish juvenile and mature perennial crops. Not all Coalitions collected the optional information because it is not required on the INMP/NMP Summary Report templates. Crop age information and/or codes were used to populate a normalized set of age description codes used for all data throughout the GWP database.

If available, Coalitions also provided any information regarding the results of their own data quality control and/or data management processes, including any data flags or data qualifier codes, and indicators of which records may have been verified by the Coalition when contacting growers. The data qualifiers provided by the different Coalitions were associated to a normalized set of codes, which are now stored in the GWP database; this allowed for a consistent set of quality assessment codes to be applied to the INMP/NMP data.

Coalitions provided all data including incomplete (e.g., one of the mandatory fields was missing) or suspect data (e.g., yields an order of magnitude larger than the average for the crop). These data may have been excluded from the individual Coalition's reporting to the CVRWQCB but were included in the information used in the generation of GWP Values to ensure a comprehensive assessment for each township. Coalitions also provided a list of parcels with unreported data, but where an INMP/NMP Summary Report was expected. For these parcels, the average GWP Values for the township were assumed.

- **Quality Control of INMP/NMP Data.** Data received from the Coalitions were stored as "preliminary data." Preliminary data were loaded into the GWP database to be run through a series of quality control (QC) checks and processed for data consistency prior to being used in calculating GWP Values. The QC checks included the following:
    - Crop: Crop names provided by each Coalition were cross-walked to a normalized list of crop names used throughout the GWP database.
    - Parcels: Assessor parcel numbers and counties were reformatted according to the formatting rules used by each county's Geographic Information System (GIS) layers.
    - Acreage: The acreage of each reported field was checked against the mapped parcel acres. Records were flagged as suspect if the relative percent difference between the reported acreage and the mapped parcel acreage was greater than 20% and the difference between the two was greater than 10 acres.
    - Nitrogen Applied and Yield: Reported nitrogen applied and yield values were checked against data thresholds for expected ranges of valid data. The amount of nitrogen was checked to make sure it is sufficient to produce the amount of yield reported. This is further described in Step 3 (Section 2.3).

- **Duplicates:** Additional checks were performed to ensure that duplicate data were not processed as individual records for calculating GWP Values.

Data that were flagged during the QC checks were returned to the appropriate Coalition for review. Most of the work performed by the Coalitions at this step was to ensure that the parcel information was correct and could be mapped, though some additional grower follow-up was conducted and data corrections were provided. If data could not be corrected, the data flag remained on the record. The approach to address data gaps in the 2019 INMP/NMP Summary Reports is summarized in Table 4. Additional detail is also provided in Section 2.3.

- **Analyzing INMP/NMP Data.** All INMP/NMP Summary Report data were analyzed to quantify the range of applied nitrogen, yields, and their relationship for each crop within GWP Townships. These datasets were then used to develop comprehensive Crop Management and Yield Matrices (Crop Matrices) that reflect the distribution of applied nitrogen and yield for each crop. These Crop Matrices identify the appropriate management scenarios for CV-SWAT runs that are conducted in Step 2. Parcel data were used to spatially associate the individual INMP/NMP Summary Reports with soil and climate conditions at that location.

Table 3. Summary of Reported INMP/NMP Data for the 2019 Crop Year Used to Calculate GWP Values

Coalition	Crops Reported	INMP/NMP Fields	Parcels	Total Acres Reported
Buena Vista Coalition	14	258	207	18,929
Cawelo Water District Coalition	22	488	342	24,966
East San Joaquin Water Quality Coalition	104	13,892	11,212	526,648
Grassland Drainage Area Coalition	24	288	225	37,097
Kaweah Basin Water Quality Association	52	6,215	4,276	151,122
Kern River Watershed Coalition Authority	86	10,311	6,731	614,792
Kings River Water Quality Coalition	88	17,760	13,184	565,010
Sacramento Valley Water Quality Coalition	96	11,855	8,886	542,967
San Joaquin County and Delta Water Quality Coalition	92	6,638	5,920	196,514
Tule Basin Water Quality Coalition	46	5,029	3,967	187,793
Westlands Stormwater Coalition (Westlands Water Quality Coalition)	61	4,195	3,322	406,192
Westside San Joaquin River Watershed Coalition	73	4,375	3,582	199,619
Westside Water Quality Coalition	8	1,032	989	106,451
Total	**182**	**82,336**	**62,843**	**3,578,100**

Table 4. Approach to Data Gaps in the 2019 INMP/NMP Summary Report Data

Data Gap	Approach to Resolve Data GAP	Townships Affected	Total acres Affected	Percent of Total Acres
Reported N applied is insufficient to achieve yield in CV-SWAT	Nitrogen is added at a 90% efficiency to the reported value based on the reported yield. On average this was less than 6 lbs/acre. See Section 2.3 for additional detail.	299	388,639	13%
Reported yield is missing (i.e., null)	If there is no reported yield and reported N applied = 0 (or field is reported as a research field), then substitute the most efficient CV-SWAT modeled yield and N applied given that the reported nitrogen applied was 0.	155	48,551	2%
Reported yield is above expected upper limit	Crop-specific upper limits for reported yields were determined based on 4-year averages from the County Agricultural Commissioners' Reports. For perennial crops, upper limits were set at 3x the 4-year average, while annuals were set at 2.5x the 4-year average. For minor crops with little yield information, the yield threshold was set at 250,000 lbs. For pasture, the yield threshold was set to 40,000 lbs/ac. Yields were replaced with crop-specific averages (Coalition, Domain, or Valley-wide depending on how many other records are reported for that crop).	171	39,456	1%
APN (Assessor's Parcel Number) in INMP/NMP database has no match to spatial parcel database	Representative soil and climate used based on the "relative" parcel location in the township as provided by the Coalition.	137	32,059	1%
Reported N applied is missing (i.e., null)	If the reported yield is 0 and N removed coefficient from Geisseler (2016, 2021) are not available, then assume no nitrogen was applied.	62	13,471	0.4%
	If the reported yield is above 0 and N removed coefficient from Geisseler (2016, 2021) is available, then assume nitrogen applied is consistent with nitrogen required.	2	111	0.004%
Reported N applied is above 500 lbs/acre	If N > 500 lbs/acre, then replace nitrogen applied with crop-specific average nitrogen applied (Coalition, Domain or Valley wide depending on how many other records are reported for that crop). See Section 2.3 for additional detail.	31	3,389	0.1%

2.2 Step 2. Develop Root-zone Library

Step 2 of the GWP Formula implementation included development of the Root-zone Library using the CV-SWAT model. It includes unique model runs for Central Valley crops, including model runs that account for soil and climate conditions, and management information from INMP/NMP Summary Reports. Specifically, the Root-zone Library includes a unique estimate of percolation and nitrate leaching using CV-SWAT results based on crop, soil, climate, applied nitrogen, and yield, which can then be used to match INMP/NMP Summary Reports for each GWP Township. The methods to develop the Root-zone Library are defined as the equations and workflow that use the data from Step 1 to produce root-zone GWP Values. The comprehensive root-zone physical processes in the CV-SWAT model provide the robust, scientifically valid equations for the GWP Formula. The following sections outline the development of the Root-zone Library.

2.2.1 CV-SWAT Model Inputs

CV-SWAT is an adaptation of SWAT to Central-Valley-specific conditions and has been in development and refinement since 2017. CV-SWAT was initially developed as part of the Southern and Northern Management Practices Evaluation Programs (MPEPs) to assess the effectiveness of agricultural management practices and their potential influence on groundwater quality. SWAT adaptations for the Central Valley included augmenting the model to represent the diverse cropping systems, soils, management practices, yields, and climates unique to the region. This effort was supported in part by a $2 million Conservation Innovation Grant from the Natural Resources Conservation Service (NRCS). Significant time and resources were invested, including collaborative input from NRCS staff, University of California (UC) research and extension staff, CVRWQCB staff, as well as private crop consultants to develop, calibrate, execute, and evaluate CV-SWAT.

CV-SWAT has been further adapted for the GWP program to serve as the methodological component of the GWP Formula. SWAT uses information on topography, climate, soil, land cover, and land use to delineate watersheds, drainage networks, and discrete modeling units (i.e., hydrologic response units [HRUs]) to simulate its suite of physically based processes. As described in the GWP Workplan, the spatial domains are the Sacramento Valley, San Joaquin River Watershed, and the Tulare Lake Basin. Below is an overview of the data inputs, model setup, calibration process, and resulting model specifications that were employed for simulating agricultural systems and estimating nitrate leaching. More detailed information on these individual pieces is provided in Appendix 3 and Appendix 4.

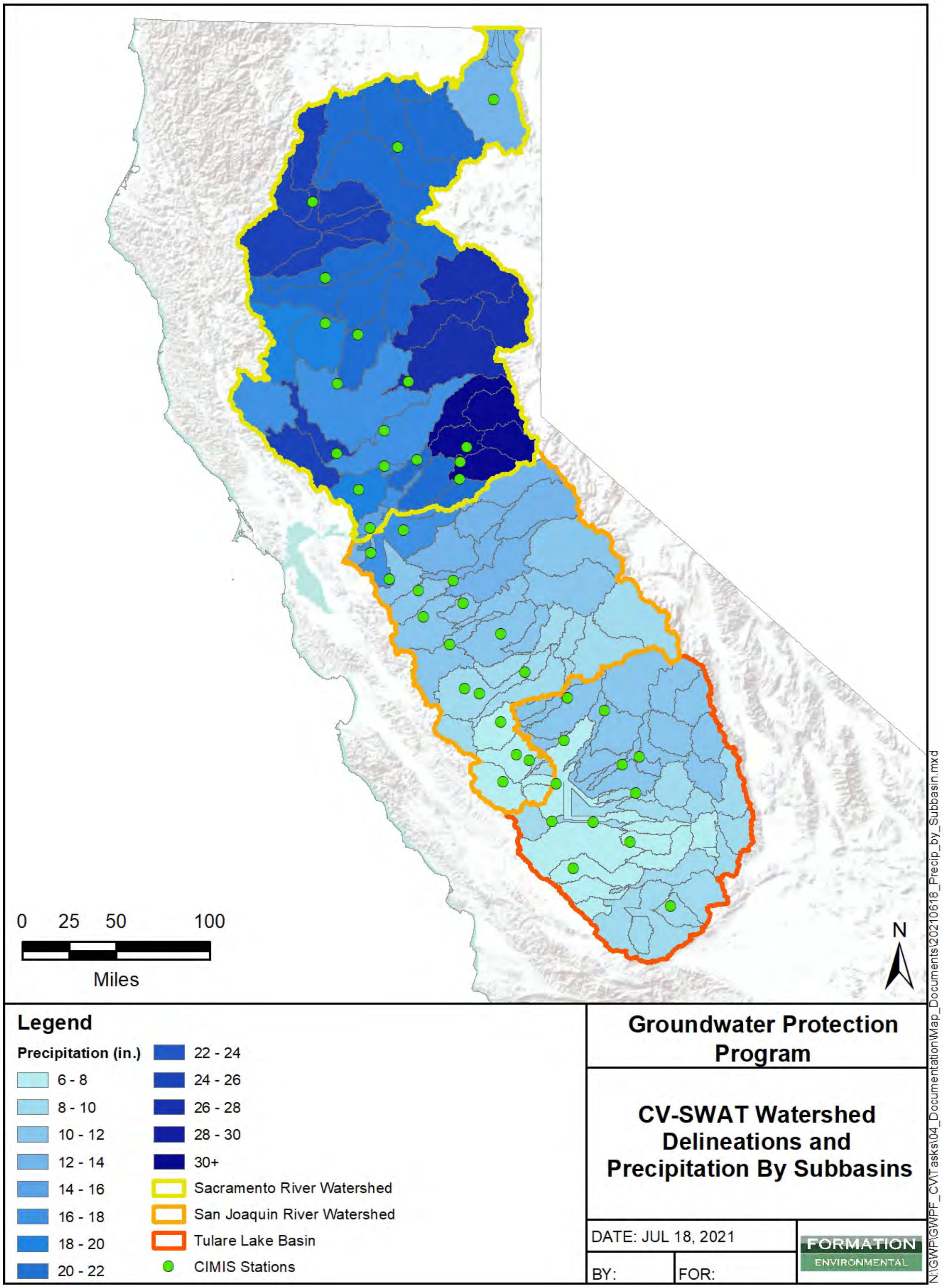
Topography. A 30-meter (98-foot) gridded Digital Elevation Model (DEM) from the Shuttle Radar Topography Mission (Farr et al. 2007) was used to create stream networks and to delineate watersheds. This information influences hydrologic processes within SWAT including surface and subsurface flow processes and basin drainage through surface water channels. These data, in conjunction with soil and land use information, are used to delineate HRUs, the most discrete modeling unit in SWAT.

Climate. SWAT requires daily information on solar radiation, relative humidity, wind speed, air temperature, and precipitation to simulate physical processes related to plant growth, evapotranspiration (ET), nutrient uptake and cycling, and the water cycle. Sub-watersheds (sub-basins) within SWAT are assigned climate information from the weather station that is nearest to its centroid. Weather station data were obtained from the California Irrigation Management Information System (CIMIS). The CIMIS program was started in 1982 and it has grown with around 156 stations in recent years. These data were QA/QC'd to identify invalid data and missing values. Climate record completeness was also evaluated for the range of years simulated in CV-SWAT (1983-2019). Where invalid and missing data were identified, they were filled using data from nearest station. In addition, CIMIS stations with limited record completeness were removed as inputs to the CV-SWAT model. Decommissioned old stations and new stations were combined to generate the final set of weather stations spanning roughly 420 miles from Redding (Shasta College station) to south of Bakersfield (Arvin-Edison station), including 46 stations that represent the range of climatic variability within the Central Valley. A watershed-level summary of climate input data is provided in Table 5.

TABLE 5. SUMMARY OF CLIMATIC DATA FROM CIMIS USED IN CV-SWAT

Watershed	CIMIS Stations	Mean Annual Precipitation (inches)	Mean Annual Air Temperature (°F)	Mean Annual Relative Humidity (%)	Mean Annual Solar Radiation (Mj/m)	Mean Daily Windspeed (mph)
Tulare Lake Basin	12	9.5	63	60%	6,809	3.9
San Joaquin River	17	12.8	61	63%	6,752	5.1
Sacramento River	17	22.8	60	62%	6,637	5.2

FIGURE 3. SPATIAL DISTRIBUTION OF CIMIS WEATHER STATIONS AND MODELED PRECIPITATION IN CV-SWAT



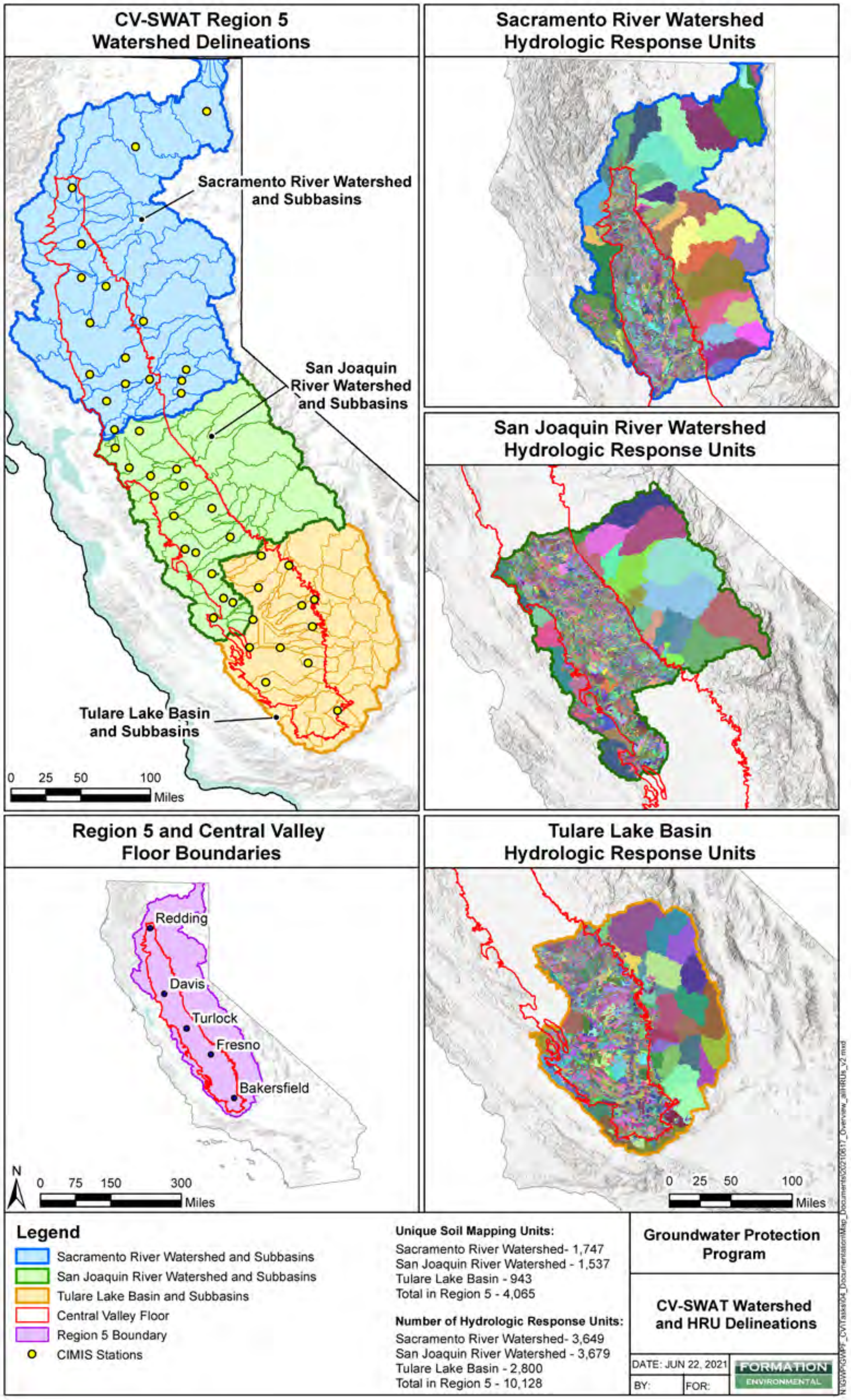
Soils. Information on soil is a vital component of the SWAT model. A detailed and accurate representation of soil physical and chemical properties is crucial for accurate simulations. During the initial development of CV-SWAT, modelers from the NRCS shared a beta version of a soil dataset they had developed for a Conservation Effects Assessment Program evaluation. This database is largely based on soil pedon information archived in the National Cooperative Soil Survey database. These data are mainly from field samples taken from soil pits (pedons) that were analyzed in the laboratory for their chemical and physical properties. Given the makeup of this dataset, it was named “PEDON.”

The PEDON dataset was used for this project because this dataset contains many field-observed soil horizons that were otherwise combined in the default the SWAT soil database (SWAT SSURGO). Where data were missing for mapping units, the NRCS Gridded Soil Survey Geographic Database (gSSURGO) (2020) was used to gap-fill, followed by the NRCS STATSGO database. In total, the final CV-SWAT soil database contains 4,065 unique mapping units across the three domains. For all mapping units, pedotransfer functions were used to calculate saturated hydraulic conductivity values from percent sand, silt, clay, and organic matter (Saxton and Rawls 2006). For vertisols, the hydrologic soil group designations were changed from Group C to Group D, to reflect more accurate soil hydrology.

A detailed summary of the methodology for developing soils data for modeling the three Central Valley domains is included in Appendix 3.

Land Use. Land use characterization is a requirement for SWAT and a critical component for simulating the effects of cropping systems and management on water quality. This includes details on the crop type and crop growth parameters as well as information related to management (i.e., planting and harvesting dates, tillage, nitrogen application, irrigation). Development of land use for CV-SWAT is discussed in greater detail in Section 2.2.2.

FIGURE 4. OVERVIEW OF CV-SWAT MODELING DOMAINS AND HYDROLOGICAL RESPONSE UNITS



2.2.2 CV-SWAT Model Development

After integration of relevant model inputs, calibration of CV-SWAT was systematically completed to accurately represent Central Valley agriculture with respect to crop N, water use, growth, and yield ("crop processes") as well as other N pathways simulated in the crop root-zone. This includes iterative parameterization, evaluation, and refinement of CV-SWAT crop models, including crop-specific management suites and calibration of various N pathways. The following sections outline the methods for developing land use (crop and management) classes in CV-SWAT as well as crop model calibration and defining crop management. Crop summaries are further detailed in Appendix 3 and Appendix 4.

Select Crops to Model. While more than 180 crop classes were reported in 2019 INMP/NMP data (Table 3), 50 crops make up most of the reported acreage (>95%). Therefore, prioritization of crops and crop groups for modeling was required to ensure efficient and adequate model representation of the landscape. Prioritization of crops and crop groups for modeling in CV-SWAT was informed by coalition-submitted INMP/NMP Summary Report data. Specifically, INMP/NMP Summary Report data from 2016-2019 were evaluated to understand crop distribution patterns as well as the range of management practices and yield outcomes observed across the Central Valley. Watershed-specific crop models were developed for all crops with >2,000 INMP/NMP Summary Report reported acres in 2016-2018 or >1,000 reported acres in 2019. In total, 98.6% of the 2019 INMP/NMP reported acres have an associated CV-SWAT model. Minor crops not modeled in CV-SWAT include the following:

1.) Crops with insufficient data to develop representative crop models,

2.) Heterogenous crop class (e.g., nursery crops, mixed vegetables) where management practices and reported yield units are too heterogenous to model, or

3.) Crops with minimal acreage.

Specific details on how minor crops were addressed are described in Section 2.3.

Calibrate Crop Models. A strength of SWAT relative to other modeling alternatives is its explicit crop model. Consistent with how crops actually grow, SWAT simulates crop growth as a function of solar radiation (supplied from climate data) and maturity when a defined number of heat units are accumulated. As crops age from seedlings to full maturity, their canopy and root system develop, which affects ET and nutrient uptake. Also, optimal plant N concentrations are defined as a function of maturity, further influencing N uptake within the growing season. There are 36 crop model parameters in CV-SWAT that control the magnitude and timing of various crop processes, including biomass and yield production as well as water and nutrient uptake. Of these crop model parameters, a subset have a large impact on crop growth and water and nutrient balances (Table 6). These were the main focus parameters for the calibration process.

TABLE 6. CROP MODEL PARAMETERS THAT AFFECT MAGNITUDE AND TIMING OF BIOMASS AND YIELD PRODUCTION

BIO_E	Radiation use efficiency in ambient CO_2 (kg/ha)/(MJ/m^2)
HVSTI	Potential harvest index for the plant at maturity given ideal growing conditions
BLAI	Potential maximum leaf area index for the plant (m^2/ m^2)
ALAI_MIN	Minimum leaf area index for plant during dormant period (m^2/ m^2)
FRGRW1	Fraction of the growing season corresponding to the 1st point on the optimal leaf area development curve
LAIMX1	Fraction of the maximum plant leaf area index corresponding to the 1st point on the optimal leaf area development curve
FRGRW2	Fraction of the growing season corresponding to the 2nd point on the optimal leaf area development curve
LAIMX2	Fraction of the maximum plant leaf area index corresponding to the 2nd point on the optimal leaf area development curve
DLAI	Fraction of growing season at which senescence becomes the dominant growth process
T_OPT	Optimal temperature for plant growth (°C)
T_BASE	Minimum temperature for plant growth (°C)
Heat Units*	Total amount of accumulated heat units required for plant to reach maturity
RDMX	Maximum rooting depth for plant (m)
BIO_LEAF	Fraction of tree biomass converted to residue during dormancy
CNYLD	Fraction of nitrogen in the yield
BN1	Normal fraction of nitrogen in the plant biomass at emergence
BN2	Normal fraction of nitrogen in the plant biomass at 50% maturity
BN3	Normal fraction of nitrogen in the plant biomass at maturity

* Heat units are defined in SWAT management files, not crop model parameters, but are included in the table because they affect crop growth and maturity.

These parameters were adjusted in an iterative process at the landscape scale, taking into account available literature and professional experience. A landscape-scale manual calibration approach was required because the spatial and temporal complexity of cropping systems in the Central Valley is immense and not adequately characterized for any one crop in any one region across a sufficient period of time to allow for a site-specific (i.e., field level) calibration approach. The time and resources required to obtain site-specific data for the 6 million+ acres of the Central Valley make collecting such a comprehensive dataset virtually impossible. In lieu of such data, achieving representative landscape-level dynamics of crop processes ensures that the suite of physical root-zone processes captured for any one field are reasonable and reflective of reality.

Crop processes were tailored to each domain, with variability a function of soil and climatic information. Crop models were evaluated based on expected in-season values for water and N uptake, plant growth, and yield. Expected values were identified through evaluation of available scientific literature and other relavent datasets (e.g., County Agricultural Comissioners reports, INMP/NMP data, California Actual Evapotranspiration [CalETa]). Model simulations were evaluated across space and time to ensure that averages and variability were within expected ranges. Where needed, crop model parameters were adjusted iteratively and consistent with principles of crop physiology and available literature. A list of references by crop is supplied in Appendix 4.

Define Management. Management suites were developed on a crop-specific basis within each domain to be representative of current practices and capture differences across the Central Valley. Management suites consist of planting and harvest dates, N fertilizer type, application rate and timing, irrigation type, rate, and timing, and tillage. A major resource for developing these suites was crop production budgets developed by UC agricultural economists, UC Farm Advisors, and cooperating growers. These budgets comprehensively list all major management activities in each domain. Extensive consultation with UC Extension Specialists and Farm Advisors, crop advisors, and other industry experts provided additional input. Nitrogen management practices (application rate and timing) were developed from these sources, as well as grower-reported nitrogen application rates and crop yields from 2016-2019 INMP/NMP data.

Similarly, irrigation practices (irrigation timing and volume) were developed using UC crop budgets, consultations with experts, and evaluation of actual ET data from representative fields (Paul et al. 2021). Seasonal irrigation totals were adjusted for effective precipitation and reflect crop irrigation requirements. Irrigation timing reflected the pattern of seasonal ET, and the type of irrigation system modeled for each crop (drip, micro-sprinkler, sprinkler, or flood/furrow). For each crop, irrigation practices based on the most common type of irrigation system used on that crop (e.g., flood for alfalfa, drip irrigation for processing tomato) were developed for each domain. In the Tulare Lake Basin, pre-season irrigations were modeled to account for the leaching of salts, which is commonly done to avoid negative impacts associated with elevated salinity levels. More information on crop-specific management practices can be found in Appendix 3 and 4.

Calibrate Nitrogen Pathways. As mentioned, CV-SWAT simulated a wide variety of N pathways that comprise the comprehensive N budget. These N pathways were evaluated and calibrated as part of the crop model calibration and management suite development to ensure reasonable, and in some cases conservative, estimates consistent with the current understanding of these processes. The N pathways include the following: 1) denitrification, or the conversion of nitrate to N_2 (and other gaseous species), 2) ammonia volatilization of ammoniacal-N fertilizer, 3) N storage in perennial plant biomass, 4) N lost in surface runoff and lateral flow, and 5) organic N stored in soil organic matter. Below briefly describes how each of these pathways are handled and calibrated in CV-SWAT. Section 3.3 provides the average values for these N pathways for each calibrated crop. As requested by the CVRWQCB in the GWP Formula conditional approval letter, additional information on the sensitivity of these N pathways to model inputs is provided in Appendix 6.

- **Denitrification.** Denitrification is a microbially mediated process within the soil root-zone and is a function of a variety of factors in SWAT. These factors include substrate concentration (i.e., the amount of nitrate and organic carbon present in the soil, which are both required for the process) as well as environmental factors including soil temperature and moisture content. Within SWAT, the soil moisture content at which denitrification begins (named "SDNCO") can be adjusted as well as a general rate factor (named "CDN") to control the process. All crops in CV-SWAT are parameterized the same with respect to denitrification because this physical process is not crop-specific.

In terms of model calibration, direct field measurements of total denitrification are complex and seldom made. The last systematic, California crop-specific research was conducted in the 1980s, meaning these estimates are no longer relevant for current cropping systems. However, a more recent body of work exists that evaluates nitrous oxide (N_2O) emissions in California systems because it is an important greenhouse gas (Verhoeven et al. 2017). These data suggest that N_2O emissions are generally less than 1% of applied N. Data also suggest that the N_2O emissions can vary widely, from less than 20% to more than 50% of total denitrification (Cuhel et al. 2010; Weier et al. 1993). CV-SWAT simulates total denitrification, not the suite of gaseous N species that may be formed from microorganisms through denitrifying processes. For the purposes of calibrating CV-SWAT, it was conservatively assumed that N_2O emissions are roughly 50% of total denitrification emissions, meaning total denitrification rates were calibrated to roughly 2% or less of the total fertilizer N input.[5] To achieve this, the SDNCO was set to 95% of field capacity, while the CDN was scaled based on soil carbon content. It was observed that higher organic matter soils tended to overestimate denitrification. Because of this, the CDN is reduced as soil organic matter increased to avoid over-estimation of this pathway.

Although the denitrification parameters were set the same for each crop, the final estimated rates of denitrification vary based on management practices and/or a given HRU depending on soil and climate information. It is important to note that the denitrification estimates (discussed below) used in the calculation of GWP Values are conservative in CV-SWAT relative to current literature (Verhoeven et al. 2017). This was done specifically because there is some uncertainty with the pathway and to avoid unrealistically high estimates for specific HRUs and/or management scenarios (e.g., high fertilizer rates and low yield scenarios).

- **Ammonia volatilization.** Ammonia volatilization in SWAT is calculated in parallel with nitrification (conversion of ammoniacal N to nitrate N) and both processes are intrinsically linked and are affected by the same factors. In moist soils, nitrification occurs readily and rapidly and only a small fraction of ammoniacal fertilizer N is lost through volatilization. If soils are not amply moist, and/or fertilizer N is placed on the soil surface, there is more opportunity for ammonia volatilization. In SWAT, this process is a function of fertilizer type (how much N is applied in an ammoniacal form), soil temperature and moisture content, the depth at which the fertilizer is placed, and soil cation exchange capacity (CEC). The depth of application is considered because fertilizer placement is important for this N pathway. The larger the soil column for which ammonia gas must pass through to be lost from the system, the more opportunity there is for nitrification to occur. Fertilizer type and placement is crop-specific in CV-SWAT, with winter grains receiving topdressings of urea, which can contribute more volatilization than other management practices.

[5] Assuming N_20 emissions are 1% of applied N and N_20 is 50% of all gaseous losses, then total denitrification is approximately 2% of total N applied (1% of fertilizer/50% of total denitrification = 2% of total fertilizer input).

The soil CEC also influences ammonia volatilization because ammonium is a cation and can adsorb to negatively charged exchange sites and therefore not volatilize.

With respect to the calibration process, California-specific data suggest relatively low volatilization losses and a high degree of variability (Krauter et al. 2006). However, these data are not entirely representative of today's management practices and may suggest slightly higher rates overall than what is currently occurring. Therefore, while the average ammonia volatilization "emission factor" was estimated to be 3.2% of applied N (Krauter et al. 2006), the calibration process targeted closer to 1-2% of applied N, with crop-specific differences due to management practices as discussed above. SWAT has a default CEC value of 0.15 for all soils. To calibrate ammonia volatilization losses, this value was adjusted to 0.1 in CV-SWAT to control N losses and avoid over-estimation for specific HRUs and/or management scenarios. Fertilizer types and placements (depth in the soil profile), which affect ammonia volatilization, are outlined for broad crop groups in Table 7.

TABLE 7. VOLATILIZATION POTENTIAL OF FERTILIZER TYPES AND PLACEMENTS

Fertilizer type	Associated Crops	Fertilizer Use	Volatilization Potential
Ammonium Sulfate (21-0-0)	• Annuals • Pasture	• Pre-plant application below the soil surface • Top-dress for pasture	• Low to moderate
Urea Ammonium Nitrate (32-0-0)	• Annuals • Perennials	• Side Dress application below the soil surface • Fertigation in micro-sprinkler and drip systems	• Low for side dressing and subsurface drip systems • Low to moderate for micro-sprinkler
Urea (46-0-0)	• Winter grains and silage	• In-season top-dress application on the soil surface	• Higher

- **N storage in perennial biomass.** N storage in perennial biomass is a major component of the overall N budget for perennial crops and was calibrated for each crop model. California-specific data on major perennial crops including almond, pistachio, walnut, orange, and table grape, among others, were used to inform this portion of the crop model and provide targeted amounts of N storage. This includes California-specific literature for almonds (Muhammad et al. 2020), other *prunus* species including peach (El-Jendoubi et al. 2013); pistachios (Rosecrance et al. 1998), orange (Morgan et al. 2006; Roccuzzo et al. 2012), grapes (Araujo and Williams 1998; Williams 1987; Williams 2017) and walnuts (Weinbaum et al. 1998). This N pathway is controlled in part by calibrating crops to take up an appropriate total amount of N in a growing season and ensuring that the proper amount of N is removed with harvested materials. From there, the "BIO_LEAF" parameter (Table 6) controls the amount of biomass (and therefore biomass N) returned to the soil as residues during dormancy. This parameter therefore allows for further control of how much N is stored in perennial biomass to calibrate values that are consistent with literature.

- **N in runoff and lateral flow.** N lost through surface runoff and lateral flow are both simulated in CV-SWAT. These N pathways were monitored during calibration, but not explicitly calibrated because SWAT is a hydrologic model and is already well suited for simulating these processes (Krysanova and White 2015). These processes are a function of topographic (slope from the digital elevation model) and soil properties (e.g., infiltration rate) associated with a given HRU, as well as water and N inputs. Losses may be higher in foothill regions where slopes are steeper relative to the Central Valley floor, but in general, these losses are low in CV-SWAT.

- **N storage in soil organic matter.** Soil organic matter (and specifically soil organic N) is a complex component of soil and its dynamics are influenced by a variety of factors. SWAT simulates three different pools of soil organic N: 1) fresh plant residue N, 2) active organic N, and 3) stable organic N. Each is described below. Organic matter N dynamics can either lead to N storage or N depletion and depend on crop type, management, soil, and climate information. However these changes are often only a small fraction of the entire N budget.

  - **Fresh plant residue N** is returned to the soil in annual biomass that was not removed with yield or sequestered in standing perennial tissue. This N is labile and breaks down readily to nitrate (80%) and *active organic N* (20%) based on the soil carbon to nitrogen ratio, temperature, moisture, and residue decomposition rate factors.

  - **Active organic N** is humus N that can either mineralize to nitrate or be stored in stable organic N. Mineralization of *active organic N* is a function of its concentration, soil temperature and moisture, and a rate factor (named "CMN"). The default value for CMN in SWAT is 0.0003. This value was retained for perennial crops in CV-SWAT, but increased to 0.00045 for annuals to promote breakdown of soil organic matter and N mineralization. These settings are intended to augment the effects of tillage in CV-SWAT (perennial cropping systems typically have less soil disturbance and may accumulate more soil organic matter).

  - **Stable organic N** is humus N that can be converted to active organic N or remain as stable organic N. Cycling between *active* and *stable organic N* pools is a function of the concentration of each pool in the soil. SWAT aims to equilibrate the percent of total humus N in the *active pool* to 2% (with 98% as *stable organic N*). As such, crops and/or specific management scenarios that return considerable amounts of residue N (that contributes to *active organic N*) may ultimately end up storing soil organic matter. On the other hand, crops and/or specific management scenarios that return relatively little residue N, or soils with high stable organic N fractions (e.g., the Sacramento-San Joaquin River Delta soils), can lead to a depletion in total soil organic N (Miller et al. 2018).

2.2.3 CV-SWAT Automation

An innovative automated workflow was used to develop the Root-zone Library. This included executing numerous (~75,000) CV-SWAT runs to account for the diversity in INMP/NMP Summary Report data and management (i.e., the Crop Matrices from Step 1). Each climate, soil, crop, and management scenario was modeled to ensure that all scenarios have a percolation and nitrate leaching estimate. This was achieved in part by treating land use as a single crop for all acreage in the CV-SWAT model runs, therefore simulating each crop on every soil in every climate.

Calibrated crop models served as the foundational starting point for all automations. The calibrated crop models represent a productive crop in terms of the suite of crop processes with representative management practices. These calibrated crop models served as the baseline for automated iterations of N application, irrigation, and plant growth and yield. The iterations were based on the Crop Matrix developed for each crop in Step 1. Each component and the basic approach for iterative adjustments (based on crop physiology) to create the Root-zone Library are described below:

N application. N application rates were adjusted proportionally across all fertilizer events detailed in the crop-specific baseline management suite. Thus, only N application *rates* are adjusted, while N application *timing* remains the same for all scenarios.

Irrigation. Irrigation rates were adjusted proportionally for a subset of scenarios with either low or high plant growth and/or reported yield. As with N application, only *rates* are adjusted, while *timing* remains the same for all scenarios.

- Low growth/low yield. For these conditions, irrigation rates are reduced under the assumption that young perennials or poor-yielding crops are not irrigated at the same rate of fully mature or average-to-above average yielding crops. This avoids a potential artificial inflation of percolation estimates.

- All other scenarios. For other scenarios, irrigation rates were kept the same as the baseline as this volume is sufficient for meeting crop water demand and ensuring adequate percolation across the modeling period (e.g., to manage salinity buildup in the root-zone over the 30-year period).

Plant growth and yield. As described in Section 2.2.2, a subset of crop model parameters has a large impact on crop growth as well as water and nutrient balances (Table 6). Of these, a select subset was adjusted (consistent with principles of plant physiology) to achieve a variety of growth and yield scenarios (a list of references by crop is supplied in Appendix 4). Other crop model parameters that influence the timing of canopy development and senescence as well as optimal plant biomass N concentration parameters were not modified in Crop Matrices.

- Plant growth adjustments. Three crop model parameters were adjusted in the Crop Matrices to modify plant growth relative to the calibrated baseline crop models. These include BIOE (radiation use efficiency), BLAI (optimal leaf area index), and BIO_LEAF (fraction of perennial biomass returned as residue; this only applies to perennial crops). These parameters are reduced for young perennial scenarios and/or low-yielding reports. BIO_LEAF is reduced to avoid returning too much biomass to the soil as residue and therefore under-estimate N storage in perennial tissue for young plantings. On the other hand, these parameters are increased in high growth/yield scenarios. In these instances, the increase in BIO_LEAF ensures that N stored in perennial tissue does not exceed the bounds suggested by the literature. There are no scenarios created with conflicting crop model parameter adjustments—for example, scenarios with increased BLAI and reduce BIOE.

While the timing for crop canopy development and N uptake parameters are not explicitly modified in the Crop Matrices, crop processes related to ET and N uptake are altered as a function of the modifications listed above. For ET, adjustments to BLAI results in altered crop leaf area indexes and therefore the amount of leaf area actively transpiring. Thus, low growth/yield scenarios have reduced ET (and reduced irrigation applications as stated above), while average and high growth/yield scenarios have higher ET (and moderate to slightly higher irrigation applications). With respect to N uptake, crops grown in SWAT aim to reach the specified optimal N concentrations at various growth stages (BN1, BN2, and BN3 of Table 6). Therefore, in scenarios with reduced biomass production, total N uptake will inherently be less, while the opposite is true for higher biomass scenarios.

- Yield adjustments. Yield is adjusted in the Crop Matrices through total growth (above) and through adjustment of the parameter HVSTI (the harvest index). In SWAT, the HVSTI is used to determine what fraction of the above ground biomass is removed as yield. Therefore, adjusting this parameter will result in different yields for any given amount of total plant growth. At the same time, variation in the total plant growth itself also influences yield values. Therefore, total plant growth and HVSTI were adjusted in parallel to produce varying plant yields.

- Nitrogen removed adjustments. As documented in Geisseler (2016, 2021), N concentrations in harvested materials can vary across space and time. Part of this variability can be a function of N availability throughout a growing season. As such, it is possible that N concentrations in harvested materials may be lower than average in cases where there is less N available for plant uptake. Conversely, well-fertilized fields may produce yields with slightly elevated N concentrations (i.e., "luxury consumption"). The Crop Matrices captured this phenomenon by adjusting baseline N removal coefficients for a subset of scenarios where reported N applied and yield were not as expected. Where fertilizer inputs were lower than expected relative to reported yields, the N concentrations in harvested materials were reduced (maximum of 15% reduction). Where fertilizer rates were higher relative to reported yield, the N concentrations in harvested materials were increased (maximum of 15% increase) Geisseler (2016, 2021).

2.2.4 Root-zone Library

Results from the automated workflow described in Section 2.2.3 are documented in the Root-zone Library. The Root-zone Library includes a unique estimate of percolation and nitrate leaching using CV-SWAT results based on crop, soil, climate, applied nitrogen, and yield, which can then be used to match INMP/NMP Summary Reports for each GWP Township (Figure 5). Specifically, the Root-zone Library contains all of the relevant data needed for calculating GWP Values, including:

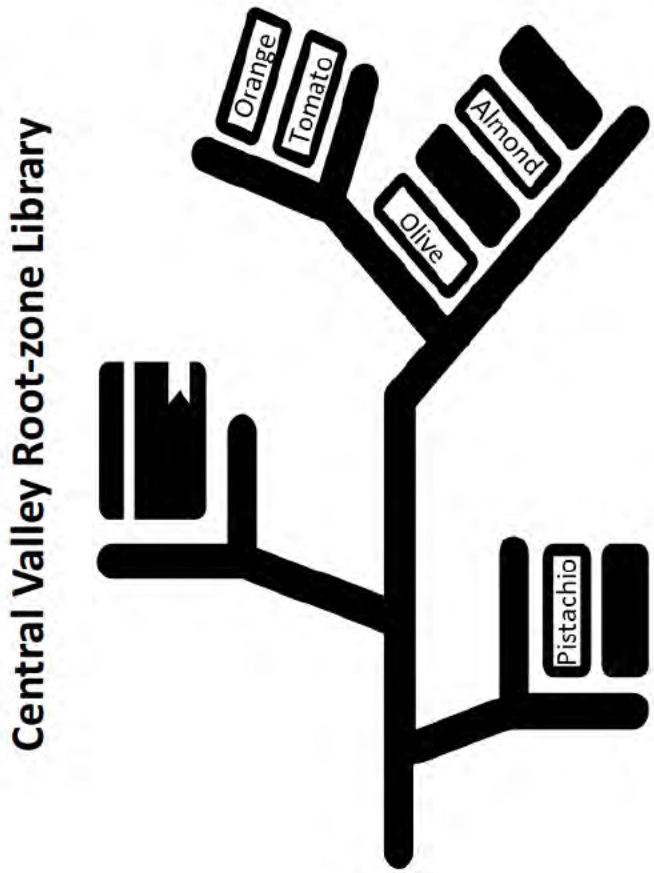
- QA/QC'd 2019 INMP/NMP data from the 13 participating water quality coalitions

- Spatial parcel data to relate INMP/NMP Summary Reports to specific soil and climate information

- HVAs as designated in Coalitions' Groundwater Assessment Reports
- Township and Range data to aggregate GWP Values for each GWP Township
- Nearly 75,000 CV-SWAT simulations containing more than 200 million HRU-specific results.

Figure 5. Infographic of the Root-zone Library

The Root-zone Library includes a unique estimate of percolation and nitrate leaching using CV-SWAT results based on crop, soil, climate, applied nitrogen, and yield, which can then be used to match INMP/NMP Summary Reports for each ***GWP Township*****.**



Books: Each crop is a book in the Root-zone Library. The Library contains approximately 70-80 books.

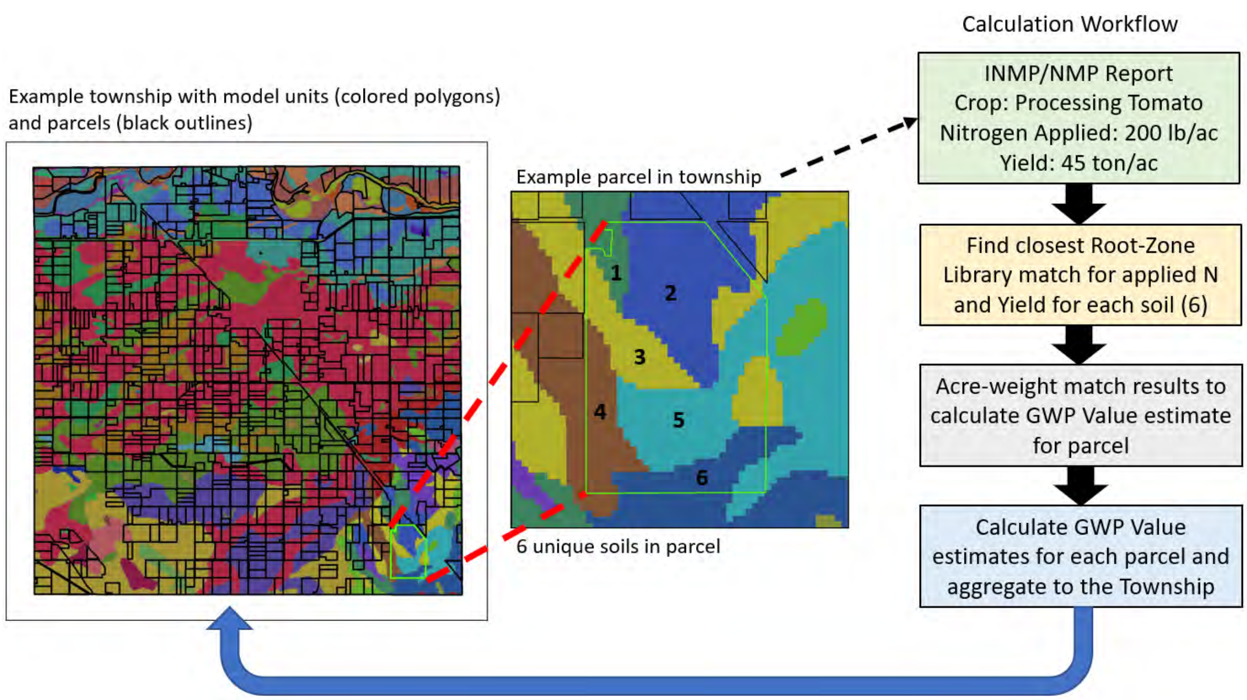
Chapters: Each chapter within a book is a unique combination of soil and climate characteristics. Each book has up to 9,000+ chapters.

Pages: Each page represents a unique management scenario using the final Crop Management Matrix. The Matrix incorporates applied nitrogen and yield from INMP/NMP Summary Reports. Each chapter has approximately 500-800 pages that estimate percolation and leaching based on unique crop, soil, climate, applied nitrogen, and yield, which in turn are then used to develop root-zone-based GWP Values for GWP Townships.

2.3 Step 3. Calculate Root-zone GWP Values

Step 3 is the final step of the GWP Formula and it involves calculation of GWP Values for each GWP Township. This step captures the sub-field level physical processes simulated in CV-SWAT to calculate robust estimates of N loads and percolation at the bottom of the root-zone based on grower-reported INMP/NMP Summary Report data. As outlined in Figure 6, this calculation is done by matching the appropriate Root-zone Library entry with INMP/NMP Summary Report data (based on yield, applied nitrogen, soil, climate, and parcel) and aggregating the results to the township level. Several considerations were necessary to ensure an appropriate match between the Root-zone Library and the INMP/NMP Summary Report data. This included considerations for N applied for minor crops not modeled in CV-SWAT.

Figure 6. Overview of the GWP Value Calculation Based on CV-SWAT Results and Grower-Reported INMP/NMP Summary Report Data



Nitrogen Applied. The reported N application rate is a key criterion used for matching the INMP/NMP Summary Report data to the appropriate model run in the Root-zone Library. As described in Section 2.1.2, the Crop Matrix used to develop the Root-zone Library includes the full range of N application rates reported by growers in INMP/NMP Summary Reports. However, for some growers, the reported N applied was insufficient to achieve the expected yield in CV-SWAT (Table 4). This is likely due to management practices that quantify the amount of residual soil nitrate-N in a field prior to a growing season so that N application rates can be reduced accordingly for this N credit. For example, Farm Evaluation data reported by growers in 2017 demonstrate that soil sampling was conducted on over 3.5 million acres.

As described in Section 2, CV-SWAT is a physically based model, and crop growth and yield are dependent on sufficient water, nutrients, temperature, and solar radiation. Therefore, for any given CV-SWAT scenario, a certain amount of N is required to consistently achieve expected yields over the 38-year modeling period. If there is an inadequate amount of N, then the expected yield cannot be achieved. Therefore, N application rates were increased for a subset of INMP/NMP data to ensure the expected yield was achieved. In addition, N application rates were reduced for a subset of questionable INMP/NMP data that were assumed to be erroneous. Each is described below.

- **Increasing Reported N Application Rates.** As described in Table 4, INMP/NMP reported N application rates were increased for a subset of INMP/NMP Summary Reports in order to achieve expected yields in CV-SWAT and ensure a representative match in the Root-zone Library. This was done by calculating the amount of N required to achieve the reported yield based on the amount of N removed in the yield. The equation assumes that the amount of N required is equal to the amount of N removed in yield x 0.85. A factor of 0.85 is used to reflect a relatively lower N concentration in the yield given relatively low N applied (Geisseler 2016, 2021). Furthermore, the equation assumes an additional 20 lbs/ac of N are required for perennial tissue in tree crops, 15 lbs/ac of N for perennial tissue in grapes, and no N in perennial tissue for annuals. This required amount of N is assumed to be applied at a 90% efficiency. The adjusted INMP/NMP N application rate was then used in conjunction with the reported yield to garner the appropriate Root-zone Library match(es). On average, the additional amount of N added to the INMP/NMP reported N was 6 lbs/ac. This is a conservative estimate because it assumes the N removed in yield is less than the average and the additional N required is not applied at 100% efficiency.

- **Reducing Reported N Application Rates.** As described in Table 4, a subset of INMP/NMP reported N application rates were flagged, namely those above 500 lbs/ac. This threshold was set to address questionable reported values above any recommended agronomic rate. The assumption is that errors were made with reporting the amount of N applied. These errors could include reporting the total mass of fertilizer as opposed to the mass of N in the fertilizer, or the total mass of N in organic amendments as opposed to the estimated amount of plant available N from the amendment. In these cases, crop-specific acre-weighted averages from the Township, Coalition, or Central Valley were substituted (depending on the number of data points at each aggregation level).

Mixed vegetables. A subset of INMP/NMP Summary Reports is related to mixed vegetables. This crop class represents a potentially complex and diverse suite of unique crops, crop rotations, and management practices. For the purposes of calculating GWP Values, INMP/NMP Summary Reports related to this crop class were matched to the CV-SWAT lettuce model. Based on professional judgement, the CV-SWAT lettuce model was identified as the best available model currently available. In cases where multiple mixed vegetables reports were submitted for a given parcel, each report was individually matched to the appropriate CV-SWAT lettuce results based on applied N and yield.

Pasture. Two separate management suites were developed to model pasture in CV-SWAT. This is necessary because pasture management can vary fundamentally in terms of harvested plant material and therefore N removal in yield. Specifically, it is common for some pasture operations to cut the vegetation and remove it from the field, while others may not implement this management practice, but rather graze cattle on site (i.e., no yield or N in plant material is removed). As such, both systems (yield removal and no yield removal with cattle grazing) were modeled in CV-SWAT. INMP/NMP Summary Reports do not clarify how pasture fields were managed with respect to these two possible management suites. Therefore, the following assumptions were made for matching INMP/NMP Summary Report data to Root-zone Library entries: 1.) if the pasture yield was reported as 0 lbs/ac, then CV-SWAT matches were made with the cattle grazing model based on N applied and 2.) if reported yield was above 0 lbs/ac, then matches were made to the CV-SWAT model with yield removal based on N applied and yield.

Surrogate Crop Models. There is a small subset of cases where a reported crop does not have an explicit CV-SWAT model, but where use of a surrogate CV-SWAT model is appropriate. As discussed in Section 2.2.2, a given crop is explicitly modeled in domains where INMP/NMP reported acreage was sufficient to warrant model development. Thus, surrogate crop models are only used in instances where the reported INMP/NMP acreage is minor and when there is an existing CV-SWAT crop model that is comparable to the reported crop (e.g., wheat in place of triticale grain).

Minor Crops not Modeled in CV-SWAT. As discussed in Section 2.2.2, the Root-zone Library contains modeled results for crops that comprise the vast majority of irrigated agriculture in the Central Valley, but not all. For the purposes of calculating GWP Values, estimates were made for minor crop classes not modeled in CV-SWAT, as described below. As noted previously, the acreage associated with minor crops is minimal for any given township and therefore the methodology employed for estimating nitrate load and percolation at the bottom of the root zone has little impact on township-scale GWP Values. Only 1.4% of the 2019 INMP/NMP reported acreage do not have an associated CV-SWAT model.

- **Minor Crops with an N Removal Coefficient.** For crops with an N removal coefficient, the A-R value was used to estimate N load at the bottom of the root-zone. If the crop was modeled in another domain(s), and therefore has INMP/NMP Summary Report data matched to the Root-zone Library, then the average percent of the A-R value that was estimated at the bottom of the root-zone was multiplied by the reported A-R value. Percolation estimates were supplemented from township averages from other reported crops matched to Root-zone Library entries.

- **Minor Crops with no N Removal Coefficient.** For crops with no N removal coefficient, a general nitrogen-use efficiency of 70% was assumed. Therefore, 30% of the reported applied N was assumed at the bottom of the root-zone. Percolation estimates were supplemented from township averages from other reported crops matched to Root-zone Library entries.

- **Rice.** There are approximately 1,400 acres of reported rice acreage in the 2019 INMP/NMP Summary Report dataset in the San Joaquin River Watershed.[6] For these reports, estimates for N load and percolation at the bottom of the root-zone were determined based on California-specific

[6] The majority of rice acreage in the Central Valley is enrolled with the California Rice Commission Water Quality Coalition, which is not subject to the GWP provisions.

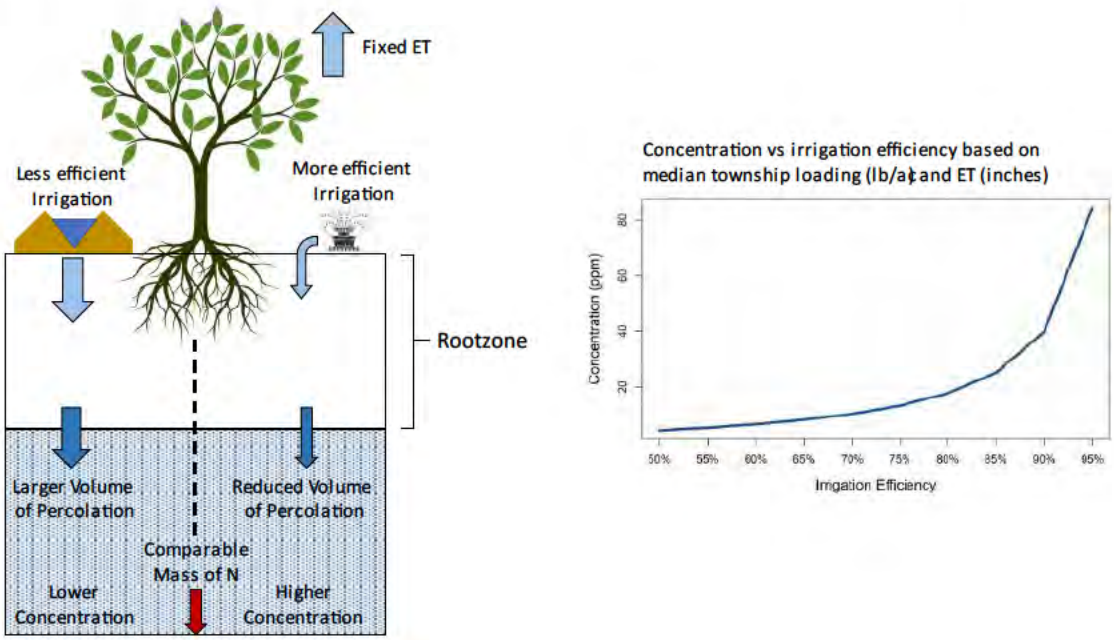
scientific literature on rice (references provided in Appendix 4). The N load estimated at the bottom of the root-zone for rice was 1.4 lbs/ac while the percolation was assumed to be 6 inches.

3 GROUNDWATER PROTECTION VALUES

Root-zone-based GWP Values are presented in terms of total nitrate-N load and nitrate-N concentration for each GWP Township. Load expresses the mass of nitrate-N at the bottom of the root-zone in total pounds (lbs) and average pounds per acre (lbs/acre). Nitrate-N concentration expresses that mass dissolved into water percolating below the root-zone in units of mass per unit volume (mg/L). Both nitrate-N load and concentration are helpful for understanding the potential influence of irrigated agriculture on groundwater quality. Load relates more closely to the agronomic efficiency of N use, whereas concentration is also strongly influenced by water use efficiency, climatic conditions, and recharge from other parts of the landscape. As such, concentration is a function of not only N-Load, but also the amount of water percolating below the root zone.

The same nitrate-N load for any given township can have different estimates of concentration due to differences in estimated percolation (Figure 7). In addition, as growers continue to adopt more efficient irrigation infrastructure and management practices to conserve water, the depth (or amount) of percolating water will decline, resulting in increased nitrate-N concentrations. This means that as irrigation becomes more efficient, the nitrate-N concentration at the bottom of the root zone will likely increase, even as fertilizer is being used more agronomically efficiently. Therefore, to avoid confusing water quality protection with water conservation, the root-zone-based GWP Values discussed in this section focus mainly on N leaching load. While initial estimated nitrate-N concentrations for the bottom of the root-zone on a township basis are provided in this Report (as requested by the CVRWQCB), they do not necessarily reflect impacts to groundwater quality. Estimated nitrate-N concentrations on a township basis will be updated as part of the GWP Targets process when other components of the water cycle (e.g., regional recharge, targeted recharge) and attenuation of nitrate in the vadose-zone are fully considered. The purpose of GWP Targets is to set a desired target that is intended to achieve compliance with receiving water limitations.

FIGURE 7. RELATIONSHIP BETWEEN IRRIGATION EFFICIENCY AND NITRATE-N CONCENTRATION AT THE BOTTOM OF THE ROOT-ZONE

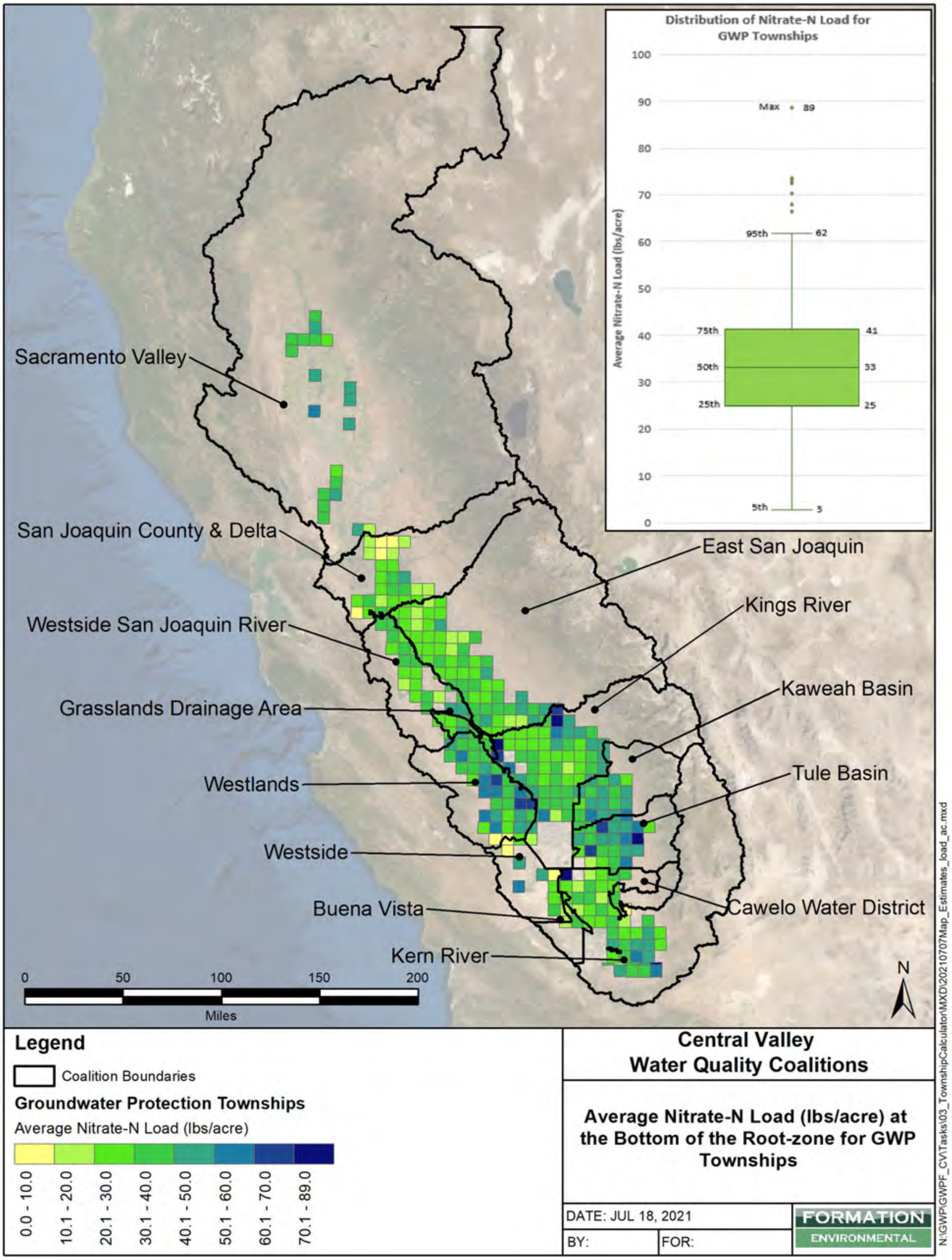


Root-zone-based GWP Value results are summarized and presented as 1) a spatial map of nitrate-N load and 2) as a series of detailed tabular summaries. Both are described in the following sections.

3.1 SPATIAL MAP OF AVERAGE LOAD

A spatial map showing the distribution of average nitrate-N load at the bottom of the root-zone was developed for GWP Townships (Figure 8). As discussed previously, nitrate-N load is the most relevant metric and the focus of the root-zone-based GWP Values. Notably, nitrate-N load at the bottom of the root-zone does not reflect the actual potential impact to groundwater quality. As stated previously, the GWP Values reported here do not factor in regional recharge, vadose zone processes and other physical factors that can determine actual impacts on groundwater quality. Nitrate-N load reported by GWP Township had a median value of 33 lbs/ac, with a 25th percentile of 25 lbs/ac and a 75th percentile of 41 lbs/ac (Figure 8).

FIGURE 8. DISTRIBUTION OF AVERAGE NITRATE-N LOAD



3.2 DETAILED TABULAR SUMMARIES

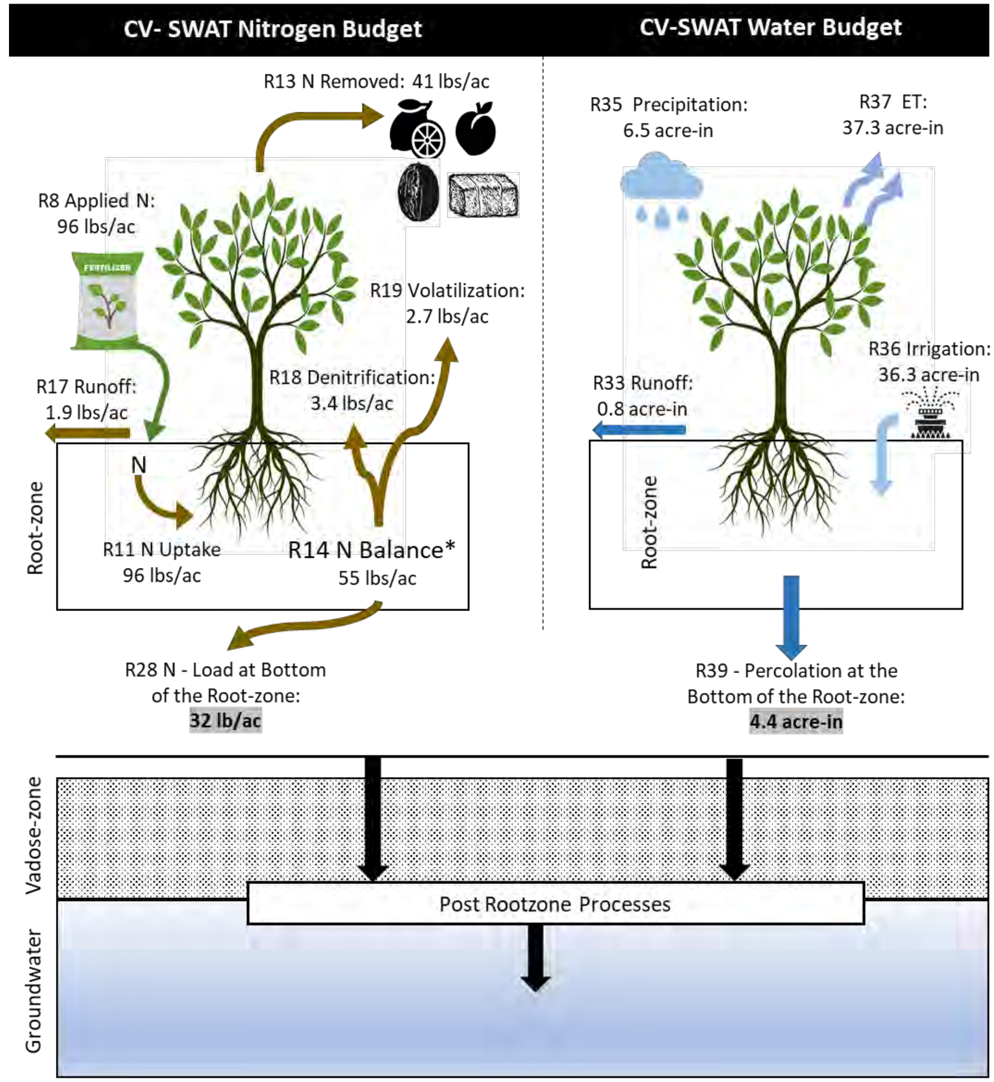
Two types of tabular summaries documenting root-zone-based GWP Values, as well as other relevant information requested by the CVRWQCB, are provided. The first includes a tabular summary documenting root-zone based GWP Values for each GWP Township (load and concentration) as well as relevant information about each GWP Township (coalition[s], INMP/NMP data, % HVA, etc.). This information is provided in Appendix 1.

The second type of tabular summary includes a series of detailed tables documenting important components of the water and nitrogen budgets estimated in CV-SWAT for each GWP Township. This level of information was specifically requested by the CVRWQCB in the GWP Formula conditional approval letter. Table 8 is an example “detailed summary” showing total and acre-weighted average (AWA) results for an individual GWP Township (MTR25S26E). Similar tables for each GWP Township are in Appendix 2. For visual reference and clarification, Figure 9 illustrates the various components of the township water and nitrogen budgets outlined in Table 8 with specific row (R) number references for each component of these budgets. Each row of the detailed tabular summaries is described in the following sections.

Figure 9. Infographic of Root-Zone-Based GWP Values For MTR25S26E; GWP Township Targets Will Take into Account Post-Rootzone Processes

Root-zone-based GWP Values: Results for GWP Townships were calculated using the conditionally approved root-zone GWP Formula for irrigated agriculture as described in the Workplan (Central Valley Coalitions 2020).

GWP Township Targets: Account for other scientifically supported variables (post root-zone processes) that influence the potential average concentration of nitrate in water expected to reach groundwater (e.g., vadose zone attenuation, regional recharge conditions).



*Note that the N Balance (A-R) includes leguminous crops, which fix nitrogen and may remove more N than was applied. As a result, it is possible to have a negative N balance (i.e., to have more N "lost" through N pathways than the A-R).

TABLE 8. EXAMPLE DETAILED TABULAR SUMMARY FOR TOWNSHIP: MTR25S26E

Row (R)	Category	INMP/NMP	CV-SWAT	units
INMP/NMP Data and N Balance Results				
1	Coalitions	KRWCA,TBWQC		
2	Percent HVA	99		%
3	Reported Acreage	18,324		acres
4	Parcels	588		number
5	Reported Crops	18		number
6	Reported N Applied[1]	1,721,141		lbs
7	Total N Applied[1]	1,790,433	1,762,737	lbs
8	AWA N Applied	98	96	lbs/ac
9	AWA N Applied Difference		2	lbs/ac
10	Total N Uptake		1,642,777	lbs
11	AWA N Uptake		96	lbs/ac
12	Total N Removed	755,417	746,036	lbs
13	AWA N Removed	41	41	lbs/ac
14	AWA N Balance	56	55	lbs/ac
15	AWA N Balance Difference (INMP/NMP vs. CV-SWAT)		1	
CV-SWAT Nitrogen Budget Results				
16	Total N in Rain		24,785	lbs
17	Total N Runoff		33,778	lbs
18	Total Denitrification		59,704	lbs
19	Total Ammonia Volatilization		46,043	lbs
20	Total Change in Soil Organic N		19,750	lbs
21	Total Perennial Tissue N		309,310	lbs
22	AWA N in Rain		1.4	lbs/ac
23	AWA N Runoff		1.9	lbs/ac
24	AWA Denitrification		3.4	lbs/ac
25	AWA Ammonia Volatilization		2.7	lbs/ac
26	AWA Change in Soil Organic N		1.1	lbs/ac
27	AWA Perennial Tissue N		17.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)		32	lbs/ac
29	Percent of N Balance (Row 14) at Bottom of Root-zone (Row 28)		58	%
CV-SWAT Water Budget Results				
30	Total Precipitation		9,346	acre-ft
31	Total Applied water		52,564	acre-ft
32	Total Evapotranspiration (ET)		54,000	acre-ft
33	Total Runoff		1,161	acre-ft
34	Total Percolation		6,686	acre-ft
35	AWA Precipitation		6.5	inches
36	AWA Applied water		36.3	inches
37	AWA Evapotranspiration (ET)		37.3	inches
38	AWA Runoff		0.8	inches
39	AWA Percolation		4.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone		32	mg/L

AWA: Area-Weighted Average

[1]Reported N Applied and Total N Applied can be different due to addressing data gaps 2019 INMP/NMP Summary Report Data (see Table 4 for additional detail).

3.2.1 INMP/NMP DATA AND N BALANCE RESULTS (ROWS 1-15)

For each GWP Township, the detailed summary table quantifies relevant INMP/NMP data and N-balance results (Rows 1 through 5). This includes the reporting coalition(s) (Row 1), percentage of HVA within the township (Row 2), the acreage associated with irrigated agriculture on HVA that is used for calculating the GWP Values (Row 3), the number of parcels for which there are INMP/NMP data (Row 4), and the number of reported crops (Row 5).

The remaining rows characterize INMP/NMP and CV-SWAT information on a total township basis as well as an acre-weighted average basis. This includes information on N applied (Rows 6-9), N removed (Rows 12-13), and N balance [A-R] (Rows 14-15). Additional information on the definition and calculation of N applied, N uptake, and N removed are discussed below:

- **Nitrogen Applied.** Nitrogen applied is quantified in a variety of ways.
    - Row 6 documents the total nitrogen applied from INMP/NMP reports within that township. This is calculated by multiplying the reported lbs/ac application rate by the reported acreage to solve for the total mass of N.
    - Row 7 documents the total INMP/NMP N applied after required adjustments (Section 2.2.2). Row 7 also quantifies the total mass of N applied modeled in related CV-SWAT matches.
    - Row 8 documents the acre-weighted average N application rate (lbs/ac) for Row 7 values.
    - Row 9 documents the difference between INMP/NMP and CV-SWAT data on a per-acre basis.
- **Nitrogen Uptake.** Nitrogen uptake is only calculated from CV-SWAT simulations and is not a part of INMP/NMP reporting. These data document how calibrated crop models respond to nitrogen inputs on the township level. They also demonstrate that N removed only reflects a fraction of the total N taken up by plants. The portion of N taken up by plants that is not removed is subject to a variety of fates, including organic matter cycling and storage in perennial tissues (Rows 20, 21, 26, and 27).
- **Nitrogen Removed.** Nitrogen removed in harvested materials is documented for both INMP/NMP and CV-SWAT datasets on a township total (Row 13) and acre-weighted basis (Row 14).
- **Nitrogen Balance.** The nitrogen balance is evaluated in a variety of ways. The N balance generally represents the mass of N that is potentially subject to a variety of fates including moving beyond the root-zone.
    - Row 14 documents the acre-weighted N balance. This is calculated by taking the difference between the acre-weighted average applied N (Row 8) and acre-weighted average N removed (Row 13).

- Row 15 documents the difference between INMP/NMP and CV-SWAT data on a per acre basis.

3.2.2 CV-SWAT Nitrogen Budget Results (Rows 16-29)

CV-SWAT simulates major components of the nitrogen cycle, such as gaseous loss pathways (denitrification and ammonia volatilization), soil organic matter storage and depletion, surface runoff and lateral flow, and storage in perennial tissue. Each of these N pathways are discussed at length in Section 2.2.1. Results presented per GWP Township are a function of data inputs (e.g., soil information, climate, crop, management) and CV-SWAT's physically based modeling framework. This includes the calibration approach implemented to ensure nitrogen budget results reflect the current understanding and available literature for these crop/soil/and management systems (Section 2.2.2).

For each GWP Township, the detailed summary tables quantify relevant CV-SWAT nitrogen budget results (Rows 16 through 29). Results are given in totals (lbs) for the GWP Township as well as acre-weighted averages (lbs/acre). This includes N in rain (Rows 16 and 22) and N in runoff (Rows 17 and 23). Pathways for denitrification, ammonia volatilization, changes in soil carbon, and storage in perennial tissue are in rows 18 through 27. Total nitrate-N load at the bottom of the root-zone for the GWP Township is displayed on an acre-weighted basis (Row 28). Lastly, Row 29 displays the percentage of the N balance (Row 14) (i.e., the mass of N potentially subject to leaching) that was estimated at the bottom of the root-zone.

3.2.3 CV-SWAT Water Budget Results (Rows 30-40)

CV-SWAT simulates major components of the water cycle, including precipitation, applied irrigation water, ET, runoff and lateral flow, and percolation beyond the root-zone. Each of these water budget components are described in detail in Section 2.2.1. Water budget results per GWP Township are a function of data inputs (e.g., soils information, crop management, climate, etc.) and CV-SWAT's physically based modeling framework. This includes the calibration of each crop model, which reflects the current understanding of these crop/soil/management systems (Section 2.2.2).

For each GWP Township, the detailed summary tables quantify relevant CV-SWAT water budget results (Rows 30 through 40). Results are given in totals (acre-feet) for the township as well as acre-weighted averages (inches). This includes precipitation (Rows 30 and 35), applied water (Rows 31 and 36), ET (Rows 32 and 37), runoff and lateral flow (Rows 33 and 38), and percolation (Rows 34 and 40). The nitrate-N concentration (mg/L) at the bottom of the root-zone is calculated using the nitrate-N load from the CV-SWAT nitrogen budget results and the percolation results from the CV-SWAT water budget results. As mentioned previously, nitrate-N concentrations impact on groundwater quality will be further refined in future steps of the GWP Target process where regional recharge and other factors are fully considered.

3.3 Crop Summaries

As requested by the CVRWQCB in the GWP Formula conditional approval letter, select nitrogen budget components are summarized for the five primary crops per domain (Sacramento Valley, San Joaquin Valley, and Tulare Lake Basin). This includes summaries by crop for denitrification, ammonia volatilization, perennial tissue N storage, change in soil organic carbon, and N in runoff. Estimates of the select nitrogen budget components are given tabularly as acre-weighted averages per crop and to define the distribution with the GWP Townships by domain (min, 5th, 25th, 50th, 75th, 95th, and max values). Brief descriptions on the main factors influencing each N budget component are provided. More detailed information on the drivers and sensitivity of these budget components with CV-SWAT is provided in Appendix 6.

3.3.1 Sacramento River Domain

The top five crops by acreage in the Sacramento River Domain, as reported by growers in INMP/NMP Summary Reports, are walnuts, almonds, processing tomatoes, sunflowers, and prunes. Table 9 displays information on the N budget components for these five crops. Each budget component is described below:

- **Soil Organic Matter Storage.** For each crop, the range in soil organic matter storage varies from negative values (net N mineralization) to positive values (N sequestration), with acre-weighted domain averages ranging from –3.9 to 2.6 lbs/ac. These dynamics are strongly influenced by soil properties (e.g., soil organic matter content), the amount of residue returned to the field annually, and precipitation. Negative values are generally associated with fields in the Sacramento-San Joaquin River Delta where higher amounts of net N mineralization have been observed (Miller et al. 2018).

- **Denitrification and Volatilization.** Denitrification and volatilization and generally low across all crops, particularly on an acre-weighted basis (less than or equal to 5.1 lbs/ac, combined). These results are consistent with California-specific measurements of these N pathways (Verhoeven et al. 2017; Krauter et al. 2006). Higher values are a function of management (N inputs and crop productivity), soil properties, and climate.

- **Perennial Tissue Storage.** N stored in perennial tissue is presented for walnuts, almonds, and prunes. Processing tomatoes and sunflowers are annual crops and do not have perennial biomass in which N could be stored. Storage estimates are consistent with California-specific literature for walnuts (Weinbaum et al. 1998) and almonds (Muhammad et al. 2020), and average 21 and 24 lbs/ac, respectively, on an acre-weighted basis. Prunes are modeled to have slightly less storage than walnuts and almonds, with 16 lbs/ac, which is informed by surrogate crop data, namely other *prunus* species including peach and almond (El-Jendoubi et al. 2013; Muhammad et al. 2020), and a general understanding of plant biomass production and N uptake dynamics. Estimates of N storage in perennial tissue are influenced mainly by management (N inputs and crop productivity).

- **Runoff.** N lost through runoff and lateral flow is also generally low, with acre-weighted averages totaling less than 3 lbs/ac. Higher values are a function of slope, management (N inputs and crop productivity), and soil properties.

TABLE 9. NITROGEN BUDGET COMPONENTS FOR THE 5 PRIMARY CROPS FOR THE SACRAMENTO VALLEY (LBS/AC, UNLESS OTHERWISE NOTED)

Crop and Reported Acreage	Acre-weighted N Balance (A-R)	Annual N Budget Component	Acre-weighted Average	Min	25th Percentile	50th Percentile	75th Percentile	90th Percentile	Max
Walnuts 148,183 ac	57	Change in Soil Organic N	-3.9	-31	-7.5	-2.9	-0.25	2.6	11
		Denitrification	1.4	0.089	0.63	1.3	1.8	3	12
		Ammonia Volatilization	2.1	0.13	1	2.3	3.2	4.9	16
		Perennial Tissue N Storage	21	8.9	18	21	24	28	40
		N in runoff	0.82	0.18	0.54	0.76	0.98	1.4	3.8
Almonds 90,001 ac	60	Change in Soil Organic N	2.6	-20	-2.4	1.3	5.4	11	24
		Denitrification	1.1	0.073	0.34	0.69	1.3	2.3	14
		Ammonia Volatilization	4	0.36	2.2	3.4	4.9	7	12
		Perennial Tissue N Storage	24	14	20	23	28	31	39
		N in runoff	1.2	0.13	0.61	0.93	1.4	1.9	7.4
Processing Tomatoes 35,828 ac	58	Change in Soil Organic N	0.62	-41	-3.7	0.15	5.6	13	30
		Denitrification	1.9	0.18	1.1	1.6	2.3	3.7	5.8
		Ammonia Volatilization	3	0.36	2.1	3.1	4	5	6.7
		Perennial Tissue N Storage	0	0	0	0	0	0	0
		N in runoff	1.1	0.2	0.67	0.91	1.4	1.8	3.8
Sunflower 22,908 ac	53	Change in Soil Organic N	-2.8	-33	-6.1	-2.7	1	2.9	13
		Denitrification	0.61	0.089	0.27	0.44	0.62	1	3.8
		Ammonia Volatilization	2.1	0.27	1.3	2.1	2.6	3.6	8.2
		Perennial Tissue N Storage	0	0	0	0	0	0	0
		N in runoff	0.9	0.18	0.54	0.67	0.97	1.6	4.3
Prunes 19,837 ac	73	Change in Soil Organic N	-3.5	-16	-7.2	-3.6	-0.16	2.1	4.7
		Denitrification	2.7	0.17	1.6	2.4	3.9	5.2	15
		Ammonia Volatilization	2.2	0.29	1.3	2.1	3.2	4	7.3
		Perennial Tissue N Storage	16	9.1	13	16	17	19	22
		N in runoff	1	0.18	0.58	0.86	1.2	1.8	3.8

3.3.2 San Joaquin River Watershed

The top five crops by acreage in the San Joaquin River Watershed, as reported by growers in INMP/NMP Summary Reports, are almonds, pistachios, wine grapes, processing tomatoes, and walnuts. Table 10 displays information on the N budget components for these five crops. Each budget component is described below:

- **Soil Organic Matter Storage.** For each crop, the range in soil organic matter storage varies from negative values (net N mineralization) to positive values (N sequestration), while acre-weighted domain averages range from -1.5 to 7.6 lbs/ac. These dynamics are influenced by soil properties, the amount of residue returned to the field annually, and precipitation. Slight positive increases in soil organic N are consistent with reports from De Clerk et al. 2003, which demonstrate a general increase in soil organic matter in agricultural fields in the Central Valley between 1950 and 2001. Negative values are associated with fields in the Sacramento-San Joaquin River Delta where generally higher amounts of net N mineralization have been observed (Miller et al. 2018).

- **Denitrification and Volatilization.** Denitrification and volatilization and generally low across all crops, particularly on an acre-weighted basis (less than or equal to 8.3 lbs/ac, combined). These results are consistent with California-specific measurements of these N pathways (Verhoeven et al. 2017; Krauter et al. 2006). Higher values are a function of management (N inputs and crop productivity), soil properties, and climate.

- **Perennial Tissue Storage.** N Stored in perennial tissue is presented for almonds, pistachios, wine grapes, and walnuts. Processing tomatoes are annual crops and do not have perennial biomass in which N could be stored. Storage estimates are consistent with California-specific literature for almonds (Muhammad et al. 2020), pistachios (Rosecrance et al. 1998), grapes (Araujo and Williams 1998; Williams 1987; Williams 2017), and walnuts (Weinbaum et al. 1998), and have acre-weighted averages of 22, 23, 14, and 24 lbs/ac, respectively. Estimates are influenced mainly by management (N inputs and crop productivity).

- **Runoff.** N lost through runoff and lateral flow is also generally low, with acre-weighted averages totaling less than or equal to 2.1 lbs/ac. Higher values are a function of slope, management (N inputs and crop productivity), and soil properties.

TABLE 10. NITROGEN BUDGET COMPONENTS FOR THE 5 PRIMARY CROPS FOR THE SAN JOAQUIN VALLEY (LBS/AC, UNLESS OTHERWISE NOTED)

Crop and Reported Acreage	Acre-weighted N Balance (A-R)	Annual N Budget Component	Acre-weighted Average	Min	25th Percentile	50th Percentile	75th Percentile	90th Percentile	Max
Almonds 472,368 ac	63	Change in Soil Organic N	4.9	-26	2	4.2	6.7	11	34
		Denitrification	2.1	0.089	0.55	1.1	2.3	4.7	26
		Ammonia Volatilization	4.6	0.36	2.8	4.2	5.9	7.8	21
		Perennial Tissue N Storage	22	10	19	22	26	30	43
		N in runoff	1.5	0.03	0.78	1.3	2.1	3.1	27
Pistachios 138,807 ac	83	Change in Soil Organic N	6.9	-17	1.8	6.6	11	17	23
		Denitrification	4.7	0.089	2	3.6	6	8.6	30
		Ammonia Volatilization	3.6	0.36	1.8	3.3	4.7	6.4	16
		Perennial Tissue N Storage	23	13	20	23	27	30	42
		N in runoff	1.2	6.00E-04	0.34	0.82	1.8	2.9	14
Wine Grapes 93,237 ac	33	Change in Soil Organic N	-1.5	-19	-4.4	-2	0.51	1.6	5.3
		Denitrification	1.8	0.068	0.36	0.76	1.8	3.4	15
		Ammonia Volatilization	1.6	0.089	0.86	1.2	1.8	2.7	8.7
		Perennial Tissue N Storage	14	4.7	12	14	16	18	27
		N in runoff	0.72	0.089	0.45	0.55	0.84	1.3	7.9
Processing Tomatoes 83,253 ac	61	Change in Soil Organic N	7.6	-10	2.1	5.8	11	16	25
		Denitrification	3.5	0.2	0.89	1.7	4.4	8.5	27
		Ammonia Volatilization	2.8	0.2	1.5	2.2	3.3	5.1	14
		Perennial Tissue N Storage	0	0	0	0	0	0	0
		N in runoff	0.69	0.1	0.27	0.4	0.71	1.3	7
Walnuts 58,833 ac	70	Change in Soil Organic N	1.8	-46	-0.62	2.3	4.8	7.3	14
		Denitrification	1.5	0.034	0.54	1.1	2.1	3.3	12
		Ammonia Volatilization	2.9	0.089	1.1	2.3	4.3	6.9	17
		Perennial Tissue N Storage	24	9.2	19	24	29	33	42
		N in runoff	2.1	0.089	0.8	1.5	2.8	4.6	22

3.3.3 Tulare Lake Basin

The top five crops by acreage in the Tulare Lake Basin, as reported by growers in INMP/NMP reports, are almonds, pistachios, citrus (oranges), table grapes, and raisin grapes. Table 11 displays information on the N budget components for these five crops.

- **Soil Organic Matter Storage.** For each crop, the range in soil organic matter storage varies from negative values (net N mineralization) to positive values (N sequestration), with acre-weighted domain averages ranging from –0.01 to 6.2 lbs/ac. These dynamics are influenced by soil properties, the amount of residue returned to the field annually, and precipitation. As mentioned previously, slight positive increases in soil organic N are consistent with reports from De Clerk et al. 2003.
- **Denitrification and volatilization.** Denitrification and volatilization and generally low across all crops, particularly on an acre-weighted basis (less than 7 lbs/ac, combined). As mentioned previously, these results are consistent with California-specific measurements of these N pathways (Verhoeven et al. 2017; Krauter et al. 2006). Higher values are a function of management (N inputs and crop productivity), soil properties, and climate.
- **Perennial Tissue Storage.** N Stored in perennial tissue is presented for almonds, pistachios, oranges, table grape, and raisin grape. Storage estimates are consistent with California-specific literature for almonds (Muhammad et al. 2020), pistachios (Rosecrance et al. 1998), orange (Morgan et al. 2006; Roccuzzo et al. 2012), and table and raisin grapes (Araujo and Williams 1998; Williams 1987; Williams 2017), and have acre-weighted averages of 21, 23, 18, 16, and 17 lbs/ac, respectively. Estimates are influenced mainly by management (N inputs and crop productivity).
- **Runoff.** N lost through runoff and lateral flow is also generally low, with acre-weighted averages totaling less than 2 lbs/ac. Higher values are a function of slope, management (N inputs and crop productivity), and soil properties.

TABLE 11. NITROGEN BUDGET COMPONENTS FOR THE 5 PRIMARY CROPS FOR THE TULARE LAKE BASIN (LBS/AC, UNLESS OTHERWISE NOTED)

Crop and Reported Acreage	Acre-weighted N Balance (A-R)	Annual N Budget Component	Acre-weighted Average	Min	25th Percentile	50th Percentile	75th Percentile	90th Percentile	Max
Almonds 386,603 ac	66	Change in Soil Organic N	6.6	-19	3.5	5.4	7.6	14	31
		Denitrification	2.1	0.037	0.57	1.1	2.6	4.7	26
		Ammonia Volatilization	4.4	0.4	2.5	4	5.5	7.3	19
		Perennial Tissue N Storage	21	11	18	20	24	27	37
		N in runoff	1.4	0.1	0.65	1.1	1.9	3.3	28
Pistachios 177,837 ac	87	Change in Soil Organic N	5.8	-16	0.14	4.6	9.4	13	23
		Denitrification	3.6	0.0054	0.96	2.3	4.6	7.6	23
		Ammonia Volatilization	3.2	0.27	1.2	2.2	3.9	6.2	14
		Perennial Tissue N Storage	23	11	19	21	26	28	36
		N in runoff	1.3	0.089	0.35	0.62	1.4	2.9	23
Citrus, Oranges 126,138 ac	73	Change in Soil Organic N	4.9	-8.7	2.3	4.6	6.3	7.9	15
		Denitrification	1.3	0	0.36	0.75	1.3	2.1	21
		Ammonia Volatilization	2.4	0.18	1.4	2	2.7	3.8	17
		Perennial Tissue N Storage	18	9.8	16	18	21	23	29
		N in runoff	1.8	0.0041	0.49	0.89	1.6	3.4	35
Table Grapes 112,949 ac	43	Change in Soil Organic N	-0.013	-12	-0.94	0.65	1.8	3.2	5.9
		Denitrification	2.6	0.013	0.65	1.5	3	5.6	23
		Ammonia Volatilization	1.5	0.18	0.83	1.2	1.8	2.6	7.3
		Perennial Tissue N Storage	16	5.4	14	16	19	21	28
		N in runoff	1.1	0	0.38	0.63	1.3	2.3	19
Raisin Grapes 76,077 ac	39	Change in Soil Organic N	1.1	-9.9	-0.27	1.3	2.3	3.4	5.9
		Denitrification	1.7	0	0.45	0.98	2.1	3.9	19
		Ammonia Volatilization	1.3	0.18	0.7	1	1.5	2.3	12
		Perennial Tissue N Storage	17	5.5	13	16	19	22	29
		N in runoff	1	0.089	0.42	0.73	1.2	2.1	19

4 Comparison of CV-SWAT and Reported Literature

As requested by the CVRWQCB in the GWP Formula conditional approval letter, this section provides a comparison of CV-SWAT results to reported literature values for an annual crop (potato) and perennial crops (almond and pistachios). The studies for potato, almond, and pistachios were compared to Root-zone Library results. In addition, detailed data were provided by the potato researchers facilitating a detailed CV-SWAT model using site-specific data. These data facilitated a three-way comparison between the observational data, a calibrated CV-SWAT site-specific model for two sites, and a comparison to Root-zone Library matches based on yield and N applied only.

4.1 Potato

4.1.1 Background

Dr. Brian Marsh of UC-ANR agreed to provide detailed data for comparison of CV-SWAT to potato field observation data at 16 sites in Kern County. The references for the actual published studies include the following:

- Marsh, B. M. 2016. An investigation of current potato nitrogen fertility programs' contribution to ground water contamination. World Academy of Science, Engineering and Technology. International Journal of Agricultural and Biosystems Engineering 10(3).
- Marsh, B. M. 2019. An evaluation of nitrogen fertility management in commercial potato fields. International Journal of Agriculture, Forestry and Life Sciences, 3(1): 52-63.

Field investigations to support these published studies were carried out in 2014 (Marsh 2016) and 2016 (Marsh 2019) to study nitrogen dynamics in commercial potato fields. Table 12 summarizes the plant and soil N budget components published in Marsh 2016 and 2019. Site characteristics (soil texture) ranged from sand to loam. Fields were monitored for nitrogen status using soil samples and plant tissue samples. Soil samples were taken pre-plant and post-harvest from the soil profile (0 to 6 feet) to measure nitrate-N. All sites included in the study had considerable pre-planting soil nitrate-N (140 to 841 lbs./acre). Total plant biomass (vine and tuber, separately), vine N, and tuber N were measured. It should be noted that N leaching (or load at the bottom of the root-zone/soil profile) was not explicitly measured. The study used a mass balance approach to estimate "unaccounted N," from which N leaching or load at the bottom of the root-zone can be inferred. The "unaccounted N" was calculated as follows:

Unaccounted for N = [Total N uptake + Final Soil Nitrate-N] – [Applied N + Initial Soil Nitrate-N]

TABLE 12. YIELD AND N COMPONENTS REPRODUCED FROM MASH 2016 AND 2019 LITERATURE VALUES

Year	Site #	Soil Texture	(A) N-Applied (lbs/acre)	(B) DM Yield (lbs/acre)	(C) Tuber N (lbs/ac)	(D) Vine DM (lbs/A)	(E) N Uptake (lbs/acre)	(F) Soil N Preplant (lbs/acre)	(G) Soil N Postharvest (lbs/acre)	N-gained/lost (A+F)-(E+G)
2014	1	SL	180	8,177	120	1,587	169	243	327	73
2014	2	LS	245	8,865	134	1,444	160	323	337	-68
2014	3	SL	246	12,524	161	1,600	203	323	353	-13
2014	4	SL	266	11,123	103	1,479	147	398	444	-73
2014	5	SL	271	19,275	155	1,155	209	325	418	31
2014	6	S	280	12,576	99	2,307	158	340	512	60
2014	7	SL	294	13,590	148	3,430	243	152	143	-60
2014	8	SL	310	13,870	232	5,031	393	285	204	2
2016	1	LS	270	11,097	198	3,082	287	170	191	38
2016	2	LS	209	10,153	119	2,686	173	486	469	-43
2016	3	SL	150	7,610	121	1,528	148	140	114	-28
2016	4	SL	290	6,022	130	1,843	197	841	866	-48
2016	5	LS	183	9,007	87	2,383	148	264	404	105
2016	6	SL	222	9,904	176	2,939	245	434	607	196
2016	7	LS	228	11,209	203	2,965	271	270	370	143
2016	8	LS	283	14,079	280	4,176	373	370	184	-96

*Positive mass balance values indicate no (zero) leaching of N load below the rootzone. Negative values indicate N leached below the bottom of the root-zone.

4.1.2 Methods

To assist with comparisons to the Root-zone Library and to parametrize a detailed CV-SWAT model run, Dr. Marsh provided soil series and fertilization information for each site-year. All field studies were sprinkler irrigated and irrigation volumes were measured using rain gauges. The actual locations of the study sites were not provided. Therefore, an overlay analysis was performed using potato fields extracted from DWR crop layers (2014, 2016, and 2018) with CV-SWAT soil information to identify dominant soils/HRUs associated with the potato fields. From there, HRUs were related to the field study sites through soil series. Note that while the soil series is the most-specific classification in the soil taxonomy hierarchy, multiple soil mapping units may be classified as the same soil series but have somewhat different physical and chemical properties.

Root-zone Library matches for all 16 sites were completed using the final Root-zone Library developed to calculate GWP Values (Section 2). Specifically, CV-SWAT matches were made based on the reported N application rates and yields for each field site. This is identical to the workflow implemented for calculating GWP Values, meaning this exercise illustrates a comparison of N load and percolation (at the bottom of the root-zone) using the GWP Formula approach and Root-zone Library compared to observational data.

Site-specific CV-SWAT models were also developed for 2 of the 16 sites (Sites 3 and 8) for comparison to field data. These sites were chosen based on their representative soil, crop, and management characteristics. As compared to Root-zone Library matches (which use regionally calibrated models and management assumptions), the site-specific models included parameterizing CV-SWAT with site-specific reported irrigation and fertilizer application rates and timings, as well as planting and harvest dates. Soils were initialized within the model using reported pre-plant soil nitrate-N concentrations. Details of CV-SWAT inputs for each site are presented in Table 13. Models were executed for the year during which the field data were collected to ensure comparable climate information.

Table 13. Inputs Used to Develop SWAT Model for the Selected Two Sites

Variables	Site 3	Site 8
Planting date	15- Jan-2014	21-Mar-2014
Soil Type	Sandy Loam	Fine Sandy Loam
Harvest date	15-May-2014	10-Jul-2014
N Applied	Pre-planting 149 lb N/acre At-planting 90 lb N/acre	Pre- planting 254 lb N/acre During season 56 lb n/acre
Irrigation	16 inches (20 applications)	12.8 inches (20 applications)
Initial Soil N	323 lb N/acre	285 lb N/acre

4.1.3 Results

The following sections describe 1) comparisons of the Root-zone Library “matches” for N load at the bottom of the root-zone and 2) site-specific CV-SWAT model comparisons for Sites 3 and 8.

4.1.3.1 Root-zone Library Comparison

As stated previously, Marsh 2016 and 2019 did not specifically measure N leaching (or load at the bottom of the root-zone/soil profile). Rather, both studies used a mass balance approach to estimate "unaccounted N" from which N leaching or N load at the bottom of the root-zone can be inferred (Table 14). In this context, the mass balance approach suggests the following:

- Negative values in the mass balance suggest a loss of N in the overall budget. This implies that N moved past the bottom of the root-zone.
- Positive values in the mass balance suggest a net accumulation of mineral N in the budget. This implies there was likely little to no N leaching. Therefore, for this comparison, all positive values can be considered zero (0) N load when comparing to the corresponding Root-zone Library matches (Table 14).

Results include the following:

- 50% of the site years (8 out of 16) had positive values in the N-gained/lost column. This suggests there is likely little to no (i.e., zero) N load at the bottom of the root-zone. The corresponding N load estimates from the Root-zone Library were always greater than zero (0). This result demonstrates the estimated N load from the Root-zone Library is conservative.
- 38% of the site-years (6 out of 16) had negative mass balance (signifying N Load at the bottom of the root-zone) and the Root-zone Library N load was greater (Table 14). These results also demonstrate that the estimated N load from the Root-zone Library is conservative.
- 12.5% of the site years (2 out of 16) had negative values mass balance (signifying N Load at the bottom of the root-zone) with slightly higher estimates than the Root-zone Library results. It should be noted that the difference was 1 and 3 lbs/acre for these site years.

This clearly demonstrates that the Root-zone Library N load estimated at the bottom of the root-zone is conservative. In other words, the Root-zone Library includes higher N loads than the field observational data using the N mass balance approach described in Marsh 2016 and 2019. These results also demonstrate that simulating CV-SWAT across 30 years ensures a reasonable, conservative estimate of N load based on grower reported data. The field observational data illustrate that N leaching can be vary widely for a given growing season, including may instances with little to no leaching of N load. In the 30-year model simulation, N budget components such as residual soil N, organic residue N mineralization, and annual N loading dynamics are captured from one season to the next meaning that a robust average value is created that reasonably (and conservatively) represents these unknowns.

TABLE 14. COMPARISON OF ROOT-ZONE LIBRARY MATCHES TO MEASURED FIELD DATA FOR POTATO

	N Applied (lbs/ac)		Dry matter yield (lbs/ac)		N Removed in Yield (lbs/ac)		Mass Balance (lbs/ac)	N Load (lbs/ac)
Site-Year	Field Data	RZ-Library	Field Data	RZ-Library	Field Data	RZ-Library	Field Data	RZ-Library
2014-1	180	182	8,177	8,217	120	122	73 (0)	39
2014-5	271	268	19,275	14,980	155	210	31 (0)	46
2014-6	280	279	12,576	12,330	99	192	50 (0)	69
2014-8	310	311	13,870	13,882	232	217	2 (0)	64
2016-5	183	182	9,007	8,984	87	133	105 (0)	39
2016-6	222	225	9,904	10,215	176	159	196 (0)	53
2016-7	228	225	11,209	11,099	203	164	143 (0)	47
2016-8	283	279	14,079	13,186	280	185	96 (0)	66
2014-2	245	247	8,865	8,270	134	129	-71	91
2014-3	246	247	12,524	12,624	161	197	-12	41
2014-4	266	268	11,123	11,259	103	176	-73	75
2016-1	270	268	11,097	11,268	198	176	38	69
2016-3	150	150	7,610	7,521	121	111	-28	30
2016-4	290	290	6,022	5,906	130	106	-68	155
2014-7	294	290	13,590	13,650	148	213	-60	59
2016-2	209	204	10,153	10,198	119	136	-53	50

*Positive mass balance values indicate no (zero) leaching of N load below the rootzone. Negative values indicate N leached below the bottom of the root-zone.

4.1.3.2 SITE-SPECIFIC CV-SWAT MODEL COMPARISONS

Site-specific CV-SWAT models were developed for Site 3 and Site 8, which represent similar cropping conditions to those used in the CV-SWAT calibrated model used in the Root-zone Library (Table 15). Results of these comparisons demonstrate that CV-SWAT calibrated to site-specific conditions accurately simulated dry matter yield, dry matter biomass, N update, and N load (Table 15). In addition, matches from the Root-zone Library also tracked the field observation, estimating higher N Load than both the field observational data and the calibrated CV-SWAT simulations. This means that both the site-specific and Root-zone Library results were able to accurately reflect crop and soil N dynamics measured in the field. These results also demonstrates that both CV-SWAT and field measurements of N load at the bottom of the root-zone can vary substantially by site, for any given yield and N applied.

Furthermore, results from both the field observational data and CV-SWAT demonstrate that well managed irrigation regimes can result in little-to-no leaching of N beyond the root-zone, even in coarse textured soils (Table 15). This is evident in the field data and is also accurately reflected in the CV-SWAT results. In addition, these data also demonstrate that consideration of pre-plant N in fertilizer budgeting is an important management practice, minimizing the amount of N load at the bottom of the root-zone.

TABLE 15. FIELD OBSERVATIONAL DATA COMPARED TO DETAILED CV-SWAT MODEL AND ROOT-ZONE LIBRARY

Variables	Field Observation	Detailed CV-SWAT Model Results	Root-zone Library Match
Site 3 – Comparison Results			
Irrigation + Precipitation (inches)	18.9	18.1	23.4
ET (inches)	-	14.0	18.1
Dry Matter Yield (lbs/acre)	12,514	10,907	12,624
Dry Matter Biomass (lbs/acre)	14,113	15,423	19,780
N Applied (lbs/acre)	246	246	247
N Uptake (lbs/acre)	203	198	262
N Load (lbs/acre)	13*	26	41
Percolation (inches)		0.5	3.6
Soil Pre-plant N (lbs/acre)	323	321	-
Soil Post-harvest N (lbs/acre)	353	334	-
Site 8 – Comparison Results			
Irrigation + Precipitation (inches)	12.8	12.8	21.4
ET (inches)	-	16.1	16.5
Dry Matter Yield (lbs/acre)	13,859	11,155	13,882
Dry Matter Biomass (lbs/acre)	18,886	17,930	22,064
N Applied (lbs/acre)	310	310	311
N Uptake (lbs/acre)	393	392	333
N Load (lbs/acre)	-2* (gained)	0	64
Percolation (inches)		0	3.6
Soil Pre-plant N (lbs/acre)	285	285	-
Soil Post-harvest N (lbs/acre)	203	204	-

*N load in field observations are not specifically measured, but estimated based on a system N balance.

4.2 ALMOND AND PISTACHIO

4.2.1 BACKGROUND AND METHODS

This comparison evaluates the Root-zone Library to two peer reviewed manuscripts that investigated almond and pistachio N dynamics under varying fertigation strategies. These manuscripts include the following:

- Baram, S., V. Couvreur, T. Harter, M. Read, P. H. Brown, J. W. Hopmans, and D. R. Smart. 2016. Assessment of orchard N losses to groundwater with a vadose zone monitoring network. Agricultural Water Management 172: 83-95.

- Baram, S., V. Couvreur, T. Harter, M. Read, P. H. Brown, M. Kandelous, D. R. Smart, and J. W. Hopmans. 2017. Estimating nitrate leaching to groundwater from orchards: Comparing crop nitrogen excess, deep vadose zone data driven estimates and HYDRUS modeling. Vadose Zone Journal 57: 1–13.

Baram et al. 2016 and 2017 investigated nitrate loading below the root-zone in mature almond and pistachio orchards in Madera County during 2014 and 2015. These studies measured NO_3 concentrations below the root-zone in pore water content that ranged from 1mg L^{-1} to more than 2,400 mg L^{-1} for the almond orchard, and up to 11,000 mg L^{-1} for the pistachio orchard. While deep pore water was sampled, estimations of N lost were calculated based on a mass balance. “N lost” in this context includes the N pathways simulated in CV-SWAT (Section 2.2.2), namely N loading at the bottom of the root-zone, gaseous losses, and other potential pathways like loss in surface runoff and lateral flow and soil organic matter storage. These different pathways were not decoupled in the field study. The mass balance equation for calculating N lost in the field study was as:

N lost = N application (fertilizer N, compost N, N in irrigation) –

N removed in yield (kernel, hull, and shell) – N stored in perennial tissue*

*The paper considers perennial tissue N storage in their N lost calculation (Table 1 of Baram et al. 2016). For the purposes of this comparison, N stored in perennial tissue is explicitly compared and “N losses” are all other N pathways besides perennial N tissue storage.

Three different fertigation strategies were evaluated as part of this work:

- AGP - Advanced grower practice with best management practices

- HFLC – High frequency low concentration applications

- P&F – Pump and fertilize, which is like AGP except that lower N loads were applied with each fertigation.

4.2.2 Methods

The published manuscripts did not provide yield, nor did they provide field locations to specifically match the associated climate and soil in the Root-zone Library. Therefore, the one coordinate provided in the publication (36°49'15.85''N, 120°12'1.20"W) was used to estimate climate and soil conditions. These were combined with N applied and N removed to query the Root-zone Library to estimate N lost from the system for comparison purposes.

4.2.3 Results

Match results for each crop (x) year (x) fertigation are presented in Table 16. Results for both almond and pistachio Root-zone Library matches to field reported data are discussed below in terms of the nitrogen budget and water budget components.

Nitrogen budget. The nitrogen budgets for both almond and pistachio Root-zone Library matches and reported field data were in very good agreement for all N components (N applied, N Removed, Perennial Tissue N, and N Lost) (Table 16). With respect to estimated N lost (i.e., the sum of N lost through leaching, gaseous loss, surface and lateral flow, and changes in soil organic matter), 7 of the 12 treatments years were within 5 lbs/ac and an additional 3 were within 10 lbs/ac. For the two treatment years that differed by more than 10 lbs/ac, the Root-zone Library estimated higher N losses. When compared statistically, N lost from both the root-zone library and literature sources tracked closely (R^2: 0.95) and fell along the 1:1 line (Figure 10). This means that both estimates of N lost are highly correlated with no systematic bias (e.g., over or under prediction) by the Root-zone Library.

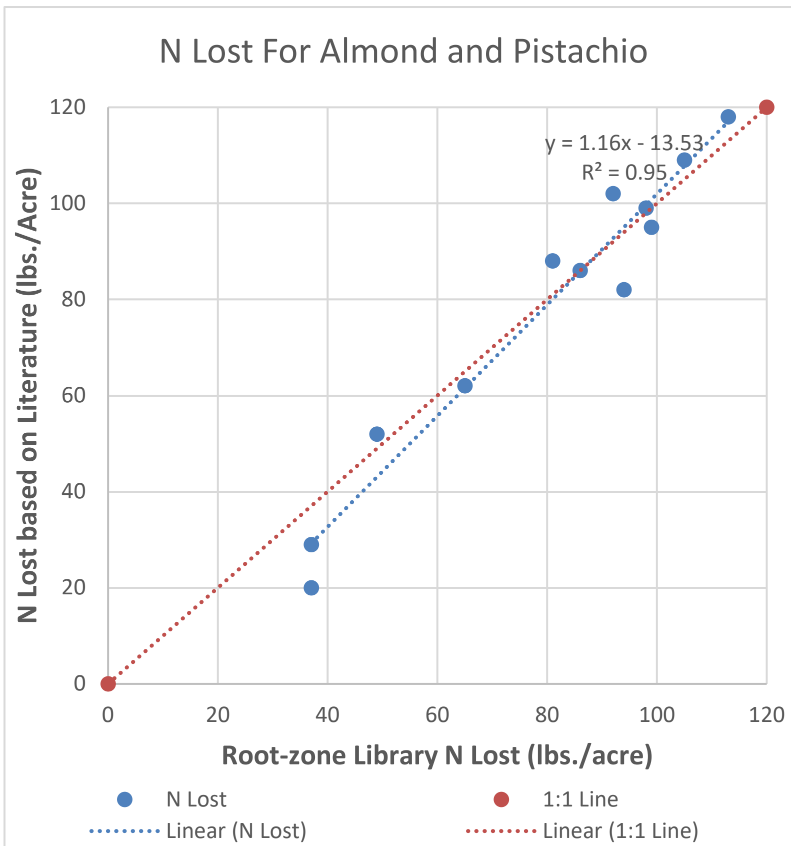


Figure 10. Root-zone Library N Lost Comparison to Literature Values

Consistent with the overall N budgets results, comparisons with different fertigation strategies evaluated in the field study are also in good agreement (Table 16). This indicates that 1) the assumed management suite developed for CV-SWAT and used to develop the Root-zone Library is reflective of current management practices implemented for these crops, 2) CV-SWAT is accurately reflecting actual N losses through its physically based root-zone processes.

N stored in perennial tissue was not directly measured in the field study but estimated based on previous work (Silva et al. 2013). Estimates from the root-zone library are comparable to the field study estimate and vary from 4 lbs/ac less, to 8 lbs/ac more than the field study estimates.

As noted previously, results for this comparison were queried from the Root-zone Library using a slightly different approach because yields were not reported in the manuscript. Only N applied and N removed in harvested materials were reported. Therefore, queries for the Root-zone Library were made based on applied N and N removed. Regardless of the query method, N removal values for both CV-SWAT and the field study are a function of the same N removal coefficients, meaning the Root-zone Library matches are representative and appropriate.

TABLE 16. COMPARISON OF ROOT-ZONE LIBRARY MATCHES TO MEASURED FIELD DATA FOR ALMOND AND PISTACHIO

			N Applied (lbs/ac)		N Removed (lbs/ac)		Perennial Tissue N (lbs/ac)		N Lost (lbs/ac)	
Year	Crop	Treatment	Field Data	RZ-Library	Field Data	RZ-Library	Field Data*	RZ-Library	Field Data	RZ-Library
2014	Almond	AGP	329	325	186	191	25	22	118	113
2014	Almond	HFLC	329	325	202	209	25	27	102	92
2014	Almond	P&F	300	304	180	182	25	25	95	99
2015	Almond	AGP	269	273	162	160	25	21	82	94
2015	Almond	HFLC	219	220	165	165	25	22	29	37
2015	Almond	P&F	219	220	174	165	25	22	20	37
2014	Pistachio	AGP	203	201	69	67	25	27	109	105
2014	Pistachio	HFLC	185	185	72	74	25	31	88	81
2014	Pistachio	P&F	189	193	65	67	25	27	99	98
2015	Pistachio	AGP	197	201	86	89	25	26	86	86
2015	Pistachio	HFLC	183	185	96	94	25	27	62	65
2015	Pistachio	P&F	183	185	106	106	25	33	52	49

*Perennial tissue storage was not explicitly measured in this study. It is based off the work in Silva et al. 2013.

Water budget. Water budget comparison are displayed in Table 17. While individual fertigation strategies were compared with respect to the N budget components, the manuscripts aggregated water information to the annual level for irrigation, precipitation, and ET, while percolation was aggregated by crop only and values from individual years were not reported. For this reason, irrigation and ET results from the Root-zone Library are presented as the range across the matches (sometimes there is no difference) while percolation estimates are the average of all matches for each crop.

As with the N budget, the water budget is generally in good agreement with respect to all components (irrigation volume, precipitation, ET, and percolation), however there are differences based on how he Root-zone Library was developed. Specifically, precipitation differs because the field study was carried out in 2014 and 2015, while the Root-zone Library results reflect climate over a 30-year period. Furthermore, ET estimates from the field study were higher than the Root-zone Library results for almonds which could partially explain why CV-SWAT simulated higher percolation values. However, it should be noted that the field study estimates are calculated through crop coefficients and not directly measured. While ET estimates for pistachio were closer than almonds in both years, irrigation and percolation estimates differed, with the Root-zone Library estimates from CV-SWAT simulating more irrigation for this field and estimating less percolation. Differences in soil water storage and percolation could be related to the soil types assumed for querying the Root-zone Library. As mentioned previously, the exact location of the field study is unknown and therefore a representative soil type from that area was selected.

TABLE 17. WATER BUDGET COMPARISON FOR FIELD AND MODELED DATA

Measurements/Parameters	Almond		Pistachio Orchard	
	Field Data	RZ Library	Field Data	RZ Library
Irrigation Type	Micro-Sprinkler	Micro-Sprinkler	Drip line	Drip line
Irrigation 2014 (inches)	44.2	43.3	28.5	39.5-40.3
Irrigation 2015 (inches)	47.2	42.4-43.3	30.5	39.5-40.3
Rain 2014 (inches)	4.0	9.4*	4.0	9.4
Rain 2015 (inches)	4.6	9.4	4.6	9.4
Evapotranspiration 2014 (ETc; inches)	48.4#	42.8	41.4#	42.0-42.1
Evapotranspiration 2015 (ETc; inches)	50.0#	42.7	43.0#	42.0-42.1
Average percolation (inches y^{-1})	4.1 ± 3.3€	8.4	11.8€	6.0

*Root-zone Library estimates are 30-year averages and are therefore different that 2014 and 2015 measurements.

#ETc calculated from crop coefficient.

€ Based on water mass balance.

5 COMPARISONS OF CV-SWAT AND HYDRUS

As requested by the CVRWQCB in the GWP Formula conditional approval letter, this section provides a comparison of CV-SWAT results to another model (HYDRUS). The goal of the assessment is to compare landscape-calibrated CV-SWAT model estimates of percolation and N loading at the bottom of the root-zone to point-level HYDRUS model estimates with the same soil, climate, management, and crop information (to the extent feasible). This assessment was completed collaboratively with researchers at University of California Davis (UC-Davis) and scientists from Formation Environmental. Specifically, the HYDRUS modeling team included Dr. Isaya Kisekka and Dr. Iael Raij Hoffman from the Sustainable Agricultural Water Management Research Group (Dr. Iael Raij Hoffman as the lead modeler). Scientists from Formation Environmental completed the SWAT modeling. The following sections provide background information on the two models, as well as the methods and results of the comparison.

5.1 BACKGROUND

Nitrate loading from agriculture is a non-point source process occurring at the landscape scale on over six million acres in the Central Valley. Various models and indices assess the hydrologic and biogeochemical processes included in this process, but they differ in their capacity to simulate the effects of spatially diverse crops, crop stress responses, climate, and soil, as well as a range of irrigation and fertilizer management on the soil water balance and nitrogen cycling. SWAT and HYDRUS are commonly used models to simulate these processes, but key differences affect their suitability to simulate the effects of management on nitrate loading at the landscape scale (Table 18).

HYDRUS. HYDRUS is used for point-level modeling and is well-suited for short-term analysis periods. It is an advanced soil physics and chemistry software package used to simulate movement of water, heat, and solutes in variably saturated media in one-, two-, or three- dimensions. The Richards equation forms the basis for simulating water movement in saturated and unsaturated media. The water transport processes used to simulate movement in soil are considered very robust. Though many studies use the HYDRUS modules (e.g., evaluation of irrigation schemes and rates [Dabach et al. 2013; Šimůnek et al. 2016], assessment of groundwater recharge, and transport of point-based agricultural contaminants [Beegum et al. 2019]), HYDRUS is not recommended for very large 3D domains (Šimůnek et al. 2012). Currently, HYDRUS does not account for individual crop and N dynamics in a crop modeling framework.

SWAT. SWAT is used for landscape-level modeling and is well-suited for long-term analysis periods. As described in the GWP Formula Workplan, SWAT is a spatially distributed, continuous, daily-time-step, hydrologic model developed by USDA Agricultural Research Services to predict the impact of crop/land management practices on water quality (Francesconi et al. 2016). It simulates sediment and agricultural chemical losses to the environment in watersheds with heterogeneous soils, land use, and management conditions. Inputs for weather, soil, topography, vegetation, and land management practices drive the various geophysical and biophysical processes associated with water quality and movement, sediment transport, crop growth, nutrient cycling, pesticide fate and transport, energy balance, chemical and microbial dynamics, and water impoundments.

Each model has strengths and weaknesses with respect to simulating water and solute movement within the soil profile. For example, SWAT has a more robust framework (compared to HYDUS) for handling crop and organic N dynamics to simulate nitrogen budget components. Conversely, the "tipping bucket approach" used in SWAT to simulate water movement within the soil profile is less robust than the non-linear, partial differential Richards equation solved in HYDRUS. Put simply, SWAT's strengths are related to modeling crop and organic N dynamics, while HYDRUS' strength is water and solute movement within the soil profile. In addition, SWAT is well suited for large landscape scale use where HYDRUS is designed for more site-specific applications.

TABLE 18. SUMMARY OF KEY DIFFERENCES BETWEEN SWAT AND HYDRUS

Process	SWAT	HYDRUS
Water movement and solute transport	Uses a "tipping bucket approach," where soil layers drain when the volume of water exceeds what can be stored. Without this, there is no downward movement of water.	Solves the non-linear, partial differential Richards equation and therefore simulates unsaturated flow when soils are below field capacity.
Crop models	Uses an explicit crop model that grows and develops as a function of heat unit accumulation and requires solar radiation, water, and nutrients to achieve optimal growth and yield. Over 40 parameters can be adjusted to control how crops grow.	Does not simulate an actual crop. Furthermore, in HYDRUS 2D/3D (used for this study), the root-zone is static, meaning the crop root-zone distribution never changes. Rather, roots are either "on" or "off."
Organic N cycling	Handles organic N cycling in a process-based fashion and models three pools of organic matter. Dynamics are affected by the carbon: nitrogen ratio, soil moisture and temperature, and the concentration of N in the various pools.	Does not consider organic N cycling. Modelers must therefore account for this process empirically (to the extent feasible) or couple it with an N production model (e.g., Matteau et al. 2019).

5.2 METHODS

The assessment was conducted for a single crop (processing tomato), modeled on four representative soils with varying physical and chemical properties, and the same management and climate information. The four soils were selected in the Tulare Lake Basin and represent dominant mapping units for each of the four soil hydrologic groups ("A," "B," "C," D") (Table 19). Climate data were used from two CIMIS stations (Stratford and Arvin-Edison). The models were run for 38 years, including an 8-year warm-up followed by a 30-year modeling period.

Consistent management and crop representations were developed and applied to both models (Table 20). As discussed previously, the calibrated CV-SWAT tomato model from the GWP formula work was used. Both models applied the same suite of management practices (Table 20). However, HYDRUS N application rates were reduced by 1% to empirically account for gaseous losses. While HYDRUS can simulate these N pathways, it was decided to adjust fertilizer rates given the relatively low gaseous losses in this cropping system and the level of effort required to calibrate the model. Gaseous losses in CV-SWAT were also approximately 1% of applied fertilizer in these simulations but handles through CV-SWAT physically based processes. With respect to the crop, HYDRUS requires a different approach than CV-SWAT to calibrate water and nutrient uptake dynamics given that there is currently no crop model. The HYDRUS crop dynamics were calibrated to be as comparable to CV-SWAT (where feasible) given the two differing modeling frameworks. Below outlines the parameterization of the crop dynamics in HYDRUS:

- *Root-zone parameterization:* The root-zone was parameterized based on the Vrugt mode (Vrugt et al. 2001) with a maximum root depth of 150 cm, depth of maximum intensity of 50 cm, a maximum root radius of 75 cm, and the radius of maximum intensity at 0 cm.

- *Evapotranspiration:* ET estimates were developed using the CV-SWAT-calculated potential ET (Hargreaves method) multiplied by tomato crop coefficients defined in Snyder et al. 2007 – 0.3 for the first 25% of the season, a linear increase until the 50% of the season reaching 1.1, 1.1 until 80% of the season, and then a linear decrease to 0.65 at the end of the season.

- *Plant water and N uptake:* Plant water and N uptake were "turned on" at planting and "turned off" after harvest. N uptake is a function of plant transpiration and is calculated as the volume of transpired water multiplied by the N concentration in the transpired water.

- *Mineralization:* N Mineralization of soil organic matter was represented empirically through zero-order kinetics and modeled in the top 45 cm in the soil profile. Annual N mineralization targets were set based on an assumed annual contribution of tomato plant residues (Geisseler et al. 2019) (i.e., N mineralization equals organic residue inputs). The concentration of total soil organic N in the soil was assumed to remain constant, thus there was not a net accumulation or depletion of total soil organic N. Mineralization rates were calculated through zero-order kinetics calibrated for each soil and were a function of soil moisture content.

- *Crop Growth, Biomass, Yield, and Residue:* HYDRUS does not have an explicit crop model, therefore these parameters could not be adjusted or accounted for in the model. Furthermore, all of the modeled N uptake was assumed to be removed from the field, with none being returned as residues. This process was empirically represented through the handling of mineralization (above), though this approach does not account for any potential N immobilization.

As discussed in Section 5.1, each model has strengths and weaknesses for simulating water and nitrogen budget components. Without observational field data, the models can only be compared to each other, with any differences in results described in context of individual model strengths and weaknesses. Without observations, traditional error statistics (e.g., Nash-Sutcliffe Efficiency (NSE)) results presented in the following sections demonstrate the relative difference/similarity between the two estimates. NSE is a dimensionless model evaluation statistic and indicates variance in modeled time series data compared to observation data. NSE ranges between −∞ and 1.0 with NSE=1 being the optimal value. Values between 0.0 and 1.0 are generally viewed as acceptable levels of performance, whereas values <0.0 indicate poor model performance (Moriasi et al. 2007). The NSE coefficient is sensitive to extreme values and indicates poor performance with large negative values when the results contain numerous outliers. Again, without observational data, the NSE statistics are only used in this study to demonstrate the relative similarity/dissimilarity of model results.

TABLE 19. SOIL PROPERTIES

Soil Series	WASCO	EXCELSIOR	WESTHAVEN	TULARE
Hydrologic Group	A	B	C	D
Texture	Sandy Loam	Loam	Sandy Loam	Silty Clay
Soil Depth (mm)	1,600	1,550	1,520	1,520
Available Water Content (mm)	170	206	213	294
Effective Saturated Hydraulic Conductivity (mm/hr)	38.3	17.5	5.8	4.7

TABLE 20. MANAGEMENT INPUTS

Crop/Management Parameter	Assumption
Planting Date	1-Apr
Harvest Date	5-Aug
Fertilizer Type	Ammonium sulfate (pre-plant in SWAT) URAN-32
Fertilizer amount (kg/ha)	230
Fertilizer applications	7
Irrigation Type	Subsurface Drip
Irrigation amount (mm)	605
Irrigation events	38

5.3 RESULTS

Summaries of model results for relevant water and nitrogen budget components (30-year averages) for in-season and annual totals are provided in Table 21. Results for the water budget and the nitrogen budget are discussed in more detail in the following sections.

TABLE 21. COMPARISON OF SEASONAL AND ANNUAL RESULTS (30-YEAR AVERAGE) FOR EACH SOIL

Soil Series	MUKEY	Hydrologic Group	Avg. Nitrogen Uptake (lbs/acre)			Avg. Nitrogen Load (lbs/acre)			Avg. ET (inches)			Avg. Percolation (inches)		
			CV-SWAT	HYDRUS	NSE (unitless)	CV-SWAT	HYDRUS	NSE (unitless)	CV-SWAT	HYDRUS	NSE (unitless)	CV-SWAT	HYDRUS	NSE (unitless)
Seasonal (Planting to Harvest) Results														
WASCO	461835	A	231	226	0.62	19	23	0.61	21.5	22.0	0.61	4.5	2.2	-0.47
EXCELSIOR	2766118	B	231	227	0.29	25	35	0.36	21.3	21.0	0.40	5.3	2.8	0.35
WESTHAVEN	461839	C	233	223	0.56	21	24	0.72	22.4	22.0	0.46	3.4	2.1	0.44
TULARE	461824	D	277	241	-0.71	23	18	0.67	22.7	21.9	-0.31	3.1	1.5	0.20
Annual Results3														
Soil Series	**MUKEY**	**Hydrologic Group**	**Avg. Nitrogen Mineralization (lbs/acre)**			**Avg. Nitrogen Load (lbs/acre)**			**Avg. ET (inches)**			**Avg. Percolation (inches)**		
			CV-SWAT	HYDRUS	NSE	CV-SWAT	HYDRUS	NSE	CV-SWAT	HYDRUS	NSE	CV-SWAT	HYDRUS	NSE
WASCO	461835	A	51	57	-0.84	21	38	0.28	25.2	27.3	-1.4	5.1	3.8	0.63
EXCELSIOR	2766118	B	55	61	-0.39	26	45	0.24	26.1	29.2	-0.9	5.7	4.0	0.63
WESTHAVEN	461839	C	55	55	-0.38	23	42	0.27	26.5	27.4	0.27	3.9	3.8	0.74
TULARE	461824	D	101	76	-1.68	25	35	0.48	27.0	28.1	0.28	3.5	3.0	0.73

5.3.1 WATER BUDGET

Water budget results (evapotranspiration and percolation) were compared between HYDRUS and CV-SWAT models across the 30-year modeling period. This included evaluation of results at the growing season and annual timesteps for each soil hydrologic group. Results for evapotranspiration and percolation are described below.

Evapotranspiration. Estimates for ET at the growing season timestep across the 30-year modeling period were consistent between CV-SWAT and HYDRUS (Table 21), with NSE values ranging from -0.31 to 0.61. While total seasonal ET was comparable, there were differences within the growing season (e.g., monthly) between the two models. Specifically, HYDRUS simulated proportionally more ET at the beginning of the season across all soils (due to the static root-zone assumptions), while ET in CV-SWAT increased gradually between April and May as the crop canopy and root system developed and reached peak consumptive use in June and July (Figure 11). The HYDRUS modelers from UC Davis are investigating reasons for this early season ET discrepancy and believe it may be due to settings associated with the crop factor.

At the coarser annual timestep, HYDRUS estimated between 27.3 and 29.2 inches of ET on average across the four soils, which is roughly 2+ inches more than CV-SWAT (25.2 to 27.0 inches) (Table 21). The roughly 2+ inch difference is a function of evaporation outside of the growing season window (i.e., fall and winter months). CV-SWAT estimated less evaporation in this timeframe, thus retaining that water in the soil profile when the crops were not actively growing. This means there is more water in the soil profile in CV-SWAT at the onset of the (next consecutive) growing season.

Percolation. Estimates of seasonal percolation in CV-SWAT ranged from 3.1 to 5.3 inches compared to 1.5 and 2.8 inches in HYDRUS, (NSE ranged from -0.47 to 0.44), with both models simulating the least amount of percolation in the Tulare soil and the most in the Excelsior soil. At the annual timestep, CV-SWAT estimated 3.5 to 5.7 inches of percolation compared to 3.0 to 4.0 in HYDRUS (NSE ranged from 0.63 to 0.74).

Differences in modeled estimates of percolation were expected and stem from 1) higher winter ET (outside of the growing season) estimated by HYDRUS; and 2) the difference in methods used to simulate water movement processes. Specifically, CV-SWAT estimated less ET over the course of the year (compared to HYDRUS), which translates to slightly more percolation. Also, CV-SWAT uses a “tipping bucket” approach to simulate water movement in the soil profile. This means that water drains incrementally to the next soil layer when the volume of water exceeds what can be stored by the soil layer. If the volume of water does not exceed what can be stored (i.e., the soil water content is below field capacity), there is no downward movement of water in the soil profile. HYDRUS, on the other hand, solves the non-linear, partial differential Richards equation and therefore simulates unsaturated flow when soils are below field capacity. This means that at the end of the growing season when irrigation ceases, CV-SWAT had limited percolation through the soil profile because the volume of water from precipitation did not often exceed the storage capacity of the soil layers (e.g., the soils remain below field capacity). In comparison, HYDRUS simulated unsaturated flow under comparable soil moisture conditions, resulting in some water continuing to percolate through the root-zone. In summary, there is more water in the soil profile in CV-SWAT at the onset of the growing season due to reduced off-season ET and percolation relative to HYDRUS, which contributes to the slightly higher percolation estimates.

5.3.2 Nitrogen Budget

Nitrogen budget results were compared between HYDRUS and CV-SWAT models across the 30-year modeling period. Consistent with the water budget comparisons, this included evaluating results at the growing season and annual timesteps for each soil type. Results for the major budget components are described below:

Denitrification and Volatilization. Denitrification and volatilization are minor components of N loss pathways in a tomato crop that is drip irrigated. CV-SWAT simulated these components of the N cycle, though minimal losses were observed (as expected) due to the nature of the cropping system modeled. As mentioned in the Methods section, the HYDRUS simulations did not model gaseous losses explicitly, but rather N application rates were reduced by 1% to empirically represent these loss pathways.

Nitrogen Uptake. N uptake in HYDRUS ranged from 223 to 241 lbs/acre, compared to 231 to 277 lbs/acre in CV-SWAT (NSE ranged from -0.7 to 0.6). It should be noted that for soil groups A, B and C, the differences in N uptake were small (4 to 9 lbs/acre) compared to soil group D where a difference of 36 lbs/acre was observed. Soil group D is an organic matter rich Tulare soil series (i.e., elevated organic carbon and nitrogen throughout the soil profile). In this type of soil, CV-SWAT estimates higher (more realistic) mineralization rates (plant residues and soil organic matter decomposition), thus resulting in more plant available N and higher N uptake by the crop. As mentioned previously, the HYDRUS modelers chose to handle N mineralization empirically based on plant residue contributions and did not account for mineralization of existing soil organic matter for this simulation, though it could have been.

N uptake dynamics were comparable for both models in most months, though HYDRUS simulated less uptake in June. As mentioned, N uptake is a function of ET in HYDRUS. While ET in HYDRUS was similar in May and June, June N uptake was considerably less (most notably in June). This is likely not a function of limited available N because fertilizer is applied in the end of May and twice in June. Furthermore, there is virtually no N loading in June in HYDRUS. This is likely due to minimal percolation because N loading is calculated as concertation (x) percolation in HYDRUS. The reduced N uptake may also be a function of fertilizer N moving beyond the densest part of the root system such that less N is taken up with water. N uptake in SWAT is a function of parameterized optimal N concentrations at various growth stages. This means N uptake dynamics can be tailored to specific crops based on their N uptake curves (i.e., in-season demand) versus ET and root distribution alone. N uptake rate and timing can influence potential N losses, especially if fertilizer and irrigation are not managed to ensure N availability at key times within the growing season.

Nitrogen Loading. Nitrogen load at the bottom of the root-zone was comparable between HYDRUS and CV-SWAT in the growing season (NSE ranged from 0.36 to 0.72) and annual timestep across the four soil types (NSE ranged from 0.24 to 0.48). Average growing season N load in CV-SWAT ranged from 19 to 25 lbs/ac compared to 18 to 35 lbs/ac in HYDRUS. For both models, the largest N load was consistently in the same month as the most percolation. This month was consistently in June for CV-SWAT and July for

HYDRUS (Figure 12). Furthermore, across all soils, the mean loading rate was higher than the median (Figure 12). This illustrates that both models accumulated N in the soil profile during certain years, likely when percolation was less, and subsequentially discharged higher loads in wetter years. The observed temporal variability in both models (with respect to N Load) reinforces the method of using long-term simulations (30 years) for generating GWP values, given that any one year in a simulation may be considerably different than the next.

FIGURE 11. IN-SEASON N AND WATER DYNAMICS FOR SWAT AND HYDRUS ACROSS THE 30-YEAR SIMULATIONS

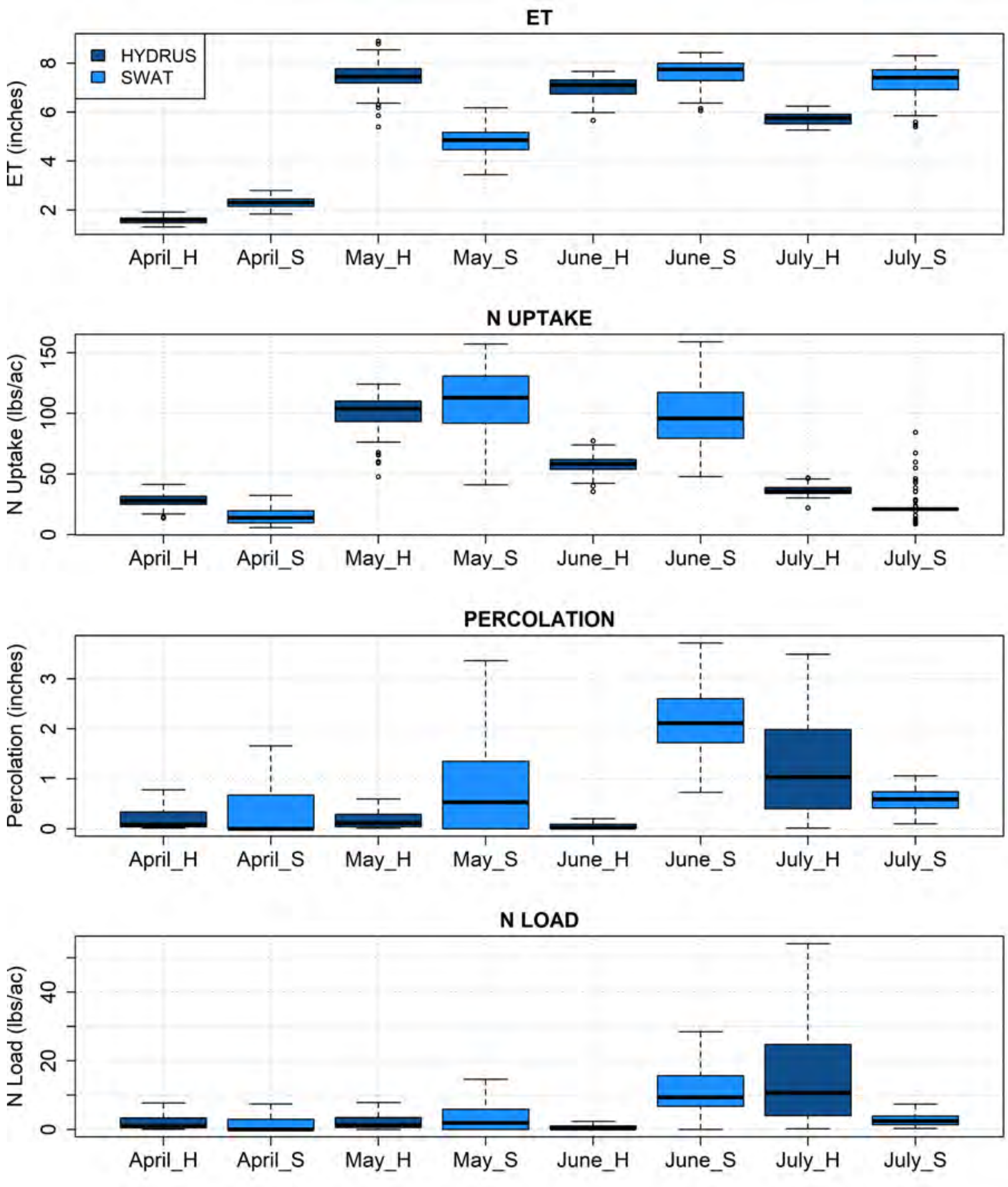
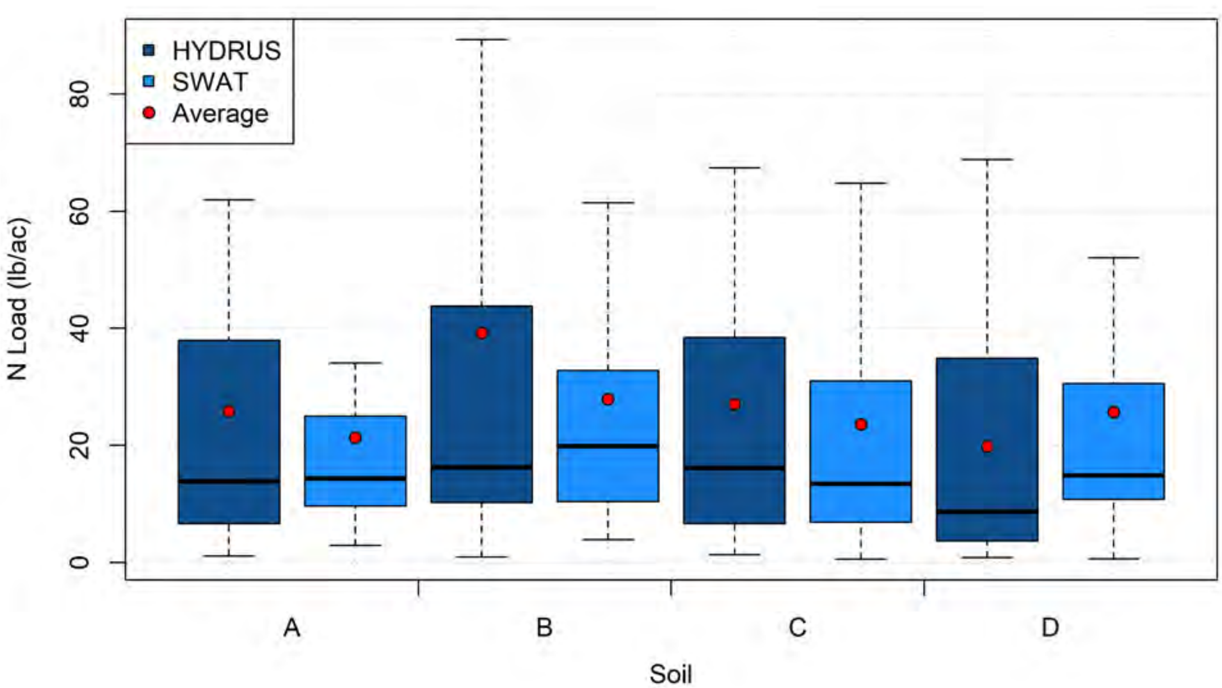


FIGURE 12. IN-SEASON N LOADING ACROSS THE 30-YEAR SIMULATION FOR EACH SOIL TYPE



5.4 DISCUSSION

Both HYDRUS and CV-SWAT estimated comparable values for percolation and nitrate leaching, with differences being explained with how root-zone processes are handled in each model. While both models performed similarly in this scenario, acknowledgement of their strengths and weaknesses is important when considering the context of their potential application. In an agricultural context, HYDRUS is a useful tool for understanding the potential impacts of various management practices on N fate such as irrigation type and fertigation strategy (Gardenas et al. 2005, Siyal et al. 2012, Šimůnek et al. 2016). However, it's current framework is less conducive for evaluation of landscape level processes like N loading across the Central Valley. While HYDRUS has been used at the landscape level to estimate N Load, this work was largely been focused in areas where agriculture is a minor component of the land use (Turkeltaub et al. 2018). For these reasons, CV-SWAT is currently better suited for use in the GWP formula for a number of reasons including its explicit crop model and handling of soil organic N dynamics. The strengths of an explicit, process-based crop model in this context include the ability to:

- Leverage existing datasets (i.e., INMP/NMP data) to estimate N loads based off applied N and yield. This is not currently feasible in HYDRUS given that yields are not simulated.
- Tailor crop-specific dynamics related to the timing and magnitude of water and nutrient demand which can affect potential N losses.
- Update and modify crop-specific dynamics as new knowledge becomes available.

- Evaluate the impacts to crops under various management scenarios using explicit, process-based crop models. While functionality to address water and N stress on crops could be added in HYDRUS, this would require customization.

- Model stresses related to inadequate N, water, and/or temperature on overall plant growth and yield.

- Interpret output from various agronomic perspectives such as yield responses to management practices or nitrogen balances (A-R) under varying scenarios.

Furthermore, process-based handling of organic N cycling is important on a regional scale because these processes can have an impact on overall N fate depending on a variety of factors. This is because there is a complex relationship between soil properties, environmental properties (temperature and moisture), and crop-specific dynamics (i.e., the quality and quantity of residue returned to the field) that vary regionally and together influence the magnitude and timing of N mineralization and immobilization/sequestration processes. For example, Geisseler et al. 2019 observed that post-harvest soil mineral N decreased in fields coming out of processing tomato. The authors noted that N leaching was unlikely given the small amount of precipitation prior to sampling and denitrification was also unlikely given the soil moisture content was below field capacity. As such, it was hypothesized that the decrease in mineral N was due to temporary immobilization by soil microorganisms consuming crop residues. While they acknowledge it is possible that the immobilized N could later mineralized back to nitrate, this off-season dynamic can have short term influences on N movement in the soil profile and potentially lead to more N remaining within the system for the next growing season. A strength of the SWAT model framework is that it allows for a straightforward approach to simulating these important organic N cycling dynamics in a process-based fashion and accounting for them across the Central Valley.

6 Team Qualifications

This section provides biographies for key team members in the following areas of expertise: soils and agronomy, SWAT modeling, and data and automation.

Soil Scientists/Agronomists
Mr. Brian Schmid: Mr. Schmid is the Managing Partner of Formation Environmental with over 16 years of experience providing technical and programmatic leadership on large, complex, multi-disciplinary agricultural and water resource projects. This includes management of science, technology, and regulatory strategy projects totaling more than $30M over the last 5 years. Mr. Schmid has extensive programmatic experience leading diverse teams on large, complex, multi-disciplinary projects, many of which involve water quality, air quality, regulatory strategy, and advanced scientific modeling techniques. Mr. Schmid is an agronomist (plant scientist) and soil scientist by training and specializes in the application of remotely sensed data and modeling techniques to quantify land surface conditions pertaining to crop identification, evapotranspiration mapping, wetland vegetation, agricultural production, soil science, and precision agriculture. This includes providing strategic guidance, consulting expert, and testifying expert services for several confidential projects involving water resource and land management throughout the Western United States and South America.

Mr. Kenneth Miller: Mr. Miller is a Soil Scientist and Agronomist. His training is focused in plant biology and physiology as well as soils and biogeochemistry. As a graduate student at the University of California, Davis, he studied the influences of soil physical, chemical, and biological properties on nutrient cycling in California agroecosystems. At Formation, Mr. Miller applies his agronomic training and expertise to support model development, calibration, and analysis of the CV-SWAT model, evaluation of grower-reported management information, and outreach to refine nutrient management strategies with respect to minimizing nutrient losses. Mr. Miller is the Project Manager.
Dr. Timothy Hartz: Dr. Hartz is a Crop Specialist with more than 35 years working with horticultural industries as an academic, a consultant, and a production manager in private industry. He was an Extension Specialist for the University of California, where he worked closely with the vegetable and strawberry industries on a range of production issues as an Extension Specialist for the University of California. His work has focused on soil fertility, drip irrigation management, and environmental water quality protection. Dr. Hartz was instrumental in refinement of the crop models for the CV-SWAT model.
Dr. John Dickey: Dr. Dickey is a Principal Soil Scientist and Agronomist with over 30 years of experience. His expertise includes the fate of salts, trace elements, and nutrients in surface and subsurface return flows; water and soil quality analyses for irrigation; and analysis, reclamation, and revegetation of saline, sodic, and saline/sodic soils. Dr. Dickey is the Program Manager for the SSJV MPEP, which is focused on the identification and implementation of management practices protective of groundwater quality, particularly related to nitrate leaching. Dr. Dickey brings experience in environmental science consulting in the western United States, as well as in agricultural research, extension, production, and consulting in California, Indiana, Burkina Faso, and China.
Dr. Mark Roberson: Dr. Roberson in a Senior Soil and Water scientist with over 29 years of agricultural and urban irrigation water management, and water quality experience. Dr. Roberson has an extensive understanding of irrigation district operations, agronomy, fertility, soil sampling, nutrient recommendations, urban and agricultural plant water demands, and on-farm water management. He has extensive knowledge and experience with drainage, particularly from the perspective of water quality. He studied as a USDA National Need Fellow and obtained a Ph.D. in soil chemistry. Dr. Roberson's academic training provides him with a thorough knowledge of soil and water chemistry as well as soil-water interactions. Since 1998 he has served as consulting staff for local, state, and federal agencies and provides consulting services for private clients.
Soil and Water Assessment Tool
Dr. George Paul: Dr. Paul is a Senior Agricultural Engineer with Formation Environmental, with more than 16 years of experience in field measurements and numerical modeling of soil, vegetation, and hydrologic processes. As an expert in evapotranspiration research, he has incorporated improvements to major remote-sensing-based surface energy balance algorithms. He developed the daily actual evapotranspiration (ETa) datasets for Oklahoma, Kansas, Texas, and California, which are extensively used for water management and ecological applications. He has supported the DWR in statewide water planning efforts, and with developing water conservation objectives and metrics. Dr. Paul is the lead modeler in the SSJV MPEP, for which he is responsible for hydrological model development, calibration, and validation to simulate agricultural nitrate leaching in the Central Valley, California.
Dr. Yohannes Yimam: Dr. Yimam has more than 14 years of experience in soil-, water-, plant-, and atmosphere-related data analysis, research, and development work. He is an expert in the development, application, calibration, and validation of prominent crop-growth, ecological, hydrological, land-surface, meteorological, and air-quality models. He also has advanced experience in analysis of large datasets, digital soil and crop mapping, geostatistics, GIS, and remote sensing data. Dr. Yimam has also been managing and leading multi-agency and multi-disciplinary projects for the last five years. He applies his expertise in root-zone modeling using SWAT for assessing agronomic conditions in the Central Valley, California.

Dr. Essayas Ayana: Dr. Ayana has more than 14 years of experience in hydrologic modeling and integration of satellite observation to water resources management. As a hydrologic modeler, he evaluated best management practices for sediment and nutrient-loading reduction for the Tarrant Regional Water District in Texas. Dr. Ayana built hydrologic models for large river basins including the upper Mississippi, Missouri, Rio Grande, Ohio, and Tennessee river basins, and he conducted sediment and nutrient loading response of the basins under natural and anthropogenic drivers.
Data and Automation
Mr. Chuan-Shin Chong: Mr. Chong is a Senior Remote-Sensing Developer with over 16 years of experience. He specializes in developing analytical solutions through remote-sensing and geospatial techniques. Mr. Chong is an expert in manipulating large datasets, automated image analysis techniques, and database management. He has utilized various types of remotely sensed data, including multispectral, hyperspectral, LiDAR, and thermal products in both pixel and object-based remote-sensing analysis techniques. Mr. Chong works closely with agronomists, soil scientists, and engineers to develop solutions for complex problems, including automation of CV-SWAT model runs on Formation's High Performance Compute Cluster.
Dr. Michael Johnson (MLJ Environmental): Dr. Johnson is the president and managing partner of MLJ Environmental. Dr. Johnson has spent the last 25 years performing monitoring and research on water quality issues in California and has been involved in water quality issues throughout the Central Valley. Dr. Johnson has extensive experience developing innovative tools to assist in identifying sources of discharge and is the technical program manager and technical lead for several agricultural coalitions in the Central Valley.
Ms. Melissa Turner (MLJ Environmental): Ms. Turner has managed the monitoring and reporting programs for several Central Valley agricultural coalitions as part of the Irrigated Lands Regulatory Program since 2004. As a senior project manager at MLJ Environmental, she has overseen the development and management of databases and their associated data for over 15 years, starting with the development of the University of California Regional Data Center (later renamed to the Central Valley Regional Data Center). She manages staff at MLJ tasked with database design and implementation, data management, quality control/ verification, software development, and data analysis.
Ms. Lisa McCrink (MLJ Environmental): Ms. McCrink manages the Nitrogen Management Plan Summary Report (NMP SR) data for two agricultural coalitions and assists with data management and analysis for an additional four. She has extensive experience working with growers on reporting nitrogen applied and yield information and ensuring that accurate data are analyzed and reported. As a Database Programmer, she is responsible for maintaining and updating database designs, performing quality control checks, writing new code as needed using MS Access, Visual Basic and/or SQL, and developing new systems to improve data analysis. Ms. McCrink's responsibilities require her to have a comprehensive understanding of the LTILRP requirements to ensure that data management, reporting, and analysis are in compliance with those regulations.

7 References

Araujo, F. J. and L. E. Williams. 1988. Dry matter and nitrogen partitioning and root growth of young field-grown Thompson Seedless grapevines. Vitis 27: 21-32.

Baram, S., V. Couvreur, T. Harter, M. Read, P. H. Brown, J. W. Hopmans, and D. R. Smart. 2016. Assessment of orchard N losses to groundwater with a vadose zone monitoring network. Agricultural Water Management 172: 83-95.

Baram, S., V. Couvreur, T. Harter, M. Read, P. H. Brown, M. Kandelous, D. R. Smart, and J. W. Hopmans. 2017. Estimating nitrate leaching to groundwater from orchards: Comparing crop nitrogen excess, deep vadose zone data driven estimates and HYDRUS modeling. Vadose Zone Journal 57: 1–13.

Beegum, S., Šimůnek, J., Szymkiewicz, A., Sudheer, K.P., Nambi, I.M., (2019). Implementation of Solute Transport in the Vadose Zone into the "HYDRUS Package for MODFLOW." Groundwater 57: 392–408.

Central Valley Coalitions. 2020. Workplan: Groundwater Protection Formula. Prepared for Buena Vista Coalition, Cawelo Water District Coalition, East San Joaquin Water Quality Coalition, Grassland Drainage Area Coalition, Kaweah Basin Water Quality Association, Kern River Watershed Coalition Authority, Kings River Watershed Coalition Authority, Sacramento Valley Water Quality Coalition, San Joaquin County and Delta Water Quality Coalition, Tule Basin Water Quality Coalition, Westlands Water Quality Coalition, Westside San Joaquin River Watershed Coalition, Westside Water Quality Coalition. Prepared by Formation Environmental, PlanTierra, LLC, and MLJ Environmental. July 1.

Cuhel, J., M. Simek, R. J. Laughlin, D. Bru, D. Cheneby, C. J. Watson, and L. Philippot. 2010. Insights into the effect of soil pH on N_2O and N_2 emissions and denitrifier community size and activity. Applied and Environmental Microbiology 76(6): 1870-1878. doi:10.1128/AEM.02484-09.

Dabach, S., N. Lazarovitch, J. Šimůnek, and U. Shani. 2013. Numerical investigation of irrigation scheduling based on soil water status. Irrigation Science 31(1), 27-36.

De Clerk, Fabrice, Michael J. Singer, and Peter Lindert. 2003. A 60-year history of California soil quality using paired samples. Geoderma 114: 215-230.

El-Jendoubi, H., J. Abadía, and A. Abadía. 2013. Assessment of nutrient removal in bearing peach trees (*Prunus persica* L. Batsch) based on whole tree analysis. Plant and Soil 369: 421-437.

Farr, T. G., P. A. Rosen, E. Caro, R. Crippen, R. Duren, S. Hensley, M. Kobrick, M. Paller, E. Rodriguez, L. Roth, D. Seal, S. Shaffer, J. Shimada, J. Umland, M. Werner, M. Oskin, D. Burbank, and D. Alsdorf. 2007. The shuttle radar topography mission. Rev. Geophys. 45(2). Accessed July 12, 2021. doi:10.1029/2005RG000183.

Paul, G., Schmid, B., Chong, C-S., Cheng, Y-B., Roberson, M., Hawkins, T., Kisekka, I., (2021). California Actual Evapotranspiration Mapping Program – An Operational Framework for Mapping Actual Evapotranspiration. In Preparation.

Francesconi, W., Srinivasan, R., Péréz-Miñana, E., Willcock, S.P., Quintero, M. 2016. Using the Soil and Water Assessment Tool (SWAT) to model ecosystem services: A systematic review. Journal of Hydrology, 535, 625–636.

Gärdenäs A, Hopmans JW, Hanson BR, Šimůnek J (2005) Two-dimensional modeling of nitrate leaching for various fertigation scenarios under micro-irrigation. Agric Water Manag 74:219–242

Geisseler, Daniel. 2016. Nitrogen concentrations in harvested plant parts – A literature overview. Accessed July 12, 2021. http://geisseler.ucdavis.edu/Geisseler_Report_2016_12_02.pdf.

Geisseler, D, K., Miller., BJ Aegerter., N.E. Clark., E.M. Miyao., 2019. Estimation of Annual Soil Nitrogen Mineralization Rates using an Organic-Nitrogen Budget Approach. Soil Science Society of America. https://doi.org/10.2136/sssaj2018.12.0473

Geisseler, Daniel. 2021. Nitrogen concentrations in harvested plant parts – Update 03/2021. Includes updated values for carrots, corn for silage, cotton, peaches, pistachios, plums, pomegranates, tomatoes, processing, safflower, sunflower, walnuts, perennial parts of trees. March 31. Accessed July 13, 2021. http://geisseler.ucdavis.edu/Geisseler_Report_U1_2021_03_31.pdf.

Krauter, C. F., C. Potter, and S. Klooster. 2006. Ammonia emission related to nitrogen fertilizer application practices, final report, June '06. California Department of Food and Agriculture Fertilizer Research and Education Program (FREP).

Krysanova, V., and White, M. 2015. Advances in water resources assessment with SWAT – an overview. Hydrological Sciences Journal, 60:5, 771-783, doi:10.1080/02626667.2015.1029482.

Marsh, B. M. 2016. An investigation of current potato nitrogen fertility programs' contribution to ground water contamination. World Academy of Science, Engineering and Technology. International Journal of Agricultural and Biosystems Engineering 10(3).

Marsh, B. M. 2019. An evaluation of nitrogen fertility management in commercial potato fields. International Journal of Agriculture, Forestry and Life Sciences, 3(1): 52-63.

Matteau, J.P., Gumiere, S.J., Gallichand, J., Létourneau, G., Khiari, L., Gasser, M.O., Michaud, A., 2019. Coupling of a nitrate production model with HYDRUS to predict nitrate leaching. Agric. Water Manag. 213, 616–626. https://doi.org/10.1016/j.agwat.2018.10.013Miller, Kenneth, Brenna J. Aegerter, Nicholas E. Clark, Michelle Leinfelder-Miles, Eugene M. Miyao, Richard Smith, Rob Wilson, and Daniel Geisseler. 2018. Relationship between soil properties and nitrogen mineralization in undisturbed soil cores from California agroecosystems. communications in soil science and plant analysis. Accessed July 13, 2021. doi:10.1080/00103624.2018.1554668.

Morgan, K. T., J. M. S. Scholberg, T. A. Obreza, and T. A. Wheaton. 2006. Size, biomass, and nitrogen relationships with sweet orange tree growth. J. Amer. Soc. Hort. Sci. 131: 149-156.

Moriasi, D. N., J. G. Arnold, M. W. V. Liew, R. L. Bingner, R. D. Harmel, and T. L. Veith, 2007. Model evaluation guidelines for systematic quantification of accuracy in watershed simulations. Tran. ASABE 50, 885–900.

MPEP (Management Practices Evaluation Program) Team. 2019. Assessment of Management Practice Performance in the Central Valley Using the Soil and Water Assessment Tool. Prepared for the Southern San Joaquin Valley MPEP Committee.

Muhammad, S., B. L. Sanden, B. D. Lampinen, D. R. Smart, S. Saa, K. A. Shackel, and P. H. Brown. 2020. Nutrient storage in the perennial organs of deciduous trees and remobilization in spring – A study in almond (*Prunus dulcis*) (Mill.) D. A. Webb. Front. Plant Sci. 11: 658. Accessed July 13, 2021. doi:10.3389/fpls.2020.00658.

Roccuzzo, G., D. Zanotelli, M. Allegra, A. Giuffrida, B. F. Torrisi, A. Leonardi, A. Quinones, F. Intrigliolo, and M. Tagliavini. 2012. Assessing nutrient uptake by field-grown orange trees. European J. Agron. 41: 73-80.

Rosecrance, R. C., S. A. Weinbaum, and P. H. Brown. 1998. Patterns of nitrogen uptake and storage in mature, alternate bearing pistachio trees. Acta Hortic. 470: 387-393.

Saxton, K. E. and W. J. Rawls. 2006. Soil water characteristic estimates by texture and organic matter for hydrologic solutions. Soil Sci. Soc. Am. J. 70: 1569–1578. Soil & Water Management & Conservation, Soil Physics. Accessed July 12, 2021. doi:10.2136/sssaj2005.0117.

Silva, S. S., M. Saiful, B. Sanden, E. Laca, and P. Brown. 2013. Almond early-season sampling and in-season nitrogen application maximizes productivity, minimizes loss—Protocol for early-season sampling and in-season nitrogen budgeting. Almond Board of California.

Šimůnek, J., M. T. Van Genuchten, and M. Šejna. 2012. HYDRUS: Model use, calibration, and validation. Transactions of the ASABE 55(4), 1263-1274.

Šimůnek, J., M. T. Van Genuchten, and M. Šejna. 2016. Recent developments and applications of the HYDRUS computer software packages. Vadose Zone Journal 15(7).

Snyder, R.L., M. Orang, K. Bali, and S. Eching. 2007. Basic Irrigation Scheduling.

Siyal, A.A., K.L. Bristow, and J. Šimunek. 2012. Minimizing nitrogen leaching from furrow irrigation through novel fertilizer placement and soil management strategies. Agric. Water Manage. 115:242–251. doi:10.1016/j.agwat.2012.09.008

Texas Water Resources Institute. 2011. Soil and Water Assessment Tool Theoretical Documentation, Version 2009.

Turkeltaub, T., Jia, X., Zhu, Y., Shao, M.A., Binley, A., 2018. Recharge and Nitrate Transport Through the Deep Vadose Zone of the Loess Plateau: A Regional-Scale Model Investigation. Water Resour. Res. 4332–4346. https://doi.org/10.1029/2017WR022190Verhoeven, E., E. Pereira, C. Decock, G. Garland, T. Kennedy, E. Suddick, W. Horwath, and J. Six. 2017. N_2O emissions from California farmlands: A review. California Agriculture 71(3): 148-159.

Vrugt, J. A., M. T. van Wijk, J. W. Hopmans, and J. Šimůnek. 2001. One-, two-, and three-dimensional root water uptake functions for transient modeling. Water Resour. Res. 37(10): 2457–2470. doi: 10.1029/2000WR000027.

Weier, K. L., J. W. Doran, J. F. Power, and D. T. Walters. 1993. Denitrification and the dinitrogen/nitrous oxide ratio as affected by soil water, available carbon, and nitrate. Soil Sci. Soc. Am. J. 57: 66-72.

Weinbaum, S. and C. van Kessel. 1998. Quantitative estimates of uptake and internal cycling of ^{14}N-labeled fertilizer in mature walnut trees. Tree Physiology 18: 795-801.

Williams, L. E. 1987. Growth of ‘Thompson Seedless’ grapevines: II. Nitrogen distribution. J. Amer. Soc. Hortic. Sci. 112: 330-333.

Williams, L. E. 2017. Dry matter accumulation and nitrogen and potassium partitioning in the roots and trunk of field-grown Thompson Seedless grapevines. Amer. J. Enol. Vitic. 68: 422-430.

APPENDIX 1 – GWP VALUES FOR GWP TOWNSHIPS

TABLE 1-1. SUMMARY OF GWP VALUES FOR GWP TOWNSHIPS

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M01N06E	SJCDWQC	73	822	-101	-97	16,804	20	8.8
M01N07E	SJCDWQC	96	9,302	48	53	361,908	39	16.4
M01N08E	SJCDWQC	26	7,136	59	58	303,453	43	16.1
M01S06E	SJCDWQC	50	2,875	-3	-2	76,600	27	14.4
M01S07E	SJCDWQC	100	13,685	28	32	461,698	34	13.9
M01S08E	SJCDWQC	72	10,831	37	40	361,998	33	13.9
M01S09E	SJCDWQC	71	6,945	29	33	138,748	20	9.3
M01S10E	ESJWQC, SJCDWQC	48	4,728	32	34	76,836	16	6.7
M02N06E	SJCDWQC	99	2,078	-87	-89	52,033	25	6.4
M02N07E	SJCDWQC	79	10,551	38	39	235,633	22	9.2
M02S04E	SJCDWQC	55	3,362	5	8	76,223	23	8.1
M02S05E	SJCDWQC	70	4,229	-78	-68	140,444	33	11
M02S06E	SJCDWQC	67	8,780	-67	-51	167,931	19	8.5
M02S07E	ESJWQC, SJCDWQC	100	11,519	39	43	266,809	23	10.5
M02S08E	ESJWQC, SJCDWQC	108	13,968	51	53	377,742	27	12.3
M02S09E	ESJWQC, SJCDWQC	99	12,350	43	47	253,056	20	9.2
M02S10E	ESJWQC, SJCDWQC	101	7,878	33	40	147,655	19	8
M02S11E	ESJWQC, SJCDWQC	28	5,363	31	38	134,325	25	13.9
M03N05E	SJCDWQC	33	3,223	13	17	64,305	20	9.9
M03N06E	SJCDWQC	100	11,040	6	6	99,360	9	3.3
M03N07E	SJCDWQC	30	4,183	-4	-1	55,879	13	4.8
M03S04E	SJCDWQC	13	70	2	23	681	10	2.7
M03S05E	SJCDWQC, WSJRWC	91	9,239	17	24	253,175	27	11.8
M03S06E	SJCDWQC, WSJRWC	102	16,197	24	31	583,964	36	16.9
M03S07E	ESJWQC, SJCDWQC, WSJRWC	102	11,419	-45	-37	234,114	21	9.9
M03S08E	ESJWQC	100	12,921	38	41	314,022	24	11.4
M03S09E	ESJWQC	100	2,012	24	28	33,847	17	9.8

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M03S10E	ESJWQC	100	9,736	27	30	198,814	20	9.7
M03S11E	ESJWQC	37	13,462	48	54	403,764	30	14
M04N05E	SJCDWQC	58	9,399	20	21	113,901	12	5.7
M04N06E	SJCDWQC	96	14,106	17	18	127,019	9	3.7
M04N07E	SJCDWQC	24	3,431	18	19	30,734	9	3
M04N08E	SJCDWQC	17	2,813	25	24	31,397	11	4.4
M04S06E	SJCDWQC, WSJRWC	84	11,502	49	50	361,937	31	17.1
M04S07E	ESJWQC, WSJRWC	91	13,549	31	38	477,488	35	18.6
M04S08E	ESJWQC, WSJRWC	99	13,640	31	37	293,246	21	10.5
M04S09E	ESJWQC	100	8,045	12	18	136,031	17	8
M04S10E	ESJWQC	100	15,014	34	38	327,998	22	10.5
M04S11E	ESJWQC	61	10,942	68	67	486,812	44	23.8
M05N05E	SJCDWQC, SVWQC	73	8,112	-5	-5	115,599	14	8.8
M05S07E	ESJWQC, WSJRWC	74	10,428	52	54	354,000	34	17.6
M05S08E	ESJWQC, WSJRWC	88	10,909	-40	-35	309,862	28	11.3
M05S09E	ESJWQC	100	8,178	-15	-5	191,599	23	11.2
M05S10E	ESJWQC	100	6,946	14	20	170,136	24	13.6
M05S11E	ESJWQC	71	9,833	41	42	246,619	25	13.6
M05S12E	ESJWQC	36	8,235	35	41	153,774	19	10.4
M05S13E	ESJWQC	52	8,812	33	37	162,819	18	10.1
M05S14E	ESJWQC	24	2,214	21	45	66,562	30	16.2
M06S07E	WSJRWC	37	1,798	46	54	51,498	29	14
M06S08E	WSJRWC	98	19,431	28	31	652,764	34	15.9
M06S09E	ESJWQC, WSJRWC	101	9,245	-19	-10	256,440	28	11.9
M06S10E	ESJWQC	100	7,051	25	35	175,807	25	14.1
M06S11E	ESJWQC	100	9,899	35	37	212,816	21	12
M06S12E	ESJWQC	100	11,617	31	37	202,719	17	12.3
M06S13E	ESJWQC	62	8,275	50	52	273,571	33	19.9
M07S08E	WSJRWC	88	11,997	43	43	431,809	36	16.9

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M07S09E	ESJWQC, WSJRWC	64	5,245	9	10	173,776	33	12.8
M07S10E	ESJWQC	82	2,939	-1	2	61,918	21	11.2
M07S11E	ESJWQC	93	12,174	39	41	450,206	37	33.8
M07S12E	ESJWQC	99	14,591	39	42	301,963	21	12.9
M07S13E	ESJWQC	98	5,770	22	29	176,481	31	17.8
M07S14E	ESJWQC	53	7,733	27	34	227,204	29	15.3
M07S15E	ESJWQC	58	8,601	33	39	314,174	37	20.5
M08S08E	WSJRWC	66	10,442	19	23	282,656	27	14.8
M08S09E	ESJWQC, WSJRWC	27	5,760	-15	-9	148,854	26	11.8
M08S11E	ESJWQC, WSJRWC	22	1,684	33	34	45,107	27	58.7
M08S12E	ESJWQC	39	3,105	-58	-53	66,126	21	9.1
M08S13E	ESJWQC	77	11,073	2	11	315,766	29	14.8
M08S14E	ESJWQC	82	8,482	-44	-53	231,607	27	10.2
M08S15E	ESJWQC	14	3,180	75	68	148,487	47	21.7
M09S08E	WSJRWC	31	2,441	6	12	35,192	14	9.3
M09S09E	WSJRWC	36	4,451	20	26	116,479	26	18.2
M09S12E	WSJRWC	35	7,733	-84	-75	277,613	36	15.8
M09S13E	ESJWQC, WSJRWC	39	8,362	-47	-47	287,814	34	14.1
M09S14E	ESJWQC	93	5,245	-20	-21	207,993	40	14.7
M09S15E	ESJWQC	73	7,411	56	54	221,583	30	15.4
M09S16E	ESJWQC	14	4,683	43	47	107,276	23	15.1
M10S09E	WSJRWC	46	2,960	-18	-8	81,601	28	19.7
M10S10E	WSJRWC	66	10,694	7	8	394,526	37	23.4
M10S11E	WSJRWC	12	1,978	-64	-56	28,692	15	9.2
M10S13E	ESJWQC, WSJRWC	27	4,489	1	4	178,807	40	22.7
M10S14E	ESJWQC	78	13,893	39	41	328,013	24	13.3
M10S15E	ESJWQC	98	14,344	39	39	390,278	27	13.9
M10S16E	ESJWQC	27	6,890	68	70	222,413	32	20.2
M10S18E	ESJWQC	10	7,467	82	83	361,319	48	34.1

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values: Total N Load (lbs)	Root-zone GWP Values: Average N Load (lbs/ac)	Root-zone GWP Values: Nitrate-N Concentration (mg/L)
M11S10E	GDAC, WSJRWC	83	9,772	9	15	302,676	31	21
M11S12E	GDAC, WSJRWC	13	3,103	0	10	130,191	42	29.6
M11S13E	ESJWQC, WSJRWC	23	8,093	42	38	358,307	44	42.5
M11S14E	ESJWQC, WSJRWC	56	16,271	64	65	536,947	33	22
M11S15E	ESJWQC	44	8,002	36	34	302,056	38	20.2
M11S16E	ESJWQC	95	13,169	56	62	408,696	31	19.2
M11S17E	ESJWQC	54	8,599	62	64	271,518	32	18.7
M11S18E	ESJWQC	20	5,502	68	69	240,598	44	26
M11S19E	ESJWQC	23	2,891	53	56	88,450	31	23.5
M11S20E	ESJWQC, KRWQC	24	3,650	74	75	154,872	42	31.5
M11S21E	ESJWQC	34	341	128	124	21,066	62	43.2
M12S11E	GDAC	34	7,846	32	34	195,637	25	22.7
M12S12E	GDAC	22	7,314	-2	1	167,507	23	20.1
M12S13E	GDAC, WSJRWC	13	4,530	47	44	172,552	38	37
M12S14E	ESJWQC, WSJRWC	71	9,312	73	70	366,986	39	33.5
M12S15E	ESJWQC, WSJRWC	16	14,491	66	65	584,035	40	20.4
M12S16E	ESJWQC	12	5,364	37	39	110,913	21	11.2
M12S17E	ESJWQC	63	17,860	35	38	327,150	18	9.8
M12S18E	ESJWQC, KRWQC	66	15,692	35	40	311,043	20	10.6
M12S19E	ESJWQC, KRWQC	58	12,571	72	73	513,350	41	28.1
M12S20E	ESJWQC, KRWQC	81	3,737	59	69	128,061	34	21.9
M12S21E	KRWQC	95	1,794	118	113	131,088	73	37.3
M12S22E	KRWQC	67	406	83	81	18,655	46	19.1
M13S12E	GDAC, WSC, WSJRWC	53	13,405	53	55	401,316	30	22.1
M13S13E	GDAC, WSC	54	10,581	68	66	503,244	48	44.4
M13S14E	ESJWQC, GDAC, WSC, WSJRWC	52	7,478	33	37	267,047	36	30.1
M13S15E	ESJWQC, GDAC, WSJRWC	38	11,748	62	60	330,204	28	17.4
M13S16E	ESJWQC, KRWQC	12	12,690	18	28	263,412	21	9.2

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M13S17E	ESJWQC, KRWQC	10	12,326	52	55	360,096	29	13.3
M13S18E	ESJWQC, KRWQC	97	15,881	44	47	396,950	25	11
M13S19E	KRWQC	100	3,849	50	55	111,019	29	13.3
M13S20E	KRWQC	100	187	39	41	3,757	20	11.1
M13S21E	KRWQC	100	789	81	83	43,032	55	23.1
M13S22E	KRWQC	100	5,774	67	74	265,873	46	24.2
M13S23E	KRWQC	75	5,729	69	72	253,580	44	24.4
M13S24E	KRWQC	33	1,315	56	59	43,200	33	19
M14S12E	WSC	41	9,139	67	70	388,374	42	25.8
M14S13E	WSC	69	20,875	52	58	788,265	38	32.7
M14S14E	WSC	91	11,848	60	62	408,430	34	37.3
M14S15E	WSC, WSJRWC	44	2,450	71	69	90,628	37	72.5
M14S16E	KRWQC	56	11,064	134	127	980,344	89	37.3
M14S17E	KRWQC	25	8,857	43	56	256,563	29	12.2
M14S18E	KRWQC	100	17,332	48	52	438,939	25	9.9
M14S19E	KRWQC	100	11,444	48	53	315,906	28	11.2
M14S20E	KRWQC	100	3,668	48	52	105,956	29	11.2
M14S21E	KRWQC	100	8,517	67	69	365,517	43	23.8
M14S22E	KRWQC	100	10,973	66	68	435,536	40	22.4
M14S23E	KRWQC	100	8,619	42	46	187,500	22	12.5
M14S24E	KRWQC	89	6,857	67	68	319,348	47	29
M14S25E	KRWQC	16	1,023	63	65	42,295	41	25.5
M15S12E	WSC	54	4,077	57	64	151,785	37	31.6
M15S13E	WSC	92	18,110	86	91	1,051,391	58	53.4
M15S14E	WSC	96	8,474	62	65	312,894	37	45.6
M15S15E	WSC	87	1,698	74	70	65,052	38	61.6
M15S16E	KRWQC	35	9,212	89	90	611,520	66	35.5
M15S18E	KRWQC	42	11,428	61	63	442,932	39	16.4
M15S19E	KRWQC	97	16,369	58	59	502,362	31	12.5

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M15S20E	KRWQC	100	14,140	42	46	337,777	24	11.7
M15S21E	KRWQC	100	13,037	45	47	326,366	25	14.9
M15S22E	KRWQC	100	12,967	46	49	307,045	24	22.5
M15S23E	KRWQC	100	12,564	49	50	304,584	24	16.6
M15S24E	KRWQC	100	13,603	57	59	482,172	35	22.5
M15S25E	KRWQC	51	7,251	65	68	321,235	44	26.6
M16S13E	WSC	44	1,527	64	79	51,068	33	29.7
M16S14E	WSC	82	12,871	68	74	506,924	39	31.6
M16S15E	WSC	61	15,961	66	70	674,392	42	39.2
M16S16E	KRWQC, WSC	76	11,454	57	58	411,477	36	47.8
M16S17E	KRWQC, WSC	19	7,201	65	66	411,794	57	31.8
M16S19E	KRWQC	58	17,119	72	71	683,986	40	16.7
M16S20E	KRWQC	100	17,858	42	47	407,639	23	10.3
M16S21E	KRWQC	100	15,974	52	54	502,374	31	22.5
M16S22E	KRWQC	100	11,359	39	42	194,367	17	13
M16S23E	KRWQC	100	15,336	46	49	387,070	25	15.3
M16S24E	KRWQC	100	13,039	55	58	455,880	35	22.7
M16S25E	KBWQA, KRWQC	89	11,295	62	64	474,049	42	26.7
M17S14E	WSC	58	1,939	36	57	51,647	27	23
M17S15E	WSC	49	18,926	74	81	992,845	52	51.2
M17S16E	WSC	76	10,922	91	83	671,266	61	83.6
M17S17E	KRWQC, WSC	80	14,477	55	60	527,185	36	42.3
M17S18E	KRWQC, WSC	16	11,068	58	63	507,461	46	29.8
M17S19E	KRWQC	42	7,578	55	60	294,688	39	21.7
M17S20E	KRWQC	47	11,739	51	55	335,174	29	17.9
M17S21E	KRWQC	100	15,688	54	58	483,377	31	20.6
M17S22E	KRWQC	100	15,954	39	46	354,630	22	12.1
M17S23E	KRWQC	93	14,860	43	47	392,525	26	15.6
M17S24E	KBWQA, KRWQC	112	4,492	61	65	194,048	43	21.4

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M17S25E	KBWQA, KRWQC	100	12,004	49	55	452,955	38	23.8
M17S26E	KBWQA	69	12,956	61	62	524,763	41	25
M17S27E	KBWQA	25	3,241	36	42	81,056	25	21.2
M18S15E	WSC	60	8,286	74	80	435,643	53	48.9
M18S16E	WSC	71	14,785	83	82	810,165	55	74.7
M18S17E	WSC	68	20,061	42	44	717,966	36	49.3
M18S18E	KRWQC, WSC	89	18,149	60	60	978,910	54	58.8
M18S19E	KRWQC, WSC	25	6,756	56	60	283,021	42	40
M18S20E	KRWQC	41	11,885	55	61	433,664	36	24
M18S21E	KRWQC	100	10,641	59	65	389,364	37	21.2
M18S22E	KRWQC	100	9,285	56	61	359,709	39	17.7
M18S23E	KBWQA, KRWQC	91	4,180	53	58	189,200	45	24.6
M18S24E	KBWQA	86	8,324	43	47	304,394	37	15.6
M18S25E	KBWQA	62	7,585	63	66	365,538	48	18.6
M18S26E	KBWQA	60	12,683	46	50	457,640	36	16.3
M18S27E	KBWQA	62	6,913	60	63	282,170	41	21.2
M19S16E	WSC	50	15,047	57	67	494,600	33	38.8
M19S17E	WSC	52	18,310	49	57	612,583	33	43.1
M19S18E	WSC	89	20,758	100	86	1,385,681	67	72.3
M19S19E	KRWQC, WSC	77	9,609	80	79	589,787	61	79.7
M19S20E	KRWQC	39	5,328	64	64	189,408	36	30.3
M19S21E	KRWQC	53	9,617	39	55	347,960	36	19
M19S22E	KRWQC	105	7,544	43	54	256,025	34	16.7
M19S23E	KBWQA, KRWQC	96	7,480	6	20	217,509	29	14
M19S24E	KBWQA	80	7,398	30	35	305,310	41	15.3
M19S25E	KBWQA	60	12,162	53	58	506,988	42	14.5
M19S26E	KBWQA	87	12,305	50	53	404,930	33	17.2
M19S27E	KBWQA	37	2,257	61	63	96,907	43	23.1
M20S15E	WSC	76	4,683	69	80	246,107	53	79.9

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M20S16E	WSC	84	9,559	68	76	396,496	41	48.3
M20S17E	WSC	51	17,941	34	42	514,979	29	32.7
M20S18E	WSC	66	19,209	62	63	851,366	44	57.9
M20S19E	KRWQC, WSC	75	8,648	36	44	282,168	33	58.5
M20S20E	KRWQC	17	6,737	62	68	378,807	56	57.5
M20S21E	KRWQC	22	2,498	-19	12	34,026	14	10.2
M20S22E	KRWQC	110	4,678	33	45	165,735	35	24.6
M20S23E	KBWQA	100	10,516	22	30	406,992	39	19.9
M20S24E	KBWQA	90	10,112	23	26	581,572	58	28.5
M20S25E	KBWQA, TBWQC	103	5,842	45	51	239,145	41	23
M20S26E	KBWQA, TBWQC	107	11,783	62	63	491,963	42	21.5
M20S27E	KBWQA, TBWQC	85	9,690	80	80	519,424	54	26.4
M21S15E	WSC	29	1,211	55	56	28,582	24	43
M21S16E	WSC	89	7,450	79	80	378,807	51	70.6
M21S17E	WSC	79	9,463	49	61	270,370	29	30.4
M21S18E	WSC	87	20,005	66	70	894,810	45	45.5
M21S19E	WSC	41	4,815	47	57	231,150	48	86.3
M21S23E	KBWQA, TBWQC	95	4,885	-34	-18	161,183	33	17.1
M21S24E	KBWQA, TBWQC	112	7,042	42	53	258,579	37	24.6
M21S25E	TBWQC	107	4,805	88	93	320,280	67	37.7
M21S26E	TBWQC	100	12,884	70	72	633,708	49	23.5
M21S27E	TBWQC	96	6,541	74	75	313,592	48	23.9
M21S28E	TBWQC	33	1,566	85	85	92,804	59	31.7
M21S29E	TBWQC	25	422	52	54	11,663	28	20.4
M22S16E	WSC	33	611	-30	20	4,643	8	17.1
M22S17E	WSC	65	345	-54	8	1,003	3	6.6
M22S18E	WSC	35	4,293	37	46	88,570	21	26.6
M22S19E	KRWQC	13	1,591	34	49	30,433	19	9.8
M22S23E	TBWQC	76	4,393	62	65	194,924	44	44

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M22S24E	TBWQC	100	4,020	50	53	140,351	35	24.4
M22S25E	TBWQC	100	5,661	69	77	259,544	46	26.4
M22S26E	TBWQC	100	14,351	60	62	575,617	40	21
M22S27E	TBWQC	93	9,037	84	84	491,647	54	32.4
M22S28E	TBWQC	51	3,978	99	94	288,326	72	38.3
M23S17E	WSC	10	343	-29	38	1,619	5	8.1
M23S23E	TBWQC	27	1,415	49	50	33,724	24	55.8
M23S24E	TBWQC	65	1,692	103	100	115,120	68	61.5
M23S25E	TBWQC	98	10,662	59	62	349,666	33	23.7
M23S26E	TBWQC	100	16,808	56	58	547,426	33	28.1
M23S27E	TBWQC	82	11,442	60	64	466,107	41	34.5
M23S28E	TBWQC	28	2,331	70	71	115,162	49	28
M24S18E	WWQC	34	807	70	70	33,166	41	21.8
M24S24E	TBWQC	13	6,680	44	51	109,469	16	15
M24S25E	TBWQC	89	15,181	52	55	401,753	26	21
M24S26E	TBWQC	100	16,680	59	61	505,854	30	22.1
M24S27E	KRWCA, TBWQC	45	8,310	81	82	457,745	55	60.5
M25S20E	WWQC	55	18,575	69	71	791,157	43	38
M25S21E	WWQC	97	2,746	12	11	7,433	3	7.1
M25S22E	KRWCA	69	3,010	111	109	211,942	70	59.9
M25S24E	KRWCA	26	9,823	4	16	185,797	19	11.4
M25S25E	KRWCA	99	10,789	44	45	323,110	30	19.6
M25S26E	KRWCA, TBWQC	99	18,324	56	55	589,965	32	32.4
M25S27E	KRWCA, TBWQC	14	6,578	70	70	261,906	40	51.8
M26S18E	WWQC	46	5,181	67	77	261,935	51	28.6
M26S21E	KRWCA, WWQC	84	5,412	45	52	130,101	24	17.1
M26S22E	KRWCA	94	2,619	54	53	56,918	22	20
M26S23E	KRWCA	34	11,972	-8	-3	231,594	19	12.1
M26S24E	KRWCA	33	16,158	36	41	545,913	34	18.4

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M26S25E	KRWCA	69	19,044	45	52	494,197	26	13.6
M26S26E	CWDC, KRWCA	66	17,810	50	54	471,780	26	22.1
M27S21E	WWQC	19	14,350	42	46	331,798	23	18.1
M27S22E	BVC, KRWCA, WWQC	97	12,402	44	50	324,754	26	25.3
M27S23E	KRWCA	77	16,687	53	61	597,954	36	17.2
M27S24E	KRWCA	71	16,005	46	54	492,553	31	13.4
M27S25E	KRWCA	100	22,407	36	39	399,880	18	8.6
M27S26E	CWDC, KRWCA	46	15,770	65	66	507,618	32	21.5
M28S21E	WWQC	54	10,623	60	60	341,845	32	19.4
M28S22E	BVC, KRWCA, WWQC	60	15,379	35	38	250,159	16	14.1
M28S23E	BVC, KRWCA	47	13,157	25	29	210,635	16	10.1
M28S24E	KRWCA	39	13,210	32	35	334,138	25	11.8
M28S25E	KRWCA	99	17,910	57	60	632,361	35	17.1
M28S26E	CWDC, KRWCA	89	17,369	43	47	400,326	23	14.8
M28S27E	CWDC, KRWCA	11	3,333	19	21	29,764	9	12.4
M29S22E	WWQC	15	3,221	19	37	46,690	14	7.7
M29S23E	BVC, KRWCA	12	6,068	36	37	237,524	39	30.2
M29S24E	BVC, KRWCA	28	14,162	-53	-42	379,257	27	15.5
M29S25E	KRWCA	49	15,836	-2	2	321,322	20	10.3
M29S26E	KRWCA	99	15,318	47	49	461,541	30	18.5
M29S27E	KRWCA	74	762	27	42	12,374	16	9
M29S29E	KRWCA	34	1,905	56	57	61,395	32	36.7
M30S26E	KRWCA	25	8,961	58	59	330,720	37	20.8
M30S27E	KRWCA	39	1,456	26	30	38,199	26	13.4
M30S28E	KRWCA	100	2,598	23	23	62,021	24	14.2
M30S29E	KRWCA	100	16,728	73	68	801,344	48	41.4
M30S30E	KRWCA	43	8,774	48	48	248,784	28	34.7
M31S26E	BVC, KRWCA	13	4,969	10	6	207,265	42	21.9
M31S27E	KRWCA	30	12,305	34	40	435,312	35	17.2

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values: Total N Load (lbs)	Root-zone GWP Values: Average N Load (lbs/ac)	Root-zone GWP Values: Nitrate-N Concentration (mg/L)
M31S28E	KRWCA	56	12,924	38	39	615,310	48	28
M31S29E	KRWCA	97	20,637	40	43	840,420	41	26.8
M31S30E	KRWCA	55	10,129	43	45	244,128	24	18.2
M32S26E	KRWCA	17	19,666	7	6	509,600	26	18.8
M32S27E	KRWCA	76	19,575	43	41	715,653	37	37.1
M32S28E	KRWCA	68	21,082	59	56	1,148,983	54	50.8
M32S29E	KRWCA	60	23,025	37	41	1,047,498	45	35.5
S11N18W	KRWCA	16	6,162	78	77	312,213	51	42.6
S11N19W	KRWCA	73	25,918	48	48	847,979	33	25.5
S11N20W	KRWCA	54	11,238	46	51	354,777	32	26.2
S11N21W	KRWCA	57	12,035	67	74	496,414	41	43.1
S12N18W	KRWCA	24	4,567	84	83	336,568	74	64.1
S12N19W	KRWCA	100	6,279	55	53	267,953	43	39.2
S12N20W	KRWCA	100	4,008	57	59	154,894	39	25.4
S12N21W	KRWCA	94	4,609	31	34	69,310	15	9
S12N22W	KRWCA	18	4,201	42	46	148,548	35	21.4
M05N04E	SVWQC	74	7,730	7	14	314,190	41	27.4
M06N01E	SVWQC	42	7,275	-35	-31	281,588	39	16.4
M07N01E	SVWQC	66	10,816	13	16	350,367	32	12.2
M08N01E	SVWQC	66	11,740	24	28	460,656	39	16
M08N02E	SVWQC	40	7,154	32	30	316,710	44	17.8
M09N02E	SVWQC	74	11,408	-13	-6	423,237	37	16.6
M10N02E	SVWQC	53	8,265	-27	-20	236,899	29	12.3
M14N03E	SVWQC	81	10,795	66	65	505,379	47	18.1
M15N01W	SVWQC	53	7,934	30	31	399,931	50	24.2
M16N03E	SVWQC	73	11,689	67	65	543,970	47	16.6
M17N03E	SVWQC	53	8,965	72	68	433,365	48	16.3
M18N01W	SVWQC	56	7,850	11	11	327,054	42	10.5
M20N03W	SVWQC	60	10,536	-5	-2	318,004	30	10

Township MTR	Coalitions	Percent HVA in Township	INMP/NMP Reported Acreage	INMP/NMP N Balance (A-R) (lbs/ac)	SWAT N Balance (A-R) (lbs/ac)	Root-zone GWP Values		
						Total N Load (lbs)	Average N Load (lbs/ac)	Nitrate-N Concentration (mg/L)
M21N01E	SVWQC	76	15,744	47	48	409,595	26	7.1
M21N01W	SVWQC	55	8,007	53	55	258,958	32	8.7
M21N02W	SVWQC	56	12,995	33	37	484,464	37	11.1
M21N03W	SVWQC	92	14,022	61	61	464,163	33	11.2
M22N01W	SVWQC	28	8,425	69	64	388,892	46	12
M23N01W	SVWQC	70	10,385	58	60	404,495	39	10.2

APPENDIX 2 – DETAILED NITROGEN AND WATER BUDGET COMPONENTS FOR EACH GWP TOWNSHIP

Township: M01N06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	73			%
3	Reported Acreage	822			acres
4	Parcels	10			number
5	Reported Crops	12			number
6	Reported N Applied	46,123			lbs
7	Total N Applied	46,123		50,078	lbs
8	AWA N Applied	56		61	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			158,579	lbs
11	AWA N Uptake			278	lbs/ac
12	Total N Removed	129,388		130,545	lbs
13	AWA N Removed	157		159	lbs/ac
14	AWA N Balance	-101		-97	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			1,744	lbs
17	Total N Runoff			400	lbs
18	Total Denitrification			930	lbs
19	Total Ammonia Volatilization			722	lbs
20	Total Change in Soil Organic N			-1,465	lbs
21	Total Perennial Tissue N			5,288	lbs
22	AWA N in Rain			3.1	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			1.3	lbs/ac
26	AWA Change in Soil Organic N			-2.6	lbs/ac
27	AWA Perennial Tissue N			9.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-21	%
CV-SWAT Water Budget Results					
30	Total Precipitation			643	acre-ft
31	Total Applied water			1,506	acre-ft
32	Total Evapotranspiration (ET)			1,540	acre-ft
33	Total Runoff			94	acre-ft
34	Total Percolation			699	acre-ft
35	AWA Precipitation			13.5	inches
36	AWA Applied water			31.7	inches
37	AWA Evapotranspiration (ET)			32.4	inches
38	AWA Runoff			2	inches
39	AWA Percolation			10.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M01N07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	96			%
3	Reported Acreage	9,302			acres
4	Parcels	205			number
5	Reported Crops	20			number
6	Reported N Applied	1,234,948			lbs
7	Total N Applied	1,303,768		1,260,341	lbs
8	AWA N Applied	140		135	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			1,345,694	lbs
11	AWA N Uptake			161	lbs/ac
12	Total N Removed	843,081		767,054	lbs
13	AWA N Removed	91		82	lbs/ac
14	AWA N Balance	48		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,808	lbs
17	Total N Runoff			6,345	lbs
18	Total Denitrification			8,135	lbs
19	Total Ammonia Volatilization			46,780	lbs
20	Total Change in Soil Organic N			59,266	lbs
21	Total Perennial Tissue N			125,620	lbs
22	AWA N in Rain			3	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			5.6	lbs/ac
26	AWA Change in Soil Organic N			7.1	lbs/ac
27	AWA Perennial Tissue N			15	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			73	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,161	acre-ft
31	Total Applied water			22,388	acre-ft
32	Total Evapotranspiration (ET)			22,374	acre-ft
33	Total Runoff			1,366	acre-ft
34	Total Percolation			8,106	acre-ft
35	AWA Precipitation			13.2	inches
36	AWA Applied water			32.2	inches
37	AWA Evapotranspiration (ET)			32.1	inches
38	AWA Runoff			2	inches
39	AWA Percolation			10.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M01N08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	26			%
3	Reported Acreage	7,136			acres
4	Parcels	97			number
5	Reported Crops	17			number
6	Reported N Applied	839,789			lbs
7	Total N Applied	893,261		889,804	lbs
8	AWA N Applied	125		125	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			839,562	lbs
11	AWA N Uptake			142	lbs/ac
12	Total N Removed	471,316		478,916	lbs
13	AWA N Removed	66		67	lbs/ac
14	AWA N Balance	59		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,929	lbs
17	Total N Runoff			6,015	lbs
18	Total Denitrification			5,679	lbs
19	Total Ammonia Volatilization			27,772	lbs
20	Total Change in Soil Organic N			-3,526	lbs
21	Total Perennial Tissue N			120,783	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			4.7	lbs/ac
26	AWA Change in Soil Organic N			-0.6	lbs/ac
27	AWA Perennial Tissue N			20.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			73	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,262	acre-ft
31	Total Applied water			18,883	acre-ft
32	Total Evapotranspiration (ET)			17,747	acre-ft
33	Total Runoff			934	acre-ft
34	Total Percolation			6,911	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			38.2	inches
37	AWA Evapotranspiration (ET)			35.9	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			11.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M01S06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	50			%
3	Reported Acreage	2,875			acres
4	Parcels	79			number
5	Reported Crops	38			number
6	Reported N Applied	238,110			lbs
7	Total N Applied	244,786		226,939	lbs
8	AWA N Applied	85		79	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			367,957	lbs
11	AWA N Uptake			185	lbs/ac
12	Total N Removed	252,908		243,266	lbs
13	AWA N Removed	88		85	lbs/ac
14	AWA N Balance	-3		-2	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,480	lbs
17	Total N Runoff			2,500	lbs
18	Total Denitrification			4,196	lbs
19	Total Ammonia Volatilization			6,603	lbs
20	Total Change in Soil Organic N			1,467	lbs
21	Total Perennial Tissue N			23,067	lbs
22	AWA N in Rain			2.8	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			0.7	lbs/ac
27	AWA Perennial Tissue N			11.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-1,209	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,019	acre-ft
31	Total Applied water			5,038	acre-ft
32	Total Evapotranspiration (ET)			5,064	acre-ft
33	Total Runoff			294	acre-ft
34	Total Percolation			1,956	acre-ft
35	AWA Precipitation			12.2	inches
36	AWA Applied water			30.4	inches
37	AWA Evapotranspiration (ET)			30.5	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M01S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	100			%
3	Reported Acreage	13,685			acres
4	Parcels	374			number
5	Reported Crops	25			number
6	Reported N Applied	1,827,421			lbs
7	Total N Applied	1,879,649		1,836,185	lbs
8	AWA N Applied	137		134	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			2,171,412	lbs
11	AWA N Uptake			178	lbs/ac
12	Total N Removed	1,460,333		1,395,805	lbs
13	AWA N Removed	107		102	lbs/ac
14	AWA N Balance	28		32	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			34,341	lbs
17	Total N Runoff			16,700	lbs
18	Total Denitrification			13,994	lbs
19	Total Ammonia Volatilization			63,172	lbs
20	Total Change in Soil Organic N			41,415	lbs
21	Total Perennial Tissue N			196,443	lbs
22	AWA N in Rain			2.8	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			3.4	lbs/ac
27	AWA Perennial Tissue N			16.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			105	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,678	acre-ft
31	Total Applied water			35,698	acre-ft
32	Total Evapotranspiration (ET)			34,703	acre-ft
33	Total Runoff			2,125	acre-ft
34	Total Percolation			12,238	acre-ft
35	AWA Precipitation			12.4	inches
36	AWA Applied water			35	inches
37	AWA Evapotranspiration (ET)			34.1	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			10.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M01S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	72			%
3	Reported Acreage	10,831			acres
4	Parcels	332			number
5	Reported Crops	30			number
6	Reported N Applied	1,507,933			lbs
7	Total N Applied	1,567,119		1,558,509	lbs
8	AWA N Applied	145		144	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,989,227	lbs
11	AWA N Uptake			193	lbs/ac
12	Total N Removed	1,163,916		1,126,573	lbs
13	AWA N Removed	107		104	lbs/ac
14	AWA N Balance	37		40	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,415	lbs
17	Total N Runoff			17,346	lbs
18	Total Denitrification			15,710	lbs
19	Total Ammonia Volatilization			46,679	lbs
20	Total Change in Soil Organic N			45,153	lbs
21	Total Perennial Tissue N			211,733	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			4.5	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			20.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			84	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,883	acre-ft
31	Total Applied water			32,282	acre-ft
32	Total Evapotranspiration (ET)			32,016	acre-ft
33	Total Runoff			1,862	acre-ft
34	Total Percolation			9,587	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			37.6	inches
37	AWA Evapotranspiration (ET)			37.3	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			10.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M01S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	71			%
3	Reported Acreage	6,945			acres
4	Parcels	291			number
5	Reported Crops	19			number
6	Reported N Applied	886,670			lbs
7	Total N Applied	960,483		941,851	lbs
8	AWA N Applied	138		136	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,161,360	lbs
11	AWA N Uptake			179	lbs/ac
12	Total N Removed	739,980		716,070	lbs
13	AWA N Removed	107		103	lbs/ac
14	AWA N Balance	29		33	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,504	lbs
17	Total N Runoff			8,662	lbs
18	Total Denitrification			5,928	lbs
19	Total Ammonia Volatilization			35,827	lbs
20	Total Change in Soil Organic N			16,196	lbs
21	Total Perennial Tissue N			123,264	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			5.5	lbs/ac
26	AWA Change in Soil Organic N			2.5	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			61	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,846	acre-ft
31	Total Applied water			20,193	acre-ft
32	Total Evapotranspiration (ET)			20,586	acre-ft
33	Total Runoff			1,153	acre-ft
34	Total Percolation			5,510	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			37.4	inches
37	AWA Evapotranspiration (ET)			38.2	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			9.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M01S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	48			%
3	Reported Acreage	4,728			acres
4	Parcels	76			number
5	Reported Crops	8			number
6	Reported N Applied	552,195			lbs
7	Total N Applied	636,353		634,777	lbs
8	AWA N Applied	135		134	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			713,060	lbs
11	AWA N Uptake			177	lbs/ac
12	Total N Removed	479,617		475,168	lbs
13	AWA N Removed	101		101	lbs/ac
14	AWA N Balance	32		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,523	lbs
17	Total N Runoff			8,137	lbs
18	Total Denitrification			2,372	lbs
19	Total Ammonia Volatilization			25,461	lbs
20	Total Change in Soil Organic N			6,098	lbs
21	Total Perennial Tissue N			69,284	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			6.3	lbs/ac
26	AWA Change in Soil Organic N			1.5	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			16	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,263	acre-ft
31	Total Applied water			13,631	acre-ft
32	Total Evapotranspiration (ET)			13,393	acre-ft
33	Total Runoff			833	acre-ft
34	Total Percolation			4,243	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			40.5	inches
37	AWA Evapotranspiration (ET)			39.8	inches
38	AWA Runoff			2.5	inches
39	AWA Percolation			10.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			7	mg/L

AWA: Acre-Weighted Average

Township: M02N06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	99			%
3	Reported Acreage	2,078			acres
4	Parcels	71			number
5	Reported Crops	10			number
6	Reported N Applied	144,120			lbs
7	Total N Applied	151,676		140,173	lbs
8	AWA N Applied	73		67	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			393,047	lbs
11	AWA N Uptake			222	lbs/ac
12	Total N Removed	333,007		328,311	lbs
13	AWA N Removed	160		158	lbs/ac
14	AWA N Balance	-87		-89	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			6,848	lbs
17	Total N Runoff			1,044	lbs
18	Total Denitrification			715	lbs
19	Total Ammonia Volatilization			5,174	lbs
20	Total Change in Soil Organic N			3,100	lbs
21	Total Perennial Tissue N			18,524	lbs
22	AWA N in Rain			3.9	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			0.4	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			1.7	lbs/ac
27	AWA Perennial Tissue N			10.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-28	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,525	acre-ft
31	Total Applied water			5,894	acre-ft
32	Total Evapotranspiration (ET)			5,111	acre-ft
33	Total Runoff			470	acre-ft
34	Total Percolation			2,969	acre-ft
35	AWA Precipitation			17.1	inches
36	AWA Applied water			39.9	inches
37	AWA Evapotranspiration (ET)			34.6	inches
38	AWA Runoff			3.2	inches
39	AWA Percolation			17.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			6	mg/L

AWA: Acre-Weighted Average

Township: M02N07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	79			%
3	Reported Acreage	10,551			acres
4	Parcels	549			number
5	Reported Crops	39			number
6	Reported N Applied	809,080			lbs
7	Total N Applied	844,792		854,019	lbs
8	AWA N Applied	80		81	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,158,413	lbs
11	AWA N Uptake			118	lbs/ac
12	Total N Removed	448,329		440,493	lbs
13	AWA N Removed	42		42	lbs/ac
14	AWA N Balance	38		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			36,712	lbs
17	Total N Runoff			9,650	lbs
18	Total Denitrification			5,331	lbs
19	Total Ammonia Volatilization			22,936	lbs
20	Total Change in Soil Organic N			4,811	lbs
21	Total Perennial Tissue N			239,612	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			0.5	lbs/ac
27	AWA Perennial Tissue N			24.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			22	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,481	acre-ft
31	Total Applied water			28,223	acre-ft
32	Total Evapotranspiration (ET)			29,992	acre-ft
33	Total Runoff			2,382	acre-ft
34	Total Percolation			9,439	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			34.5	inches
37	AWA Evapotranspiration (ET)			36.7	inches
38	AWA Runoff			2.9	inches
39	AWA Percolation			10.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M02S04E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	55			%
3	Reported Acreage	3,362			acres
4	Parcels	88			number
5	Reported Crops	13			number
6	Reported N Applied	325,126			lbs
7	Total N Applied	341,407		336,495	lbs
8	AWA N Applied	102		100	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			461,158	lbs
11	AWA N Uptake			143	lbs/ac
12	Total N Removed	323,206		324,398	lbs
13	AWA N Removed	96		97	lbs/ac
14	AWA N Balance	5		8	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,091	lbs
17	Total N Runoff			1,507	lbs
18	Total Denitrification			726	lbs
19	Total Ammonia Volatilization			7,854	lbs
20	Total Change in Soil Organic N			-5,282	lbs
21	Total Perennial Tissue N			40,827	lbs
22	AWA N in Rain			3.8	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.2	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			-1.6	lbs/ac
27	AWA Perennial Tissue N			12.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			273	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,441	acre-ft
31	Total Applied water			8,174	acre-ft
32	Total Evapotranspiration (ET)			8,494	acre-ft
33	Total Runoff			773	acre-ft
34	Total Percolation			3,455	acre-ft
35	AWA Precipitation			16.6	inches
36	AWA Applied water			30.5	inches
37	AWA Evapotranspiration (ET)			31.7	inches
38	AWA Runoff			2.9	inches
39	AWA Percolation			12.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M02S05E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	70			%
3	Reported Acreage	4,229			acres
4	Parcels	118			number
5	Reported Crops	12			number
6	Reported N Applied	499,941			lbs
7	Total N Applied	500,726		462,868	lbs
8	AWA N Applied	118		109	lbs/ac
9	AWA N Applied Difference		9		lbs/ac
10	Total N Uptake			911,944	lbs
11	AWA N Uptake			247	lbs/ac
12	Total N Removed	831,494		781,364	lbs
13	AWA N Removed	197		185	lbs/ac
14	AWA N Balance	-78		-68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,642	lbs
17	Total N Runoff			1,433	lbs
18	Total Denitrification			2,053	lbs
19	Total Ammonia Volatilization			5,405	lbs
20	Total Change in Soil Organic N			-12,467	lbs
21	Total Perennial Tissue N			34,363	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			1.5	lbs/ac
26	AWA Change in Soil Organic N			-3.4	lbs/ac
27	AWA Perennial Tissue N			9.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,539	acre-ft
31	Total Applied water			11,626	acre-ft
32	Total Evapotranspiration (ET)			10,442	acre-ft
33	Total Runoff			374	acre-ft
34	Total Percolation			4,706	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			33.9	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			13.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M02S06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	67			%
3	Reported Acreage	8,780			acres
4	Parcels	107			number
5	Reported Crops	21			number
6	Reported N Applied	1,078,223			lbs
7	Total N Applied	1,096,547		1,029,284	lbs
8	AWA N Applied	125		117	lbs/ac
9	AWA N Applied Difference		8		lbs/ac
10	Total N Uptake			1,799,118	lbs
11	AWA N Uptake			235	lbs/ac
12	Total N Removed	1,684,402		1,534,282	lbs
13	AWA N Removed	192		175	lbs/ac
14	AWA N Balance	-67		-51	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-15		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,197	lbs
17	Total N Runoff			7,440	lbs
18	Total Denitrification			8,349	lbs
19	Total Ammonia Volatilization			34,049	lbs
20	Total Change in Soil Organic N			-31,218	lbs
21	Total Perennial Tissue N			60,776	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			-4.1	lbs/ac
27	AWA Perennial Tissue N			7.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-37	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,665	acre-ft
31	Total Applied water			20,950	acre-ft
32	Total Evapotranspiration (ET)			20,121	acre-ft
33	Total Runoff			808	acre-ft
34	Total Percolation			7,265	acre-ft
35	AWA Precipitation			10.4	inches
36	AWA Applied water			32.8	inches
37	AWA Evapotranspiration (ET)			31.5	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			9.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M02S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	100			%
3	Reported Acreage	11,519			acres
4	Parcels	460			number
5	Reported Crops	23			number
6	Reported N Applied	1,631,320			lbs
7	Total N Applied	1,684,183		1,655,923	lbs
8	AWA N Applied	146		144	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			2,029,565	lbs
11	AWA N Uptake			197	lbs/ac
12	Total N Removed	1,196,102		1,164,759	lbs
13	AWA N Removed	104		101	lbs/ac
14	AWA N Balance	39		43	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,043	lbs
17	Total N Runoff			21,630	lbs
18	Total Denitrification			14,761	lbs
19	Total Ammonia Volatilization			55,330	lbs
20	Total Change in Soil Organic N			42,759	lbs
21	Total Perennial Tissue N			224,422	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			2.1	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			5.4	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			21.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,538	acre-ft
31	Total Applied water			34,169	acre-ft
32	Total Evapotranspiration (ET)			33,211	acre-ft
33	Total Runoff			1,673	acre-ft
34	Total Percolation			9,343	acre-ft
35	AWA Precipitation			11.1	inches
36	AWA Applied water			39.9	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			2	inches
39	AWA Percolation			9.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M02S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	108			%
3	Reported Acreage	13,968			acres
4	Parcels	534			number
5	Reported Crops	23			number
6	Reported N Applied	1,744,352			lbs
7	Total N Applied	1,837,352		1,851,398	lbs
8	AWA N Applied	132		133	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,189,242	lbs
11	AWA N Uptake			169	lbs/ac
12	Total N Removed	1,125,286		1,110,945	lbs
13	AWA N Removed	81		80	lbs/ac
14	AWA N Balance	51		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			35,147	lbs
17	Total N Runoff			25,814	lbs
18	Total Denitrification			19,722	lbs
19	Total Ammonia Volatilization			54,534	lbs
20	Total Change in Soil Organic N			63,039	lbs
21	Total Perennial Tissue N			301,719	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			4.9	lbs/ac
27	AWA Perennial Tissue N			23.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,995	acre-ft
31	Total Applied water			41,742	acre-ft
32	Total Evapotranspiration (ET)			41,402	acre-ft
33	Total Runoff			2,439	acre-ft
34	Total Percolation			11,261	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			38.7	inches
37	AWA Evapotranspiration (ET)			38.3	inches
38	AWA Runoff			2.3	inches
39	AWA Percolation			9.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M02S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	99			%
3	Reported Acreage	12,350			acres
4	Parcels	458			number
5	Reported Crops	22			number
6	Reported N Applied	1,572,289			lbs
7	Total N Applied	1,613,639		1,607,927	lbs
8	AWA N Applied	131		130	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,909,073	lbs
11	AWA N Uptake			164	lbs/ac
12	Total N Removed	1,071,504		1,024,772	lbs
13	AWA N Removed	87		83	lbs/ac
14	AWA N Balance	43		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,503	lbs
17	Total N Runoff			25,926	lbs
18	Total Denitrification			13,335	lbs
19	Total Ammonia Volatilization			50,155	lbs
20	Total Change in Soil Organic N			47,698	lbs
21	Total Perennial Tissue N			247,370	lbs
22	AWA N in Rain			2.8	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			4.3	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			21.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			43	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,025	acre-ft
31	Total Applied water			37,345	acre-ft
32	Total Evapotranspiration (ET)			37,107	acre-ft
33	Total Runoff			2,390	acre-ft
34	Total Percolation			10,165	acre-ft
35	AWA Precipitation			12.4	inches
36	AWA Applied water			38.4	inches
37	AWA Evapotranspiration (ET)			38.2	inches
38	AWA Runoff			2.5	inches
39	AWA Percolation			9.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M02S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	101			%
3	Reported Acreage	7,878			acres
4	Parcels	246			number
5	Reported Crops	13			number
6	Reported N Applied	895,040			lbs
7	Total N Applied	962,616		975,919	lbs
8	AWA N Applied	122		124	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,117,340	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	701,213		658,954	lbs
13	AWA N Removed	89		84	lbs/ac
14	AWA N Balance	33		40	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,589	lbs
17	Total N Runoff			16,324	lbs
18	Total Denitrification			4,653	lbs
19	Total Ammonia Volatilization			39,296	lbs
20	Total Change in Soil Organic N			20,752	lbs
21	Total Perennial Tissue N			126,736	lbs
22	AWA N in Rain			2.8	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			5.6	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,247	acre-ft
31	Total Applied water			22,662	acre-ft
32	Total Evapotranspiration (ET)			22,222	acre-ft
33	Total Runoff			1,540	acre-ft
34	Total Percolation			6,780	acre-ft
35	AWA Precipitation			12.4	inches
36	AWA Applied water			38.8	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			2.6	inches
39	AWA Percolation			10.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M02S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC			
2	Percent HVA	28			%
3	Reported Acreage	5,363			acres
4	Parcels	119			number
5	Reported Crops	11			number
6	Reported N Applied	663,874			lbs
7	Total N Applied	677,535		576,469	lbs
8	AWA N Applied	126		107	lbs/ac
9	AWA N Applied Difference		19		lbs/ac
10	Total N Uptake			657,825	lbs
11	AWA N Uptake			161	lbs/ac
12	Total N Removed	401,963		372,651	lbs
13	AWA N Removed	75		69	lbs/ac
14	AWA N Balance	31		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,641	lbs
17	Total N Runoff			8,210	lbs
18	Total Denitrification			2,623	lbs
19	Total Ammonia Volatilization			20,519	lbs
20	Total Change in Soil Organic N			17,872	lbs
21	Total Perennial Tissue N			70,193	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			5	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,306	acre-ft
31	Total Applied water			13,069	acre-ft
32	Total Evapotranspiration (ET)			13,322	acre-ft
33	Total Runoff			927	acre-ft
34	Total Percolation			3,544	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			38.5	inches
37	AWA Evapotranspiration (ET)			39.2	inches
38	AWA Runoff			2.7	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M03N05E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	33			%
3	Reported Acreage	3,223			acres
4	Parcels	51			number
5	Reported Crops	12			number
6	Reported N Applied	159,509			lbs
7	Total N Applied	167,111		173,423	lbs
8	AWA N Applied	52		54	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			268,816	lbs
11	AWA N Uptake			100	lbs/ac
12	Total N Removed	125,374		117,510	lbs
13	AWA N Removed	39		36	lbs/ac
14	AWA N Balance	13		17	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,072	lbs
17	Total N Runoff			3,173	lbs
18	Total Denitrification			3,544	lbs
19	Total Ammonia Volatilization			2,773	lbs
20	Total Change in Soil Organic N			-16,561	lbs
21	Total Perennial Tissue N			49,297	lbs
22	AWA N in Rain			3.8	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			1	lbs/ac
26	AWA Change in Soil Organic N			-6.2	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			115	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,699	acre-ft
31	Total Applied water			6,985	acre-ft
32	Total Evapotranspiration (ET)			7,520	acre-ft
33	Total Runoff			758	acre-ft
34	Total Percolation			2,393	acre-ft
35	AWA Precipitation			16.6	inches
36	AWA Applied water			31.3	inches
37	AWA Evapotranspiration (ET)			33.7	inches
38	AWA Runoff			3.4	inches
39	AWA Percolation			8.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M03N06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	100			%
3	Reported Acreage	11,040			acres
4	Parcels	382			number
5	Reported Crops	19			number
6	Reported N Applied	376,049			lbs
7	Total N Applied	449,320		452,045	lbs
8	AWA N Applied	41		41	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			814,336	lbs
11	AWA N Uptake			77	lbs/ac
12	Total N Removed	377,002		389,250	lbs
13	AWA N Removed	34		35	lbs/ac
14	AWA N Balance	6		6	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			39,614	lbs
17	Total N Runoff			5,617	lbs
18	Total Denitrification			4,793	lbs
19	Total Ammonia Volatilization			9,496	lbs
20	Total Change in Soil Organic N			-35,469	lbs
21	Total Perennial Tissue N			162,739	lbs
22	AWA N in Rain			3.8	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			0.9	lbs/ac
26	AWA Change in Soil Organic N			-3.4	lbs/ac
27	AWA Perennial Tissue N			15.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			9	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			158	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,548	acre-ft
31	Total Applied water			28,121	acre-ft
32	Total Evapotranspiration (ET)			28,926	acre-ft
33	Total Runoff			2,933	acre-ft
34	Total Percolation			11,027	acre-ft
35	AWA Precipitation			16.6	inches
36	AWA Applied water			32	inches
37	AWA Evapotranspiration (ET)			32.9	inches
38	AWA Runoff			3.3	inches
39	AWA Percolation			12	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			3	mg/L

AWA: Acre-Weighted Average

Township: M03N07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	30			%
3	Reported Acreage	4,183			acres
4	Parcels	275			number
5	Reported Crops	24			number
6	Reported N Applied	163,788			lbs
7	Total N Applied	198,217		199,848	lbs
8	AWA N Applied	47		48	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			382,133	lbs
11	AWA N Uptake			96	lbs/ac
12	Total N Removed	213,437		203,413	lbs
13	AWA N Removed	51		49	lbs/ac
14	AWA N Balance	-4		-1	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,947	lbs
17	Total N Runoff			2,594	lbs
18	Total Denitrification			2,185	lbs
19	Total Ammonia Volatilization			6,239	lbs
20	Total Change in Soil Organic N			-7,122	lbs
21	Total Perennial Tissue N			62,994	lbs
22	AWA N in Rain			3.8	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			1.6	lbs/ac
26	AWA Change in Soil Organic N			-1.8	lbs/ac
27	AWA Perennial Tissue N			15.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			13	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-1,807	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,491	acre-ft
31	Total Applied water			10,733	acre-ft
32	Total Evapotranspiration (ET)			10,916	acre-ft
33	Total Runoff			1,085	acre-ft
34	Total Percolation			4,256	acre-ft
35	AWA Precipitation			16.6	inches
36	AWA Applied water			32.4	inches
37	AWA Evapotranspiration (ET)			33	inches
38	AWA Runoff			3.3	inches
39	AWA Percolation			12.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			5	mg/L

AWA: Acre-Weighted Average

Township: M03S04E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	13			%
3	Reported Acreage	70			acres
4	Parcels	1			number
5	Reported Crops	1			number
6	Reported N Applied	140			lbs
7	Total N Applied	140		1,592	lbs
8	AWA N Applied	2		23	lbs/ac
9	AWA N Applied Difference		-21		lbs/ac
10	Total N Uptake			2,517	lbs
11	AWA N Uptake			36	lbs/ac
12	Total N Removed	0		0	lbs
13	AWA N Removed	0		0	lbs/ac
14	AWA N Balance	2		23	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-21		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			262	lbs
17	Total N Runoff			19	lbs
18	Total Denitrification			6	lbs
19	Total Ammonia Volatilization			6	lbs
20	Total Change in Soil Organic N			-506	lbs
21	Total Perennial Tissue N			1,649	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			0.1	lbs/ac
25	AWA Ammonia Volatilization			0.1	lbs/ac
26	AWA Change in Soil Organic N			-7.2	lbs/ac
27	AWA Perennial Tissue N			23.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			10	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			43	%
CV-SWAT Water Budget Results					
30	Total Precipitation			96	acre-ft
31	Total Applied water			189	acre-ft
32	Total Evapotranspiration (ET)			175	acre-ft
33	Total Runoff			19	acre-ft
34	Total Percolation			92	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			32.5	inches
37	AWA Evapotranspiration (ET)			30	inches
38	AWA Runoff			3.2	inches
39	AWA Percolation			15.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			3	mg/L

AWA: Acre-Weighted Average

Township: M03S05E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC, WSJRWC			
2	Percent HVA	91			%
3	Reported Acreage	9,239			acres
4	Parcels	165			number
5	Reported Crops	22			number
6	Reported N Applied	1,215,826			lbs
7	Total N Applied	1,239,614		1,218,639	lbs
8	AWA N Applied	134		132	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,496,711	lbs
11	AWA N Uptake			172	lbs/ac
12	Total N Removed	1,078,451		1,001,789	lbs
13	AWA N Removed	117		108	lbs/ac
14	AWA N Balance	17		24	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,213	lbs
17	Total N Runoff			3,390	lbs
18	Total Denitrification			3,994	lbs
19	Total Ammonia Volatilization			16,345	lbs
20	Total Change in Soil Organic N			-2,213	lbs
21	Total Perennial Tissue N			137,528	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			-0.3	lbs/ac
27	AWA Perennial Tissue N			15.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			115	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,127	acre-ft
31	Total Applied water			27,233	acre-ft
32	Total Evapotranspiration (ET)			26,906	acre-ft
33	Total Runoff			829	acre-ft
34	Total Percolation			7,897	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			37.2	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			10.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M03S06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC, WSJRWC			
2	Percent HVA	102			%
3	Reported Acreage	16,197			acres
4	Parcels	277			number
5	Reported Crops	25			number
6	Reported N Applied	2,059,930			lbs
7	Total N Applied	2,124,185		2,123,874	lbs
8	AWA N Applied	131		131	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,607,945	lbs
11	AWA N Uptake			170	lbs/ac
12	Total N Removed	1,736,223		1,633,489	lbs
13	AWA N Removed	107		101	lbs/ac
14	AWA N Balance	24		31	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			38,203	lbs
17	Total N Runoff			7,161	lbs
18	Total Denitrification			12,442	lbs
19	Total Ammonia Volatilization			30,310	lbs
20	Total Change in Soil Organic N			-9,621	lbs
21	Total Perennial Tissue N			243,465	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			-0.6	lbs/ac
27	AWA Perennial Tissue N			15.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			118	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,980	acre-ft
31	Total Applied water			44,995	acre-ft
32	Total Evapotranspiration (ET)			44,989	acre-ft
33	Total Runoff			1,375	acre-ft
34	Total Percolation			12,701	acre-ft
35	AWA Precipitation			10.9	inches
36	AWA Applied water			35.2	inches
37	AWA Evapotranspiration (ET)			35.2	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			9.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M03S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, SJCDWQC, WSJRWC			
2	Percent HVA	102			%
3	Reported Acreage	11,419			acres
4	Parcels	169			number
5	Reported Crops	40			number
6	Reported N Applied	907,872			lbs
7	Total N Applied	1,061,983		942,523	lbs
8	AWA N Applied	93		83	lbs/ac
9	AWA N Applied Difference		10		lbs/ac
10	Total N Uptake			1,888,825	lbs
11	AWA N Uptake			189	lbs/ac
12	Total N Removed	1,416,708		1,366,724	lbs
13	AWA N Removed	124		120	lbs/ac
14	AWA N Balance	-45		-37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,287	lbs
17	Total N Runoff			11,944	lbs
18	Total Denitrification			14,314	lbs
19	Total Ammonia Volatilization			38,817	lbs
20	Total Change in Soil Organic N			-8,918	lbs
21	Total Perennial Tissue N			106,327	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			-0.9	lbs/ac
27	AWA Perennial Tissue N			10.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,962	acre-ft
31	Total Applied water			27,267	acre-ft
32	Total Evapotranspiration (ET)			27,097	acre-ft
33	Total Runoff			1,382	acre-ft
34	Total Percolation			8,696	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			32.8	inches
37	AWA Evapotranspiration (ET)			32.5	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M03S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	12,921			acres
4	Parcels	543			number
5	Reported Crops	44			number
6	Reported N Applied	1,691,945			lbs
7	Total N Applied	1,754,012		1,679,219	lbs
8	AWA N Applied	136		130	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			2,061,061	lbs
11	AWA N Uptake			185	lbs/ac
12	Total N Removed	1,177,703		1,143,330	lbs
13	AWA N Removed	91		88	lbs/ac
14	AWA N Balance	38		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,924	lbs
17	Total N Runoff			22,264	lbs
18	Total Denitrification			21,665	lbs
19	Total Ammonia Volatilization			50,251	lbs
20	Total Change in Soil Organic N			46,869	lbs
21	Total Perennial Tissue N			259,596	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			4.5	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			23.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,970	acre-ft
31	Total Applied water			36,215	acre-ft
32	Total Evapotranspiration (ET)			35,326	acre-ft
33	Total Runoff			1,787	acre-ft
34	Total Percolation			10,172	acre-ft
35	AWA Precipitation			10.7	inches
36	AWA Applied water			39	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			9.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M03S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	2,012			acres
4	Parcels	89			number
5	Reported Crops	12			number
6	Reported N Applied	178,340			lbs
7	Total N Applied	214,680		215,907	lbs
8	AWA N Applied	107		107	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			284,600	lbs
11	AWA N Uptake			180	lbs/ac
12	Total N Removed	166,241		159,807	lbs
13	AWA N Removed	83		79	lbs/ac
14	AWA N Balance	24		28	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,842	lbs
17	Total N Runoff			3,195	lbs
18	Total Denitrification			2,361	lbs
19	Total Ammonia Volatilization			8,835	lbs
20	Total Change in Soil Organic N			7,548	lbs
21	Total Perennial Tissue N			32,975	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			5.6	lbs/ac
26	AWA Change in Soil Organic N			4.8	lbs/ac
27	AWA Perennial Tissue N			20.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			17	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,423	acre-ft
31	Total Applied water			4,779	acre-ft
32	Total Evapotranspiration (ET)			4,825	acre-ft
33	Total Runoff			261	acre-ft
34	Total Percolation			1,276	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			36.2	inches
37	AWA Evapotranspiration (ET)			36.6	inches
38	AWA Runoff			2	inches
39	AWA Percolation			7.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M03S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	9,736			acres
4	Parcels	335			number
5	Reported Crops	24			number
6	Reported N Applied	918,927			lbs
7	Total N Applied	962,363		969,936	lbs
8	AWA N Applied	99		100	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,171,990	lbs
11	AWA N Uptake			156	lbs/ac
12	Total N Removed	696,870		670,103	lbs
13	AWA N Removed	72		69	lbs/ac
14	AWA N Balance	27		30	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,900	lbs
17	Total N Runoff			14,475	lbs
18	Total Denitrification			5,460	lbs
19	Total Ammonia Volatilization			39,460	lbs
20	Total Change in Soil Organic N			27,797	lbs
21	Total Perennial Tissue N			135,904	lbs
22	AWA N in Rain			2.8	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			67	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,733	acre-ft
31	Total Applied water			22,915	acre-ft
32	Total Evapotranspiration (ET)			23,143	acre-ft
33	Total Runoff			1,499	acre-ft
34	Total Percolation			7,551	acre-ft
35	AWA Precipitation			12.4	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			37.1	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			9.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M03S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	37			%
3	Reported Acreage	13,462			acres
4	Parcels	274			number
5	Reported Crops	14			number
6	Reported N Applied	1,823,174			lbs
7	Total N Applied	1,874,587		1,807,793	lbs
8	AWA N Applied	139		134	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			1,991,312	lbs
11	AWA N Uptake			160	lbs/ac
12	Total N Removed	1,124,890		1,084,397	lbs
13	AWA N Removed	84		81	lbs/ac
14	AWA N Balance	48		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			35,387	lbs
17	Total N Runoff			32,443	lbs
18	Total Denitrification			10,175	lbs
19	Total Ammonia Volatilization			47,019	lbs
20	Total Change in Soil Organic N			61,397	lbs
21	Total Perennial Tissue N			256,387	lbs
22	AWA N in Rain			2.9	lbs/ac
23	AWA N Runoff			2.6	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			3.8	lbs/ac
26	AWA Change in Soil Organic N			4.9	lbs/ac
27	AWA Perennial Tissue N			20.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,091	acre-ft
31	Total Applied water			40,453	acre-ft
32	Total Evapotranspiration (ET)			40,363	acre-ft
33	Total Runoff			2,952	acre-ft
34	Total Percolation			10,610	acre-ft
35	AWA Precipitation			12.7	inches
36	AWA Applied water			39.1	inches
37	AWA Evapotranspiration (ET)			39	inches
38	AWA Runoff			2.9	inches
39	AWA Percolation			9.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M04N05E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	58			%
3	Reported Acreage	9,399			acres
4	Parcels	195			number
5	Reported Crops	13			number
6	Reported N Applied	354,526			lbs
7	Total N Applied	392,455		409,793	lbs
8	AWA N Applied	42		44	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			644,086	lbs
11	AWA N Uptake			71	lbs/ac
12	Total N Removed	206,833		207,927	lbs
13	AWA N Removed	22		22	lbs/ac
14	AWA N Balance	20		21	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			34,055	lbs
17	Total N Runoff			5,425	lbs
18	Total Denitrification			6,617	lbs
19	Total Ammonia Volatilization			24,573	lbs
20	Total Change in Soil Organic N			-34,704	lbs
21	Total Perennial Tissue N			123,448	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			-3.8	lbs/ac
27	AWA Perennial Tissue N			13.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			12	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,502	acre-ft
31	Total Applied water			22,989	acre-ft
32	Total Evapotranspiration (ET)			25,733	acre-ft
33	Total Runoff			2,385	acre-ft
34	Total Percolation			7,346	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			30.4	inches
37	AWA Evapotranspiration (ET)			34	inches
38	AWA Runoff			3.1	inches
39	AWA Percolation			9.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			6	mg/L

AWA: Acre-Weighted Average

Township: M04N06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	96			%
3	Reported Acreage	14,106			acres
4	Parcels	553			number
5	Reported Crops	9			number
6	Reported N Applied	406,538			lbs
7	Total N Applied	543,624		550,223	lbs
8	AWA N Applied	39		39	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			795,485	lbs
11	AWA N Uptake			58	lbs/ac
12	Total N Removed	302,216		300,948	lbs
13	AWA N Removed	21		21	lbs/ac
14	AWA N Balance	17		18	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			51,311	lbs
17	Total N Runoff			7,603	lbs
18	Total Denitrification			7,221	lbs
19	Total Ammonia Volatilization			13,634	lbs
20	Total Change in Soil Organic N			-47,656	lbs
21	Total Perennial Tissue N			197,722	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			1	lbs/ac
26	AWA Change in Soil Organic N			-3.5	lbs/ac
27	AWA Perennial Tissue N			14.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			9	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			18,837	acre-ft
31	Total Applied water			35,288	acre-ft
32	Total Evapotranspiration (ET)			37,748	acre-ft
33	Total Runoff			3,831	acre-ft
34	Total Percolation			12,713	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			30.9	inches
37	AWA Evapotranspiration (ET)			33.1	inches
38	AWA Runoff			3.4	inches
39	AWA Percolation			10.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			4	mg/L

AWA: Acre-Weighted Average

Township: M04N07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	24			%
3	Reported Acreage	3,431			acres
4	Parcels	147			number
5	Reported Crops	7			number
6	Reported N Applied	119,722			lbs
7	Total N Applied	165,677		167,221	lbs
8	AWA N Applied	48		49	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			226,193	lbs
11	AWA N Uptake			67	lbs/ac
12	Total N Removed	103,821		102,675	lbs
13	AWA N Removed	30		30	lbs/ac
14	AWA N Balance	18		19	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,650	lbs
17	Total N Runoff			2,218	lbs
18	Total Denitrification			1,766	lbs
19	Total Ammonia Volatilization			4,057	lbs
20	Total Change in Soil Organic N			-12,638	lbs
21	Total Perennial Tissue N			51,927	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			1.2	lbs/ac
26	AWA Change in Soil Organic N			-3.7	lbs/ac
27	AWA Perennial Tissue N			15.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			9	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,644	acre-ft
31	Total Applied water			9,223	acre-ft
32	Total Evapotranspiration (ET)			9,170	acre-ft
33	Total Runoff			996	acre-ft
34	Total Percolation			3,720	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			32.8	inches
37	AWA Evapotranspiration (ET)			32.6	inches
38	AWA Runoff			3.5	inches
39	AWA Percolation			13	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			3	mg/L

AWA: Acre-Weighted Average

Township: M04N08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC			
2	Percent HVA	17			%
3	Reported Acreage	2,813			acres
4	Parcels	65			number
5	Reported Crops	6			number
6	Reported N Applied	105,668			lbs
7	Total N Applied	146,588		147,619	lbs
8	AWA N Applied	52		52	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			200,618	lbs
11	AWA N Uptake			76	lbs/ac
12	Total N Removed	76,239		79,675	lbs
13	AWA N Removed	27		28	lbs/ac
14	AWA N Balance	25		24	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,955	lbs
17	Total N Runoff			2,247	lbs
18	Total Denitrification			1,294	lbs
19	Total Ammonia Volatilization			5,323	lbs
20	Total Change in Soil Organic N			-4,179	lbs
21	Total Perennial Tissue N			43,631	lbs
22	AWA N in Rain			3.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			-1.6	lbs/ac
27	AWA Perennial Tissue N			16.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			11	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			46	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,655	acre-ft
31	Total Applied water			7,324	acre-ft
32	Total Evapotranspiration (ET)			7,667	acre-ft
33	Total Runoff			773	acre-ft
34	Total Percolation			2,642	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			33.1	inches
37	AWA Evapotranspiration (ET)			34.6	inches
38	AWA Runoff			3.5	inches
39	AWA Percolation			11.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			4	mg/L

AWA: Acre-Weighted Average

Township: M04S06E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC, WSJRWC			
2	Percent HVA	84			%
3	Reported Acreage	11,502			acres
4	Parcels	167			number
5	Reported Crops	16			number
6	Reported N Applied	1,416,023			lbs
7	Total N Applied	1,458,794		1,461,979	lbs
8	AWA N Applied	127		127	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,717,476	lbs
11	AWA N Uptake			157	lbs/ac
12	Total N Removed	898,419		882,999	lbs
13	AWA N Removed	78		77	lbs/ac
14	AWA N Balance	49		50	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,426	lbs
17	Total N Runoff			6,535	lbs
18	Total Denitrification			7,232	lbs
19	Total Ammonia Volatilization			28,141	lbs
20	Total Change in Soil Organic N			45,128	lbs
21	Total Perennial Tissue N			201,157	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,773	acre-ft
31	Total Applied water			32,628	acre-ft
32	Total Evapotranspiration (ET)			33,413	acre-ft
33	Total Runoff			1,126	acre-ft
34	Total Percolation			7,799	acre-ft
35	AWA Precipitation			10.7	inches
36	AWA Applied water			35.9	inches
37	AWA Evapotranspiration (ET)			36.7	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M04S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	91			%
3	Reported Acreage	13,549			acres
4	Parcels	186			number
5	Reported Crops	18			number
6	Reported N Applied	1,902,928			lbs
7	Total N Applied	1,958,231		1,953,747	lbs
8	AWA N Applied	145		144	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,368,984	lbs
11	AWA N Uptake			181	lbs/ac
12	Total N Removed	1,523,979		1,438,445	lbs
13	AWA N Removed	112		106	lbs/ac
14	AWA N Balance	31		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,558	lbs
17	Total N Runoff			6,958	lbs
18	Total Denitrification			9,982	lbs
19	Total Ammonia Volatilization			26,979	lbs
20	Total Change in Soil Organic N			23,121	lbs
21	Total Perennial Tissue N			189,596	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			1.8	lbs/ac
27	AWA Perennial Tissue N			14.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			93	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,693	acre-ft
31	Total Applied water			37,099	acre-ft
32	Total Evapotranspiration (ET)			38,092	acre-ft
33	Total Runoff			1,256	acre-ft
34	Total Percolation			9,462	acre-ft
35	AWA Precipitation			10.7	inches
36	AWA Applied water			34	inches
37	AWA Evapotranspiration (ET)			34.9	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M04S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	99			%
3	Reported Acreage	13,640			acres
4	Parcels	320			number
5	Reported Crops	26			number
6	Reported N Applied	1,865,423			lbs
7	Total N Applied	1,969,303		1,957,241	lbs
8	AWA N Applied	144		143	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			2,437,688	lbs
11	AWA N Uptake			191	lbs/ac
12	Total N Removed	1,540,577		1,458,036	lbs
13	AWA N Removed	113		107	lbs/ac
14	AWA N Balance	31		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,269	lbs
17	Total N Runoff			28,824	lbs
18	Total Denitrification			21,548	lbs
19	Total Ammonia Volatilization			52,845	lbs
20	Total Change in Soil Organic N			50,806	lbs
21	Total Perennial Tissue N			258,105	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			4	lbs/ac
27	AWA Perennial Tissue N			20.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,591	acre-ft
31	Total Applied water			38,997	acre-ft
32	Total Evapotranspiration (ET)			38,509	acre-ft
33	Total Runoff			2,219	acre-ft
34	Total Percolation			10,304	acre-ft
35	AWA Precipitation			10.9	inches
36	AWA Applied water			36.6	inches
37	AWA Evapotranspiration (ET)			36.2	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M04S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	8,045			acres
4	Parcels	301			number
5	Reported Crops	26			number
6	Reported N Applied	936,483			lbs
7	Total N Applied	995,734		1,006,370	lbs
8	AWA N Applied	124		125	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,404,662	lbs
11	AWA N Uptake			190	lbs/ac
12	Total N Removed	902,937		863,185	lbs
13	AWA N Removed	112		107	lbs/ac
14	AWA N Balance	12		18	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,655	lbs
17	Total N Runoff			16,533	lbs
18	Total Denitrification			14,434	lbs
19	Total Ammonia Volatilization			28,655	lbs
20	Total Change in Soil Organic N			28,902	lbs
21	Total Perennial Tissue N			151,775	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			20.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			17	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			95	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,927	acre-ft
31	Total Applied water			23,952	acre-ft
32	Total Evapotranspiration (ET)			23,376	acre-ft
33	Total Runoff			1,511	acre-ft
34	Total Percolation			6,237	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			38.8	inches
37	AWA Evapotranspiration (ET)			37.9	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			9.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M04S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	15,014			acres
4	Parcels	706			number
5	Reported Crops	34			number
6	Reported N Applied	1,693,471			lbs
7	Total N Applied	1,803,480		1,737,971	lbs
8	AWA N Applied	120		116	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			2,201,652	lbs
11	AWA N Uptake			173	lbs/ac
12	Total N Removed	1,200,640		1,160,140	lbs
13	AWA N Removed	80		77	lbs/ac
14	AWA N Balance	34		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,800	lbs
17	Total N Runoff			34,313	lbs
18	Total Denitrification			24,001	lbs
19	Total Ammonia Volatilization			79,206	lbs
20	Total Change in Soil Organic N			58,906	lbs
21	Total Perennial Tissue N			285,562	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.7	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			6.2	lbs/ac
26	AWA Change in Soil Organic N			4.6	lbs/ac
27	AWA Perennial Tissue N			22.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			22	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,169	acre-ft
31	Total Applied water			40,851	acre-ft
32	Total Evapotranspiration (ET)			40,247	acre-ft
33	Total Runoff			2,614	acre-ft
34	Total Percolation			11,491	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			2.5	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M04S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	61			%
3	Reported Acreage	10,942			acres
4	Parcels	347			number
5	Reported Crops	15			number
6	Reported N Applied	1,656,636			lbs
7	Total N Applied	1,692,436		1,532,057	lbs
8	AWA N Applied	155		140	lbs/ac
9	AWA N Applied Difference		15		lbs/ac
10	Total N Uptake			1,648,374	lbs
11	AWA N Uptake			187	lbs/ac
12	Total N Removed	799,371		795,327	lbs
13	AWA N Removed	73		73	lbs/ac
14	AWA N Balance	68		67	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,867	lbs
17	Total N Runoff			31,292	lbs
18	Total Denitrification			23,060	lbs
19	Total Ammonia Volatilization			58,188	lbs
20	Total Change in Soil Organic N			66,032	lbs
21	Total Perennial Tissue N			197,021	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			3.6	lbs/ac
24	AWA Denitrification			2.6	lbs/ac
25	AWA Ammonia Volatilization			6.6	lbs/ac
26	AWA Change in Soil Organic N			7.5	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,470	acre-ft
31	Total Applied water			28,355	acre-ft
32	Total Evapotranspiration (ET)			29,006	acre-ft
33	Total Runoff			1,614	acre-ft
34	Total Percolation			7,512	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			39.5	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M05N04E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	74			%
3	Reported Acreage	7,730			acres
4	Parcels	117			number
5	Reported Crops	16			number
6	Reported N Applied	565,002			lbs
7	Total N Applied	608,078		601,978	lbs
8	AWA N Applied	79		78	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			870,608	lbs
11	AWA N Uptake			119	lbs/ac
12	Total N Removed	545,022		492,860	lbs
13	AWA N Removed	71		64	lbs/ac
14	AWA N Balance	7		14	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,209	lbs
17	Total N Runoff			6,872	lbs
18	Total Denitrification			7,768	lbs
19	Total Ammonia Volatilization			12,449	lbs
20	Total Change in Soil Organic N			-162,933	lbs
21	Total Perennial Tissue N			94,240	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			1.7	lbs/ac
26	AWA Change in Soil Organic N			-22.3	lbs/ac
27	AWA Perennial Tissue N			12.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			288	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,212	acre-ft
31	Total Applied water			15,288	acre-ft
32	Total Evapotranspiration (ET)			19,814	acre-ft
33	Total Runoff			1,500	acre-ft
34	Total Percolation			4,214	acre-ft
35	AWA Precipitation			16.7	inches
36	AWA Applied water			25.1	inches
37	AWA Evapotranspiration (ET)			32.5	inches
38	AWA Runoff			2.5	inches
39	AWA Percolation			6.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			27	mg/L

AWA: Acre-Weighted Average

Township: M05N05E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SJCDWQC, SVWQC			
2	Percent HVA	73			%
3	Reported Acreage	8,112			acres
4	Parcels	97			number
5	Reported Crops	17			number
6	Reported N Applied	475,282			lbs
7	Total N Applied	493,970		455,984	lbs
8	AWA N Applied	61		56	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			773,763	lbs
11	AWA N Uptake			101	lbs/ac
12	Total N Removed	491,741		496,369	lbs
13	AWA N Removed	61		61	lbs/ac
14	AWA N Balance	-5		-5	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,652	lbs
17	Total N Runoff			2,969	lbs
18	Total Denitrification			3,642	lbs
19	Total Ammonia Volatilization			25,804	lbs
20	Total Change in Soil Organic N			-28,210	lbs
21	Total Perennial Tissue N			64,630	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			-3.7	lbs/ac
27	AWA Perennial Tissue N			8.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			14	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-286	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,186	acre-ft
31	Total Applied water			14,695	acre-ft
32	Total Evapotranspiration (ET)			19,590	acre-ft
33	Total Runoff			1,635	acre-ft
34	Total Percolation			4,842	acre-ft
35	AWA Precipitation			17.6	inches
36	AWA Applied water			23.1	inches
37	AWA Evapotranspiration (ET)			30.7	inches
38	AWA Runoff			2.6	inches
39	AWA Percolation			7.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M05S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	74			%
3	Reported Acreage	10,428			acres
4	Parcels	270			number
5	Reported Crops	23			number
6	Reported N Applied	1,411,580			lbs
7	Total N Applied	1,423,895		1,418,683	lbs
8	AWA N Applied	137		136	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,583,406	lbs
11	AWA N Uptake			166	lbs/ac
12	Total N Removed	861,607		852,980	lbs
13	AWA N Removed	83		82	lbs/ac
14	AWA N Balance	52		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,248	lbs
17	Total N Runoff			8,005	lbs
18	Total Denitrification			11,732	lbs
19	Total Ammonia Volatilization			25,295	lbs
20	Total Change in Soil Organic N			36,626	lbs
21	Total Perennial Tissue N			187,217	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			3.8	lbs/ac
27	AWA Perennial Tissue N			19.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,616	acre-ft
31	Total Applied water			29,257	acre-ft
32	Total Evapotranspiration (ET)			29,326	acre-ft
33	Total Runoff			1,133	acre-ft
34	Total Percolation			7,405	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			36.8	inches
37	AWA Evapotranspiration (ET)			36.9	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			8.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M05S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	88			%
3	Reported Acreage	10,909			acres
4	Parcels	499			number
5	Reported Crops	28			number
6	Reported N Applied	1,186,738			lbs
7	Total N Applied	1,243,756		1,207,756	lbs
8	AWA N Applied	114		111	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,991,806	lbs
11	AWA N Uptake			200	lbs/ac
12	Total N Removed	1,640,447		1,590,092	lbs
13	AWA N Removed	150		146	lbs/ac
14	AWA N Balance	-40		-35	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,255	lbs
17	Total N Runoff			4,774	lbs
18	Total Denitrification			6,490	lbs
19	Total Ammonia Volatilization			25,581	lbs
20	Total Change in Soil Organic N			-33,573	lbs
21	Total Perennial Tissue N			84,213	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			-3.4	lbs/ac
27	AWA Perennial Tissue N			8.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-81	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,360	acre-ft
31	Total Applied water			28,264	acre-ft
32	Total Evapotranspiration (ET)			26,338	acre-ft
33	Total Runoff			1,232	acre-ft
34	Total Percolation			10,083	acre-ft
35	AWA Precipitation			11.3	inches
36	AWA Applied water			34	inches
37	AWA Evapotranspiration (ET)			31.7	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			11.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M05S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	8,178			acres
4	Parcels	266			number
5	Reported Crops	23			number
6	Reported N Applied	1,033,927			lbs
7	Total N Applied	1,143,901		1,147,351	lbs
8	AWA N Applied	140		140	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,582,129	lbs
11	AWA N Uptake			219	lbs/ac
12	Total N Removed	1,268,048		1,189,769	lbs
13	AWA N Removed	155		145	lbs/ac
14	AWA N Balance	-15		-5	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,388	lbs
17	Total N Runoff			14,129	lbs
18	Total Denitrification			10,797	lbs
19	Total Ammonia Volatilization			36,386	lbs
20	Total Change in Soil Organic N			31,337	lbs
21	Total Perennial Tissue N			71,480	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			5	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			9.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-478	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,815	acre-ft
31	Total Applied water			18,495	acre-ft
32	Total Evapotranspiration (ET)			18,446	acre-ft
33	Total Runoff			1,188	acre-ft
34	Total Percolation			6,298	acre-ft
35	AWA Precipitation			11.3	inches
36	AWA Applied water			30.7	inches
37	AWA Evapotranspiration (ET)			30.6	inches
38	AWA Runoff			2	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M05S10E

Row (R)	Category	INMP/NMP	CV-SWAT	Units
INMP/NMP Data and N Balance Results				
1	Coalitions	ESJWQC		
2	Percent HVA	100		%
3	Reported Acreage	6,946		acres
4	Parcels	317		number
5	Reported Crops	25		number
6	Reported N Applied	978,397		lbs
7	Total N Applied	978,821	970,974	lbs
8	AWA N Applied	141	140	lbs/ac
9	AWA N Applied Difference	1		lbs/ac
10	Total N Uptake		1,243,380	lbs
11	AWA N Uptake		203	lbs/ac
12	Total N Removed	880,192	837,469	lbs
13	AWA N Removed	127	121	lbs/ac
14	AWA N Balance	14	20	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)	-6		lbs/ac
CV-SWAT Nitrogen Budget Results				
16	Total N in Rain		15,830	lbs
17	Total N Runoff		16,132	lbs
18	Total Denitrification		10,584	lbs
19	Total Ammonia Volatilization		32,143	lbs
20	Total Change in Soil Organic N		40,108	lbs
21	Total Perennial Tissue N		74,848	lbs
22	AWA N in Rain		2.6	lbs/ac
23	AWA N Runoff		2.6	lbs/ac
24	AWA Denitrification		1.7	lbs/ac
25	AWA Ammonia Volatilization		5.3	lbs/ac
26	AWA Change in Soil Organic N		6.6	lbs/ac
27	AWA Perennial Tissue N		12.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)		24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone		125	%
CV-SWAT Water Budget Results				
30	Total Precipitation		5,859	acre-ft
31	Total Applied water		16,485	acre-ft
32	Total Evapotranspiration (ET)		17,123	acre-ft
33	Total Runoff		1,043	acre-ft
34	Total Percolation		4,606	acre-ft
35	AWA Precipitation		11.5	inches
36	AWA Applied water		32.3	inches
37	AWA Evapotranspiration (ET)		33.6	inches
38	AWA Runoff		2	inches
39	AWA Percolation		8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone		14	mg/L

AWA: Acre-Weighted Average

Township: M05S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	71			%
3	Reported Acreage	9,833			acres
4	Parcels	327			number
5	Reported Crops	18			number
6	Reported N Applied	6,817,089			lbs
7	Total N Applied	1,242,009		1,228,777	lbs
8	AWA N Applied	126		125	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,495,229	lbs
11	AWA N Uptake			176	lbs/ac
12	Total N Removed	829,239		812,591	lbs
13	AWA N Removed	84		83	lbs/ac
14	AWA N Balance	41		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,982	lbs
17	Total N Runoff			16,946	lbs
18	Total Denitrification			12,386	lbs
19	Total Ammonia Volatilization			38,840	lbs
20	Total Change in Soil Organic N			50,066	lbs
21	Total Perennial Tissue N			164,085	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			4.6	lbs/ac
26	AWA Change in Soil Organic N			5.9	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,137	acre-ft
31	Total Applied water			26,929	acre-ft
32	Total Evapotranspiration (ET)			27,906	acre-ft
33	Total Runoff			1,332	acre-ft
34	Total Percolation			6,660	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			39.5	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M05S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	36			%
3	Reported Acreage	8,235			acres
4	Parcels	86			number
5	Reported Crops	9			number
6	Reported N Applied	2,776,294			lbs
7	Total N Applied	1,027,584		1,019,216	lbs
8	AWA N Applied	125		124	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,190,536	lbs
11	AWA N Uptake			160	lbs/ac
12	Total N Removed	732,812		683,230	lbs
13	AWA N Removed	89		83	lbs/ac
14	AWA N Balance	35		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,412	lbs
17	Total N Runoff			11,800	lbs
18	Total Denitrification			4,857	lbs
19	Total Ammonia Volatilization			26,782	lbs
20	Total Change in Soil Organic N			33,928	lbs
21	Total Perennial Tissue N			136,418	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			4.6	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			46	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,200	acre-ft
31	Total Applied water			23,863	acre-ft
32	Total Evapotranspiration (ET)			25,024	acre-ft
33	Total Runoff			1,131	acre-ft
34	Total Percolation			5,442	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			40.4	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M05S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	52			%
3	Reported Acreage	8,812			acres
4	Parcels	93			number
5	Reported Crops	11			number
6	Reported N Applied	18,624,745			lbs
7	Total N Applied	992,149		983,786	lbs
8	AWA N Applied	113		112	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,139,064	lbs
11	AWA N Uptake			148	lbs/ac
12	Total N Removed	692,683		658,785	lbs
13	AWA N Removed	79		75	lbs/ac
14	AWA N Balance	33		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,493	lbs
17	Total N Runoff			13,776	lbs
18	Total Denitrification			8,895	lbs
19	Total Ammonia Volatilization			22,879	lbs
20	Total Change in Soil Organic N			15,215	lbs
21	Total Perennial Tissue N			138,625	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.8	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			2	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			18	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,628	acre-ft
31	Total Applied water			24,009	acre-ft
32	Total Evapotranspiration (ET)			24,899	acre-ft
33	Total Runoff			1,419	acre-ft
34	Total Percolation			5,942	acre-ft
35	AWA Precipitation			11.9	inches
36	AWA Applied water			37.5	inches
37	AWA Evapotranspiration (ET)			38.9	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M05S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	24			%
3	Reported Acreage	2,214			acres
4	Parcels	19			number
5	Reported Crops	10			number
6	Reported N Applied	246,874			lbs
7	Total N Applied	255,391		261,008	lbs
8	AWA N Applied	115		118	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			263,967	lbs
11	AWA N Uptake			133	lbs/ac
12	Total N Removed	206,977		161,351	lbs
13	AWA N Removed	93		73	lbs/ac
14	AWA N Balance	21		45	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-24		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,224	lbs
17	Total N Runoff			3,326	lbs
18	Total Denitrification			2,584	lbs
19	Total Ammonia Volatilization			6,563	lbs
20	Total Change in Soil Organic N			6,097	lbs
21	Total Perennial Tissue N			27,143	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			3.1	lbs/ac
27	AWA Perennial Tissue N			13.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			67	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,943	acre-ft
31	Total Applied water			5,228	acre-ft
32	Total Evapotranspiration (ET)			5,437	acre-ft
33	Total Runoff			373	acre-ft
34	Total Percolation			1,509	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			31.6	inches
37	AWA Evapotranspiration (ET)			32.8	inches
38	AWA Runoff			2.3	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M06N01E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	42			%
3	Reported Acreage	7,275			acres
4	Parcels	108			number
5	Reported Crops	14			number
6	Reported N Applied	709,275			lbs
7	Total N Applied	749,078		691,461	lbs
8	AWA N Applied	103		95	lbs/ac
9	AWA N Applied Difference		8		lbs/ac
10	Total N Uptake			1,290,496	lbs
11	AWA N Uptake			190	lbs/ac
12	Total N Removed	1,001,974		940,038	lbs
13	AWA N Removed	138		129	lbs/ac
14	AWA N Balance	-35		-31	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,104	lbs
17	Total N Runoff			9,036	lbs
18	Total Denitrification			10,646	lbs
19	Total Ammonia Volatilization			27,615	lbs
20	Total Change in Soil Organic N			-1,541	lbs
21	Total Perennial Tissue N			59,620	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			-0.2	lbs/ac
27	AWA Perennial Tissue N			8.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-125	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,601	acre-ft
31	Total Applied water			16,436	acre-ft
32	Total Evapotranspiration (ET)			18,865	acre-ft
33	Total Runoff			2,058	acre-ft
34	Total Percolation			6,303	acre-ft
35	AWA Precipitation			18.7	inches
36	AWA Applied water			29	inches
37	AWA Evapotranspiration (ET)			33.3	inches
38	AWA Runoff			3.6	inches
39	AWA Percolation			10.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M06S07E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	37			%
3	Reported Acreage	1,798			acres
4	Parcels	26			number
5	Reported Crops	6			number
6	Reported N Applied	239,584			lbs
7	Total N Applied	240,481		246,560	lbs
8	AWA N Applied	134		137	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			278,904	lbs
11	AWA N Uptake			157	lbs/ac
12	Total N Removed	156,982		148,659	lbs
13	AWA N Removed	87		83	lbs/ac
14	AWA N Balance	46		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			4,438	lbs
17	Total N Runoff			1,593	lbs
18	Total Denitrification			1,944	lbs
19	Total Ammonia Volatilization			4,744	lbs
20	Total Change in Soil Organic N			4,026	lbs
21	Total Perennial Tissue N			38,653	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			2.3	lbs/ac
27	AWA Perennial Tissue N			21.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,649	acre-ft
31	Total Applied water			5,493	acre-ft
32	Total Evapotranspiration (ET)			5,518	acre-ft
33	Total Runoff			257	acre-ft
34	Total Percolation			1,356	acre-ft
35	AWA Precipitation			11.1	inches
36	AWA Applied water			37.1	inches
37	AWA Evapotranspiration (ET)			37.3	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M06S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	98			%
3	Reported Acreage	19,431			acres
4	Parcels	349			number
5	Reported Crops	23			number
6	Reported N Applied	2,162,664			lbs
7	Total N Applied	2,288,266		2,333,098	lbs
8	AWA N Applied	118		120	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,708,928	lbs
11	AWA N Uptake			156	lbs/ac
12	Total N Removed	1,750,957		1,721,134	lbs
13	AWA N Removed	90		89	lbs/ac
14	AWA N Balance	28		31	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			43,526	lbs
17	Total N Runoff			9,510	lbs
18	Total Denitrification			16,813	lbs
19	Total Ammonia Volatilization			35,447	lbs
20	Total Change in Soil Organic N			12,996	lbs
21	Total Perennial Tissue N			226,620	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			0.7	lbs/ac
27	AWA Perennial Tissue N			13	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			107	%
CV-SWAT Water Budget Results					
30	Total Precipitation			16,159	acre-ft
31	Total Applied water			48,086	acre-ft
32	Total Evapotranspiration (ET)			46,937	acre-ft
33	Total Runoff			2,133	acre-ft
34	Total Percolation			15,062	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			33.2	inches
37	AWA Evapotranspiration (ET)			32.4	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			9.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M06S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	101			%
3	Reported Acreage	9,245			acres
4	Parcels	163			number
5	Reported Crops	21			number
6	Reported N Applied	1,114,417			lbs
7	Total N Applied	1,369,253		1,362,758	lbs
8	AWA N Applied	148		147	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,839,839	lbs
11	AWA N Uptake			213	lbs/ac
12	Total N Removed	1,524,821		1,456,965	lbs
13	AWA N Removed	165		158	lbs/ac
14	AWA N Balance	-19		-10	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-9		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,844	lbs
17	Total N Runoff			8,433	lbs
18	Total Denitrification			8,571	lbs
19	Total Ammonia Volatilization			36,954	lbs
20	Total Change in Soil Organic N			16,685	lbs
21	Total Perennial Tissue N			42,424	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			4.3	lbs/ac
26	AWA Change in Soil Organic N			1.9	lbs/ac
27	AWA Perennial Tissue N			4.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-272	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,099	acre-ft
31	Total Applied water			20,263	acre-ft
32	Total Evapotranspiration (ET)			19,515	acre-ft
33	Total Runoff			1,192	acre-ft
34	Total Percolation			7,956	acre-ft
35	AWA Precipitation			11.3	inches
36	AWA Applied water			28.2	inches
37	AWA Evapotranspiration (ET)			27.1	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			10.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M06S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	7,051			acres
4	Parcels	275			number
5	Reported Crops	27			number
6	Reported N Applied	756,262			lbs
7	Total N Applied	883,449		882,466	lbs
8	AWA N Applied	125		125	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,017,843	lbs
11	AWA N Uptake			167	lbs/ac
12	Total N Removed	694,258		634,988	lbs
13	AWA N Removed	98		90	lbs/ac
14	AWA N Balance	25		35	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,646	lbs
17	Total N Runoff			12,437	lbs
18	Total Denitrification			10,858	lbs
19	Total Ammonia Volatilization			32,161	lbs
20	Total Change in Soil Organic N			34,027	lbs
21	Total Perennial Tissue N			85,241	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			5.6	lbs/ac
27	AWA Perennial Tissue N			14	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			71	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,805	acre-ft
31	Total Applied water			16,166	acre-ft
32	Total Evapotranspiration (ET)			16,903	acre-ft
33	Total Runoff			1,002	acre-ft
34	Total Percolation			4,580	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			31.9	inches
37	AWA Evapotranspiration (ET)			33.4	inches
38	AWA Runoff			2	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M06S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	9,899			acres
4	Parcels	381			number
5	Reported Crops	17			number
6	Reported N Applied	952,573			lbs
7	Total N Applied	942,202		939,968	lbs
8	AWA N Applied	95		95	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,149,158	lbs
11	AWA N Uptake			156	lbs/ac
12	Total N Removed	590,833		571,928	lbs
13	AWA N Removed	60		58	lbs/ac
14	AWA N Balance	35		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,341	lbs
17	Total N Runoff			12,451	lbs
18	Total Denitrification			11,402	lbs
19	Total Ammonia Volatilization			23,100	lbs
20	Total Change in Soil Organic N			44,386	lbs
21	Total Perennial Tissue N			133,697	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			6	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,183	acre-ft
31	Total Applied water			22,567	acre-ft
32	Total Evapotranspiration (ET)			23,368	acre-ft
33	Total Runoff			1,276	acre-ft
34	Total Percolation			6,530	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M06S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	100			%
3	Reported Acreage	11,617			acres
4	Parcels	508			number
5	Reported Crops	20			number
6	Reported N Applied	3,638,236			lbs
7	Total N Applied	1,185,537		1,195,128	lbs
8	AWA N Applied	102		103	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,453,095	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	821,047		765,677	lbs
13	AWA N Removed	71		66	lbs/ac
14	AWA N Balance	31		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,483	lbs
17	Total N Runoff			14,542	lbs
18	Total Denitrification			11,415	lbs
19	Total Ammonia Volatilization			42,026	lbs
20	Total Change in Soil Organic N			54,499	lbs
21	Total Perennial Tissue N			173,510	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			4.7	lbs/ac
26	AWA Change in Soil Organic N			6.1	lbs/ac
27	AWA Perennial Tissue N			19.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			17	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,733	acre-ft
31	Total Applied water			28,045	acre-ft
32	Total Evapotranspiration (ET)			30,241	acre-ft
33	Total Runoff			1,823	acre-ft
34	Total Percolation			6,058	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			37.5	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M06S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	62			%
3	Reported Acreage	8,275			acres
4	Parcels	211			number
5	Reported Crops	11			number
6	Reported N Applied	2,807,612			lbs
7	Total N Applied	950,292		946,737	lbs
8	AWA N Applied	115		114	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			977,299	lbs
11	AWA N Uptake			140	lbs/ac
12	Total N Removed	532,776		521,598	lbs
13	AWA N Removed	64		63	lbs/ac
14	AWA N Balance	50		52	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,411	lbs
17	Total N Runoff			15,107	lbs
18	Total Denitrification			11,587	lbs
19	Total Ammonia Volatilization			29,573	lbs
20	Total Change in Soil Organic N			30,270	lbs
21	Total Perennial Tissue N			139,698	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			20.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,850	acre-ft
31	Total Applied water			21,865	acre-ft
32	Total Evapotranspiration (ET)			23,146	acre-ft
33	Total Runoff			1,315	acre-ft
34	Total Percolation			5,065	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			2.3	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M07N01E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	66			%
3	Reported Acreage	10,816			acres
4	Parcels	219			number
5	Reported Crops	24			number
6	Reported N Applied	1,239,551			lbs
7	Total N Applied	1,356,797		1,346,753	lbs
8	AWA N Applied	125		125	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,827,569	lbs
11	AWA N Uptake			172	lbs/ac
12	Total N Removed	1,208,166		1,175,516	lbs
13	AWA N Removed	112		109	lbs/ac
14	AWA N Balance	13		16	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,732	lbs
17	Total N Runoff			8,850	lbs
18	Total Denitrification			9,761	lbs
19	Total Ammonia Volatilization			31,768	lbs
20	Total Change in Soil Organic N			-6,732	lbs
21	Total Perennial Tissue N			150,449	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			-0.6	lbs/ac
27	AWA Perennial Tissue N			14.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			199	%
CV-SWAT Water Budget Results					
30	Total Precipitation			16,476	acre-ft
31	Total Applied water			26,464	acre-ft
32	Total Evapotranspiration (ET)			29,477	acre-ft
33	Total Runoff			2,914	acre-ft
34	Total Percolation			10,582	acre-ft
35	AWA Precipitation			18.6	inches
36	AWA Applied water			29.8	inches
37	AWA Evapotranspiration (ET)			33.2	inches
38	AWA Runoff			3.3	inches
39	AWA Percolation			11.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M07S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	88			%
3	Reported Acreage	11,997			acres
4	Parcels	173			number
5	Reported Crops	33			number
6	Reported N Applied	1,588,977			lbs
7	Total N Applied	1,611,314		1,615,632	lbs
8	AWA N Applied	134		135	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,924,023	lbs
11	AWA N Uptake			174	lbs/ac
12	Total N Removed	1,091,357		1,098,514	lbs
13	AWA N Removed	91		92	lbs/ac
14	AWA N Balance	43		43	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,677	lbs
17	Total N Runoff			8,489	lbs
18	Total Denitrification			16,009	lbs
19	Total Ammonia Volatilization			23,267	lbs
20	Total Change in Soil Organic N			33,980	lbs
21	Total Perennial Tissue N			175,010	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			3.1	lbs/ac
27	AWA Perennial Tissue N			15.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			83	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,278	acre-ft
31	Total Applied water			31,978	acre-ft
32	Total Evapotranspiration (ET)			31,509	acre-ft
33	Total Runoff			1,439	acre-ft
34	Total Percolation			9,386	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			34.7	inches
37	AWA Evapotranspiration (ET)			34.2	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			9.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M07S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	64			%
3	Reported Acreage	5,245			acres
4	Parcels	109			number
5	Reported Crops	18			number
6	Reported N Applied	624,348			lbs
7	Total N Applied	673,851		690,118	lbs
8	AWA N Applied	128		132	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			882,317	lbs
11	AWA N Uptake			184	lbs/ac
12	Total N Removed	625,584		638,218	lbs
13	AWA N Removed	119		122	lbs/ac
14	AWA N Balance	9		10	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,061	lbs
17	Total N Runoff			4,926	lbs
18	Total Denitrification			7,378	lbs
19	Total Ammonia Volatilization			17,861	lbs
20	Total Change in Soil Organic N			13,627	lbs
21	Total Perennial Tissue N			35,102	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			3.7	lbs/ac
26	AWA Change in Soil Organic N			2.8	lbs/ac
27	AWA Perennial Tissue N			7.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			335	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,473	acre-ft
31	Total Applied water			12,325	acre-ft
32	Total Evapotranspiration (ET)			11,520	acre-ft
33	Total Runoff			654	acre-ft
34	Total Percolation			4,999	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			30.9	inches
37	AWA Evapotranspiration (ET)			28.9	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			11.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M07S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	82			%
3	Reported Acreage	2,939			acres
4	Parcels	107			number
5	Reported Crops	15			number
6	Reported N Applied	249,118			lbs
7	Total N Applied	269,030		265,951	lbs
8	AWA N Applied	92		90	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			385,859	lbs
11	AWA N Uptake			187	lbs/ac
12	Total N Removed	272,237		262,852	lbs
13	AWA N Removed	93		89	lbs/ac
14	AWA N Balance	-1		2	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,197	lbs
17	Total N Runoff			2,771	lbs
18	Total Denitrification			3,862	lbs
19	Total Ammonia Volatilization			9,483	lbs
20	Total Change in Soil Organic N			7,334	lbs
21	Total Perennial Tissue N			19,611	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			4.6	lbs/ac
26	AWA Change in Soil Organic N			3.6	lbs/ac
27	AWA Perennial Tissue N			9.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			1,038	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,929	acre-ft
31	Total Applied water			5,431	acre-ft
32	Total Evapotranspiration (ET)			5,542	acre-ft
33	Total Runoff			349	acre-ft
34	Total Percolation			2,031	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			31.6	inches
37	AWA Evapotranspiration (ET)			32.3	inches
38	AWA Runoff			2	inches
39	AWA Percolation			8.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M07S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	93			%
3	Reported Acreage	12,174			acres
4	Parcels	224			number
5	Reported Crops	13			number
6	Reported N Applied	1,301,721			lbs
7	Total N Applied	1,330,325		1,063,108	lbs
8	AWA N Applied	109		87	lbs/ac
9	AWA N Applied Difference		22		lbs/ac
10	Total N Uptake			1,294,018	lbs
11	AWA N Uptake			175	lbs/ac
12	Total N Removed	567,356		569,581	lbs
13	AWA N Removed	47		47	lbs/ac
14	AWA N Balance	39		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,008	lbs
17	Total N Runoff			16,688	lbs
18	Total Denitrification			24,549	lbs
19	Total Ammonia Volatilization			39,900	lbs
20	Total Change in Soil Organic N			80,018	lbs
21	Total Perennial Tissue N			102,179	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			5.4	lbs/ac
26	AWA Change in Soil Organic N			10.9	lbs/ac
27	AWA Perennial Tissue N			13.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			91	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,064	acre-ft
31	Total Applied water			20,828	acre-ft
32	Total Evapotranspiration (ET)			23,463	acre-ft
33	Total Runoff			1,501	acre-ft
34	Total Percolation			4,899	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			33.9	inches
37	AWA Evapotranspiration (ET)			38.2	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			34	mg/L

AWA: Acre-Weighted Average

Township: M07S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	99			%
3	Reported Acreage	14,591			acres
4	Parcels	380			number
5	Reported Crops	17			number
6	Reported N Applied	1,467,102			lbs
7	Total N Applied	1,627,232		1,658,796	lbs
8	AWA N Applied	112		114	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,105,097	lbs
11	AWA N Uptake			166	lbs/ac
12	Total N Removed	1,062,028		1,049,318	lbs
13	AWA N Removed	73		72	lbs/ac
14	AWA N Balance	39		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			33,606	lbs
17	Total N Runoff			23,260	lbs
18	Total Denitrification			23,475	lbs
19	Total Ammonia Volatilization			62,017	lbs
20	Total Change in Soil Organic N			97,261	lbs
21	Total Perennial Tissue N			209,900	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.8	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			4.9	lbs/ac
26	AWA Change in Soil Organic N			7.7	lbs/ac
27	AWA Perennial Tissue N			16.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,496	acre-ft
31	Total Applied water			37,237	acre-ft
32	Total Evapotranspiration (ET)			39,926	acre-ft
33	Total Runoff			2,311	acre-ft
34	Total Percolation			8,575	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			35.3	inches
37	AWA Evapotranspiration (ET)			37.8	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M07S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	98			%
3	Reported Acreage	5,770			acres
4	Parcels	212			number
5	Reported Crops	26			number
6	Reported N Applied	903,088			lbs
7	Total N Applied	774,628		762,425	lbs
8	AWA N Applied	134		132	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			890,133	lbs
11	AWA N Uptake			184	lbs/ac
12	Total N Removed	638,744		600,302	lbs
13	AWA N Removed	111		104	lbs/ac
14	AWA N Balance	22		29	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			13,015	lbs
17	Total N Runoff			5,622	lbs
18	Total Denitrification			8,694	lbs
19	Total Ammonia Volatilization			26,483	lbs
20	Total Change in Soil Organic N			16,721	lbs
21	Total Perennial Tissue N			49,485	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			5.5	lbs/ac
26	AWA Change in Soil Organic N			3.4	lbs/ac
27	AWA Perennial Tissue N			10.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			107	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,841	acre-ft
31	Total Applied water			12,221	acre-ft
32	Total Evapotranspiration (ET)			13,241	acre-ft
33	Total Runoff			647	acre-ft
34	Total Percolation			3,652	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			30.2	inches
37	AWA Evapotranspiration (ET)			32.8	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			7.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M07S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	53			%
3	Reported Acreage	7,733			acres
4	Parcels	338			number
5	Reported Crops	18			number
6	Reported N Applied	860,450			lbs
7	Total N Applied	805,363		830,493	lbs
8	AWA N Applied	104		107	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			1,000,801	lbs
11	AWA N Uptake			152	lbs/ac
12	Total N Removed	594,319		570,805	lbs
13	AWA N Removed	77		74	lbs/ac
14	AWA N Balance	27		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,688	lbs
17	Total N Runoff			4,617	lbs
18	Total Denitrification			10,585	lbs
19	Total Ammonia Volatilization			19,267	lbs
20	Total Change in Soil Organic N			13,432	lbs
21	Total Perennial Tissue N			122,308	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			2	lbs/ac
27	AWA Perennial Tissue N			18.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			87	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,580	acre-ft
31	Total Applied water			19,842	acre-ft
32	Total Evapotranspiration (ET)			20,855	acre-ft
33	Total Runoff			868	acre-ft
34	Total Percolation			5,471	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			36.1	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			8.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M07S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	58			%
3	Reported Acreage	8,601			acres
4	Parcels	147			number
5	Reported Crops	30			number
6	Reported N Applied	738,130			lbs
7	Total N Applied	816,694		826,810	lbs
8	AWA N Applied	95		96	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			914,248	lbs
11	AWA N Uptake			140	lbs/ac
12	Total N Removed	527,122		491,115	lbs
13	AWA N Removed	61		57	lbs/ac
14	AWA N Balance	33		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,505	lbs
17	Total N Runoff			4,759	lbs
18	Total Denitrification			9,430	lbs
19	Total Ammonia Volatilization			22,416	lbs
20	Total Change in Soil Organic N			12,835	lbs
21	Total Perennial Tissue N			110,979	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			2	lbs/ac
27	AWA Perennial Tissue N			17	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			94	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,514	acre-ft
31	Total Applied water			19,664	acre-ft
32	Total Evapotranspiration (ET)			20,973	acre-ft
33	Total Runoff			870	acre-ft
34	Total Percolation			5,632	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			36.1	inches
37	AWA Evapotranspiration (ET)			38.5	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M08N01E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	66			%
3	Reported Acreage	11,740			acres
4	Parcels	146			number
5	Reported Crops	27			number
6	Reported N Applied	1,510,955			lbs
7	Total N Applied	1,565,441		1,561,852	lbs
8	AWA N Applied	133		133	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,859,809	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	1,282,984		1,234,462	lbs
13	AWA N Removed	109		105	lbs/ac
14	AWA N Balance	24		28	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,794	lbs
17	Total N Runoff			11,107	lbs
18	Total Denitrification			12,088	lbs
19	Total Ammonia Volatilization			34,779	lbs
20	Total Change in Soil Organic N			-35,520	lbs
21	Total Perennial Tissue N			107,205	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			-3.1	lbs/ac
27	AWA Perennial Tissue N			9.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			141	%
CV-SWAT Water Budget Results					
30	Total Precipitation			17,675	acre-ft
31	Total Applied water			24,381	acre-ft
32	Total Evapotranspiration (ET)			28,571	acre-ft
33	Total Runoff			3,014	acre-ft
34	Total Percolation			10,583	acre-ft
35	AWA Precipitation			18.4	inches
36	AWA Applied water			25.4	inches
37	AWA Evapotranspiration (ET)			29.8	inches
38	AWA Runoff			3.1	inches
39	AWA Percolation			10.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M08N02E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	40			%
3	Reported Acreage	7,154			acres
4	Parcels	81			number
5	Reported Crops	33			number
6	Reported N Applied	845,099			lbs
7	Total N Applied	870,168		846,515	lbs
8	AWA N Applied	122		118	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,031,163	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	605,708		631,371	lbs
13	AWA N Removed	85		88	lbs/ac
14	AWA N Balance	32		30	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,375	lbs
17	Total N Runoff			5,293	lbs
18	Total Denitrification			7,810	lbs
19	Total Ammonia Volatilization			23,803	lbs
20	Total Change in Soil Organic N			1,917	lbs
21	Total Perennial Tissue N			37,608	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			0.3	lbs/ac
27	AWA Perennial Tissue N			5.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			146	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,512	acre-ft
31	Total Applied water			12,842	acre-ft
32	Total Evapotranspiration (ET)			15,223	acre-ft
33	Total Runoff			1,816	acre-ft
34	Total Percolation			6,543	acre-ft
35	AWA Precipitation			18.5	inches
36	AWA Applied water			22.6	inches
37	AWA Evapotranspiration (ET)			26.8	inches
38	AWA Runoff			3.2	inches
39	AWA Percolation			11	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M08S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	66			%
3	Reported Acreage	10,442			acres
4	Parcels	212			number
5	Reported Crops	20			number
6	Reported N Applied	1,092,194			lbs
7	Total N Applied	1,152,476		1,167,944	lbs
8	AWA N Applied	110		112	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,518,744	lbs
11	AWA N Uptake			171	lbs/ac
12	Total N Removed	950,640		928,493	lbs
13	AWA N Removed	91		89	lbs/ac
14	AWA N Balance	19		23	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,264	lbs
17	Total N Runoff			7,171	lbs
18	Total Denitrification			12,219	lbs
19	Total Ammonia Volatilization			39,979	lbs
20	Total Change in Soil Organic N			-13,486	lbs
21	Total Perennial Tissue N			124,556	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			4.5	lbs/ac
26	AWA Change in Soil Organic N			-1.5	lbs/ac
27	AWA Perennial Tissue N			14	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			118	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,262	acre-ft
31	Total Applied water			24,767	acre-ft
32	Total Evapotranspiration (ET)			25,233	acre-ft
33	Total Runoff			1,104	acre-ft
34	Total Percolation			7,012	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			33.5	inches
37	AWA Evapotranspiration (ET)			34.1	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M08S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	27			%
3	Reported Acreage	5,760			acres
4	Parcels	147			number
5	Reported Crops	17			number
6	Reported N Applied	575,441			lbs
7	Total N Applied	648,062		663,629	lbs
8	AWA N Applied	113		115	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			983,295	lbs
11	AWA N Uptake			174	lbs/ac
12	Total N Removed	736,125		717,512	lbs
13	AWA N Removed	128		125	lbs/ac
14	AWA N Balance	-15		-9	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,275	lbs
17	Total N Runoff			3,620	lbs
18	Total Denitrification			9,076	lbs
19	Total Ammonia Volatilization			16,980	lbs
20	Total Change in Soil Organic N			-5,725	lbs
21	Total Perennial Tissue N			53,936	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			-1	lbs/ac
27	AWA Perennial Tissue N			9.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-276	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,296	acre-ft
31	Total Applied water			14,768	acre-ft
32	Total Evapotranspiration (ET)			14,751	acre-ft
33	Total Runoff			719	acre-ft
34	Total Percolation			4,625	acre-ft
35	AWA Precipitation			11.3	inches
36	AWA Applied water			31.4	inches
37	AWA Evapotranspiration (ET)			31.3	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			9.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M08S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	22			%
3	Reported Acreage	1,684			acres
4	Parcels	5			number
5	Reported Crops	3			number
6	Reported N Applied	129,995			lbs
7	Total N Applied	129,995		136,341	lbs
8	AWA N Applied	77		81	lbs/ac
9	AWA N Applied Difference		-4		lbs/ac
10	Total N Uptake			194,667	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	74,207		79,251	lbs
13	AWA N Removed	44		47	lbs/ac
14	AWA N Balance	33		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,332	lbs
17	Total N Runoff			660	lbs
18	Total Denitrification			2,644	lbs
19	Total Ammonia Volatilization			13,358	lbs
20	Total Change in Soil Organic N			14,303	lbs
21	Total Perennial Tissue N			0	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			10.4	lbs/ac
26	AWA Change in Soil Organic N			11.1	lbs/ac
27	AWA Perennial Tissue N			0	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			79	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,234	acre-ft
31	Total Applied water			2,302	acre-ft
32	Total Evapotranspiration (ET)			3,123	acre-ft
33	Total Runoff			189	acre-ft
34	Total Percolation			283	acre-ft
35	AWA Precipitation			11.5	inches
36	AWA Applied water			21.5	inches
37	AWA Evapotranspiration (ET)			29.2	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			59	mg/L

AWA: Acre-Weighted Average

Township: M08S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	39			%
3	Reported Acreage	3,105			acres
4	Parcels	17			number
5	Reported Crops	7			number
6	Reported N Applied	334,659			lbs
7	Total N Applied	386,155		380,505	lbs
8	AWA N Applied	124		123	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			698,430	lbs
11	AWA N Uptake			225	lbs/ac
12	Total N Removed	566,103		546,403	lbs
13	AWA N Removed	182		176	lbs/ac
14	AWA N Balance	-58		-53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,423	lbs
17	Total N Runoff			2,860	lbs
18	Total Denitrification			3,132	lbs
19	Total Ammonia Volatilization			9,779	lbs
20	Total Change in Soil Organic N			13,715	lbs
21	Total Perennial Tissue N			16,127	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			5.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-40	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,123	acre-ft
31	Total Applied water			8,562	acre-ft
32	Total Evapotranspiration (ET)			8,544	acre-ft
33	Total Runoff			419	acre-ft
34	Total Percolation			2,684	acre-ft
35	AWA Precipitation			12.1	inches
36	AWA Applied water			33.1	inches
37	AWA Evapotranspiration (ET)			33	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			10.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M08S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	77			%
3	Reported Acreage	11,073			acres
4	Parcels	72			number
5	Reported Crops	17			number
6	Reported N Applied	1,624,626			lbs
7	Total N Applied	1,775,085		1,539,245	lbs
8	AWA N Applied	160		139	lbs/ac
9	AWA N Applied Difference		21		lbs/ac
10	Total N Uptake			1,955,372	lbs
11	AWA N Uptake			212	lbs/ac
12	Total N Removed	1,512,167		1,421,464	lbs
13	AWA N Removed	137		128	lbs/ac
14	AWA N Balance	2		11	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-9		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,825	lbs
17	Total N Runoff			8,569	lbs
18	Total Denitrification			18,687	lbs
19	Total Ammonia Volatilization			52,710	lbs
20	Total Change in Soil Organic N			29,180	lbs
21	Total Perennial Tissue N			80,893	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			5.7	lbs/ac
26	AWA Change in Soil Organic N			3.2	lbs/ac
27	AWA Perennial Tissue N			8.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			268	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,223	acre-ft
31	Total Applied water			24,622	acre-ft
32	Total Evapotranspiration (ET)			25,654	acre-ft
33	Total Runoff			1,201	acre-ft
34	Total Percolation			7,827	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			32.1	inches
37	AWA Evapotranspiration (ET)			33.4	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			8.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M08S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	82			%
3	Reported Acreage	8,482			acres
4	Parcels	149			number
5	Reported Crops	18			number
6	Reported N Applied	618,634			lbs
7	Total N Applied	662,325		670,606	lbs
8	AWA N Applied	78		79	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,395,039	lbs
11	AWA N Uptake			217	lbs/ac
12	Total N Removed	1,033,443		1,122,343	lbs
13	AWA N Removed	122		132	lbs/ac
14	AWA N Balance	-44		-53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,612	lbs
17	Total N Runoff			4,747	lbs
18	Total Denitrification			10,096	lbs
19	Total Ammonia Volatilization			22,682	lbs
20	Total Change in Soil Organic N			1,265	lbs
21	Total Perennial Tissue N			58,773	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			0.2	lbs/ac
27	AWA Perennial Tissue N			9.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,513	acre-ft
31	Total Applied water			20,105	acre-ft
32	Total Evapotranspiration (ET)			19,309	acre-ft
33	Total Runoff			862	acre-ft
34	Total Percolation			8,336	acre-ft
35	AWA Precipitation			12.1	inches
36	AWA Applied water			37.5	inches
37	AWA Evapotranspiration (ET)			36	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			11.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M08S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	14			%
3	Reported Acreage	3,180			acres
4	Parcels	54			number
5	Reported Crops	12			number
6	Reported N Applied	506,893			lbs
7	Total N Applied	512,978		524,040	lbs
8	AWA N Applied	161		165	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			532,358	lbs
11	AWA N Uptake			170	lbs/ac
12	Total N Removed	275,746		306,494	lbs
13	AWA N Removed	87		96	lbs/ac
14	AWA N Balance	75		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,364	lbs
17	Total N Runoff			3,918	lbs
18	Total Denitrification			7,522	lbs
19	Total Ammonia Volatilization			12,409	lbs
20	Total Change in Soil Organic N			8,153	lbs
21	Total Perennial Tissue N			47,596	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			4	lbs/ac
26	AWA Change in Soil Organic N			2.6	lbs/ac
27	AWA Perennial Tissue N			15.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			47	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,114	acre-ft
31	Total Applied water			8,369	acre-ft
32	Total Evapotranspiration (ET)			8,565	acre-ft
33	Total Runoff			431	acre-ft
34	Total Percolation			2,516	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			32.1	inches
37	AWA Evapotranspiration (ET)			32.9	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M09N02E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	74			%
3	Reported Acreage	11,408			acres
4	Parcels	150			number
5	Reported Crops	38			number
6	Reported N Applied	1,265,384			lbs
7	Total N Applied	1,317,438		1,294,798	lbs
8	AWA N Applied	115		113	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,876,441	lbs
11	AWA N Uptake			168	lbs/ac
12	Total N Removed	1,448,808		1,373,882	lbs
13	AWA N Removed	127		120	lbs/ac
14	AWA N Balance	-13		-6	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,691	lbs
17	Total N Runoff			10,702	lbs
18	Total Denitrification			8,386	lbs
19	Total Ammonia Volatilization			27,971	lbs
20	Total Change in Soil Organic N			-35,088	lbs
21	Total Perennial Tissue N			76,437	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			-3.1	lbs/ac
27	AWA Perennial Tissue N			6.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-589	%
CV-SWAT Water Budget Results					
30	Total Precipitation			16,911	acre-ft
31	Total Applied water			22,235	acre-ft
32	Total Evapotranspiration (ET)			27,347	acre-ft
33	Total Runoff			2,414	acre-ft
34	Total Percolation			9,396	acre-ft
35	AWA Precipitation			18.2	inches
36	AWA Applied water			23.9	inches
37	AWA Evapotranspiration (ET)			29.4	inches
38	AWA Runoff			2.6	inches
39	AWA Percolation			9.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M09S08E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	31			%
3	Reported Acreage	2,441			acres
4	Parcels	54			number
5	Reported Crops	12			number
6	Reported N Applied	250,993			lbs
7	Total N Applied	260,307		264,281	lbs
8	AWA N Applied	107		108	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			388,868	lbs
11	AWA N Uptake			186	lbs/ac
12	Total N Removed	244,629		235,534	lbs
13	AWA N Removed	100		96	lbs/ac
14	AWA N Balance	6		12	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,357	lbs
17	Total N Runoff			1,313	lbs
18	Total Denitrification			3,049	lbs
19	Total Ammonia Volatilization			8,796	lbs
20	Total Change in Soil Organic N			-192	lbs
21	Total Perennial Tissue N			38,336	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			-0.1	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			14	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			122	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,989	acre-ft
31	Total Applied water			6,338	acre-ft
32	Total Evapotranspiration (ET)			6,751	acre-ft
33	Total Runoff			332	acre-ft
34	Total Percolation			1,393	acre-ft
35	AWA Precipitation			11.4	inches
36	AWA Applied water			36.5	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			6.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M09S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	36			%
3	Reported Acreage	4,451			acres
4	Parcels	90			number
5	Reported Crops	13			number
6	Reported N Applied	498,991			lbs
7	Total N Applied	520,923		535,174	lbs
8	AWA N Applied	117		120	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			677,805	lbs
11	AWA N Uptake			154	lbs/ac
12	Total N Removed	430,698		418,653	lbs
13	AWA N Removed	97		94	lbs/ac
14	AWA N Balance	20		26	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,475	lbs
17	Total N Runoff			3,678	lbs
18	Total Denitrification			6,742	lbs
19	Total Ammonia Volatilization			15,656	lbs
20	Total Change in Soil Organic N			-15,848	lbs
21	Total Perennial Tissue N			76,558	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			-3.6	lbs/ac
27	AWA Perennial Tissue N			17.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			100	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,256	acre-ft
31	Total Applied water			13,243	acre-ft
32	Total Evapotranspiration (ET)			14,303	acre-ft
33	Total Runoff			824	acre-ft
34	Total Percolation			2,358	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			36.1	inches
37	AWA Evapotranspiration (ET)			39	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			6.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M09S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	35			%
3	Reported Acreage	7,733			acres
4	Parcels	34			number
5	Reported Crops	17			number
6	Reported N Applied	885,964			lbs
7	Total N Applied	912,395		910,738	lbs
8	AWA N Applied	118		118	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,774,766	lbs
11	AWA N Uptake			249	lbs/ac
12	Total N Removed	1,547,533		1,489,614	lbs
13	AWA N Removed	200		193	lbs/ac
14	AWA N Balance	-84		-75	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-9		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,264	lbs
17	Total N Runoff			5,878	lbs
18	Total Denitrification			19,783	lbs
19	Total Ammonia Volatilization			10,895	lbs
20	Total Change in Soil Organic N			-12,957	lbs
21	Total Perennial Tissue N			0	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			1.5	lbs/ac
26	AWA Change in Soil Organic N			-1.8	lbs/ac
27	AWA Perennial Tissue N			0	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,116	acre-ft
31	Total Applied water			19,985	acre-ft
32	Total Evapotranspiration (ET)			19,635	acre-ft
33	Total Runoff			1,007	acre-ft
34	Total Percolation			6,442	acre-ft
35	AWA Precipitation			12	inches
36	AWA Applied water			33.7	inches
37	AWA Evapotranspiration (ET)			33.1	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			10	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M09S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	39			%
3	Reported Acreage	8,362			acres
4	Parcels	39			number
5	Reported Crops	13			number
6	Reported N Applied	1,017,906			lbs
7	Total N Applied	1,074,200		1,078,488	lbs
8	AWA N Applied	128		129	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,957,167	lbs
11	AWA N Uptake			246	lbs/ac
12	Total N Removed	1,465,093		1,469,390	lbs
13	AWA N Removed	175		176	lbs/ac
14	AWA N Balance	-47		-47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,564	lbs
17	Total N Runoff			6,416	lbs
18	Total Denitrification			33,609	lbs
19	Total Ammonia Volatilization			28,631	lbs
20	Total Change in Soil Organic N			37,651	lbs
21	Total Perennial Tissue N			105,578	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			4.2	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			4.7	lbs/ac
27	AWA Perennial Tissue N			13.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-74	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,993	acre-ft
31	Total Applied water			24,123	acre-ft
32	Total Evapotranspiration (ET)			23,803	acre-ft
33	Total Runoff			1,058	acre-ft
34	Total Percolation			7,524	acre-ft
35	AWA Precipitation			12.1	inches
36	AWA Applied water			36.5	inches
37	AWA Evapotranspiration (ET)			36	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			10.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M09S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	93			%
3	Reported Acreage	5,245			acres
4	Parcels	75			number
5	Reported Crops	10			number
6	Reported N Applied	875,926			lbs
7	Total N Applied	898,417		874,174	lbs
8	AWA N Applied	171		167	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			1,330,956	lbs
11	AWA N Uptake			254	lbs/ac
12	Total N Removed	1,002,699		986,632	lbs
13	AWA N Removed	191		188	lbs/ac
14	AWA N Balance	-20		-21	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,200	lbs
17	Total N Runoff			7,284	lbs
18	Total Denitrification			17,185	lbs
19	Total Ammonia Volatilization			16,707	lbs
20	Total Change in Soil Organic N			25,945	lbs
21	Total Perennial Tissue N			75,774	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			14.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-185	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,263	acre-ft
31	Total Applied water			18,375	acre-ft
32	Total Evapotranspiration (ET)			17,603	acre-ft
33	Total Runoff			782	acre-ft
34	Total Percolation			5,196	acre-ft
35	AWA Precipitation			12.1	inches
36	AWA Applied water			42.1	inches
37	AWA Evapotranspiration (ET)			40.4	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			11.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M09S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	73			%
3	Reported Acreage	7,411			acres
4	Parcels	115			number
5	Reported Crops	10			number
6	Reported N Applied	1,250,439			lbs
7	Total N Applied	1,251,473		1,231,870	lbs
8	AWA N Applied	169		166	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,376,318	lbs
11	AWA N Uptake			188	lbs/ac
12	Total N Removed	838,209		831,787	lbs
13	AWA N Removed	113		112	lbs/ac
14	AWA N Balance	56		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,972	lbs
17	Total N Runoff			10,611	lbs
18	Total Denitrification			19,774	lbs
19	Total Ammonia Volatilization			29,016	lbs
20	Total Change in Soil Organic N			40,599	lbs
21	Total Perennial Tissue N			137,620	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			4	lbs/ac
26	AWA Change in Soil Organic N			5.6	lbs/ac
27	AWA Perennial Tissue N			18.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,657	acre-ft
31	Total Applied water			23,939	acre-ft
32	Total Evapotranspiration (ET)			24,336	acre-ft
33	Total Runoff			1,015	acre-ft
34	Total Percolation			5,299	acre-ft
35	AWA Precipitation			10.9	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M09S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	14			%
3	Reported Acreage	4,683			acres
4	Parcels	66			number
5	Reported Crops	10			number
6	Reported N Applied	737,273			lbs
7	Total N Applied	662,337		662,066	lbs
8	AWA N Applied	141		141	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			713,846	lbs
11	AWA N Uptake			170	lbs/ac
12	Total N Removed	459,229		442,514	lbs
13	AWA N Removed	98		94	lbs/ac
14	AWA N Balance	43		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,682	lbs
17	Total N Runoff			5,333	lbs
18	Total Denitrification			7,663	lbs
19	Total Ammonia Volatilization			19,950	lbs
20	Total Change in Soil Organic N			15,498	lbs
21	Total Perennial Tissue N			78,521	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			4.8	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			18.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,573	acre-ft
31	Total Applied water			13,614	acre-ft
32	Total Evapotranspiration (ET)			14,322	acre-ft
33	Total Runoff			474	acre-ft
34	Total Percolation			2,612	acre-ft
35	AWA Precipitation			10.2	inches
36	AWA Applied water			38.9	inches
37	AWA Evapotranspiration (ET)			40.9	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			6.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M10N02E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	53			%
3	Reported Acreage	8,265			acres
4	Parcels	130			number
5	Reported Crops	19			number
6	Reported N Applied	631,059			lbs
7	Total N Applied	771,012		807,481	lbs
8	AWA N Applied	93		98	lbs/ac
9	AWA N Applied Difference		-4		lbs/ac
10	Total N Uptake			1,295,254	lbs
11	AWA N Uptake			161	lbs/ac
12	Total N Removed	986,230		975,586	lbs
13	AWA N Removed	119		118	lbs/ac
14	AWA N Balance	-27		-20	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,646	lbs
17	Total N Runoff			7,949	lbs
18	Total Denitrification			6,443	lbs
19	Total Ammonia Volatilization			18,986	lbs
20	Total Change in Soil Organic N			-10,272	lbs
21	Total Perennial Tissue N			51,302	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			-1.3	lbs/ac
27	AWA Perennial Tissue N			6.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-141	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,126	acre-ft
31	Total Applied water			16,019	acre-ft
32	Total Evapotranspiration (ET)			19,174	acre-ft
33	Total Runoff			1,904	acre-ft
34	Total Percolation			7,077	acre-ft
35	AWA Precipitation			18.1	inches
36	AWA Applied water			24	inches
37	AWA Evapotranspiration (ET)			28.7	inches
38	AWA Runoff			2.8	inches
39	AWA Percolation			10.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M10S09E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	46			%
3	Reported Acreage	2,960			acres
4	Parcels	36			number
5	Reported Crops	11			number
6	Reported N Applied	321,609			lbs
7	Total N Applied	321,943		343,722	lbs
8	AWA N Applied	109		116	lbs/ac
9	AWA N Applied Difference		-7		lbs/ac
10	Total N Uptake			539,443	lbs
11	AWA N Uptake			186	lbs/ac
12	Total N Removed	376,638		366,993	lbs
13	AWA N Removed	127		124	lbs/ac
14	AWA N Balance	-18		-8	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,584	lbs
17	Total N Runoff			2,359	lbs
18	Total Denitrification			4,647	lbs
19	Total Ammonia Volatilization			12,693	lbs
20	Total Change in Soil Organic N			4,375	lbs
21	Total Perennial Tissue N			21,133	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			1.5	lbs/ac
27	AWA Perennial Tissue N			7.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-351	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,808	acre-ft
31	Total Applied water			7,605	acre-ft
32	Total Evapotranspiration (ET)			8,364	acre-ft
33	Total Runoff			503	acre-ft
34	Total Percolation			1,525	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			31.5	inches
37	AWA Evapotranspiration (ET)			34.7	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			6.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M10S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	66			%
3	Reported Acreage	10,694			acres
4	Parcels	335			number
5	Reported Crops	24			number
6	Reported N Applied	1,535,273			lbs
7	Total N Applied	1,568,429		1,498,731	lbs
8	AWA N Applied	147		140	lbs/ac
9	AWA N Applied Difference		7		lbs/ac
10	Total N Uptake			1,970,060	lbs
11	AWA N Uptake			197	lbs/ac
12	Total N Removed	1,488,621		1,437,540	lbs
13	AWA N Removed	139		134	lbs/ac
14	AWA N Balance	7		8	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,144	lbs
17	Total N Runoff			8,875	lbs
18	Total Denitrification			32,007	lbs
19	Total Ammonia Volatilization			37,935	lbs
20	Total Change in Soil Organic N			-3,484	lbs
21	Total Perennial Tissue N			85,529	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			3.2	lbs/ac
25	AWA Ammonia Volatilization			3.8	lbs/ac
26	AWA Change in Soil Organic N			-0.3	lbs/ac
27	AWA Perennial Tissue N			8.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			454	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,273	acre-ft
31	Total Applied water			28,093	acre-ft
32	Total Evapotranspiration (ET)			29,634	acre-ft
33	Total Runoff			1,615	acre-ft
34	Total Percolation			6,198	acre-ft
35	AWA Precipitation			11.1	inches
36	AWA Applied water			33.7	inches
37	AWA Evapotranspiration (ET)			35.5	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M10S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSJRWC			
2	Percent HVA	12			%
3	Reported Acreage	1,978			acres
4	Parcels	44			number
5	Reported Crops	10			number
6	Reported N Applied	150,490			lbs
7	Total N Applied	161,355		166,509	lbs
8	AWA N Applied	82		84	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			345,206	lbs
11	AWA N Uptake			198	lbs/ac
12	Total N Removed	287,794		276,652	lbs
13	AWA N Removed	145		140	lbs/ac
14	AWA N Balance	-64		-56	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,621	lbs
17	Total N Runoff			690	lbs
18	Total Denitrification			2,844	lbs
19	Total Ammonia Volatilization			6,448	lbs
20	Total Change in Soil Organic N			-253	lbs
21	Total Perennial Tissue N			7,713	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			3.7	lbs/ac
26	AWA Change in Soil Organic N			-0.1	lbs/ac
27	AWA Perennial Tissue N			4.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			15	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-26	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,322	acre-ft
31	Total Applied water			4,991	acre-ft
32	Total Evapotranspiration (ET)			4,991	acre-ft
33	Total Runoff			159	acre-ft
34	Total Percolation			1,147	acre-ft
35	AWA Precipitation			9.1	inches
36	AWA Applied water			34.4	inches
37	AWA Evapotranspiration (ET)			34.4	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M10S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	27			%
3	Reported Acreage	4,489			acres
4	Parcels	37			number
5	Reported Crops	15			number
6	Reported N Applied	616,310			lbs
7	Total N Applied	636,069		653,080	lbs
8	AWA N Applied	142		145	lbs/ac
9	AWA N Applied Difference		-4		lbs/ac
10	Total N Uptake			925,073	lbs
11	AWA N Uptake			214	lbs/ac
12	Total N Removed	633,336		635,547	lbs
13	AWA N Removed	141		142	lbs/ac
14	AWA N Balance	1		4	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,552	lbs
17	Total N Runoff			5,445	lbs
18	Total Denitrification			21,056	lbs
19	Total Ammonia Volatilization			17,152	lbs
20	Total Change in Soil Organic N			7,085	lbs
21	Total Perennial Tissue N			44,009	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			4.9	lbs/ac
25	AWA Ammonia Volatilization			4	lbs/ac
26	AWA Change in Soil Organic N			1.6	lbs/ac
27	AWA Perennial Tissue N			10.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			1,020	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,900	acre-ft
31	Total Applied water			11,676	acre-ft
32	Total Evapotranspiration (ET)			12,219	acre-ft
33	Total Runoff			449	acre-ft
34	Total Percolation			2,894	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			32.4	inches
37	AWA Evapotranspiration (ET)			33.9	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M10S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	78			%
3	Reported Acreage	13,893			acres
4	Parcels	177			number
5	Reported Crops	19			number
6	Reported N Applied	4,901,757			lbs
7	Total N Applied	1,920,073		1,907,535	lbs
8	AWA N Applied	138		137	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			2,077,487	lbs
11	AWA N Uptake			167	lbs/ac
12	Total N Removed	1,384,192		1,334,125	lbs
13	AWA N Removed	100		96	lbs/ac
14	AWA N Balance	39		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,350	lbs
17	Total N Runoff			18,164	lbs
18	Total Denitrification			30,353	lbs
19	Total Ammonia Volatilization			44,181	lbs
20	Total Change in Soil Organic N			45,673	lbs
21	Total Perennial Tissue N			212,885	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			17.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,066	acre-ft
31	Total Applied water			39,491	acre-ft
32	Total Evapotranspiration (ET)			39,960	acre-ft
33	Total Runoff			1,427	acre-ft
34	Total Percolation			9,090	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			38.6	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M10S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	98			%
3	Reported Acreage	14,344			acres
4	Parcels	364			number
5	Reported Crops	20			number
6	Reported N Applied	2,305,744			lbs
7	Total N Applied	2,376,383		2,321,110	lbs
8	AWA N Applied	166		162	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			2,730,567	lbs
11	AWA N Uptake			207	lbs/ac
12	Total N Removed	1,812,361		1,764,547	lbs
13	AWA N Removed	126		123	lbs/ac
14	AWA N Balance	39		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			28,304	lbs
17	Total N Runoff			25,012	lbs
18	Total Denitrification			33,606	lbs
19	Total Ammonia Volatilization			53,533	lbs
20	Total Change in Soil Organic N			73,271	lbs
21	Total Perennial Tissue N			251,204	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			5.6	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,397	acre-ft
31	Total Applied water			44,329	acre-ft
32	Total Evapotranspiration (ET)			43,411	acre-ft
33	Total Runoff			1,558	acre-ft
34	Total Percolation			10,295	acre-ft
35	AWA Precipitation			9.5	inches
36	AWA Applied water			40.3	inches
37	AWA Evapotranspiration (ET)			39.5	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M10S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	27			%
3	Reported Acreage	6,890			acres
4	Parcels	154			number
5	Reported Crops	7			number
6	Reported N Applied	1,175,588			lbs
7	Total N Applied	1,189,946		1,189,101	lbs
8	AWA N Applied	173		173	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,331,430	lbs
11	AWA N Uptake			198	lbs/ac
12	Total N Removed	724,448		709,360	lbs
13	AWA N Removed	105		103	lbs/ac
14	AWA N Balance	68		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,054	lbs
17	Total N Runoff			10,676	lbs
18	Total Denitrification			19,609	lbs
19	Total Ammonia Volatilization			42,872	lbs
20	Total Change in Soil Organic N			45,364	lbs
21	Total Perennial Tissue N			153,491	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			6.4	lbs/ac
26	AWA Change in Soil Organic N			6.7	lbs/ac
27	AWA Perennial Tissue N			22.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			46	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,140	acre-ft
31	Total Applied water			22,784	acre-ft
32	Total Evapotranspiration (ET)			23,262	acre-ft
33	Total Runoff			696	acre-ft
34	Total Percolation			4,057	acre-ft
35	AWA Precipitation			9.2	inches
36	AWA Applied water			40.7	inches
37	AWA Evapotranspiration (ET)			41.5	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M10S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	10			%
3	Reported Acreage	7,467			acres
4	Parcels	145			number
5	Reported Crops	9			number
6	Reported N Applied	918,791			lbs
7	Total N Applied	919,199		903,166	lbs
8	AWA N Applied	123		121	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			906,811	lbs
11	AWA N Uptake			126	lbs/ac
12	Total N Removed	293,265		283,724	lbs
13	AWA N Removed	39		38	lbs/ac
14	AWA N Balance	82		83	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,383	lbs
17	Total N Runoff			7,566	lbs
18	Total Denitrification			26,838	lbs
19	Total Ammonia Volatilization			20,591	lbs
20	Total Change in Soil Organic N			56,264	lbs
21	Total Perennial Tissue N			161,138	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			3.7	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			7.8	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,219	acre-ft
31	Total Applied water			22,608	acre-ft
32	Total Evapotranspiration (ET)			23,391	acre-ft
33	Total Runoff			646	acre-ft
34	Total Percolation			3,893	acre-ft
35	AWA Precipitation			8.7	inches
36	AWA Applied water			37.8	inches
37	AWA Evapotranspiration (ET)			39.1	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			34	mg/L

AWA: Acre-Weighted Average

Township: M11S10E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC, WSJRWC			
2	Percent HVA	83			%
3	Reported Acreage	9,772			acres
4	Parcels	129			number
5	Reported Crops	19			number
6	Reported N Applied	1,251,317			lbs
7	Total N Applied	1,319,114		1,318,825	lbs
8	AWA N Applied	135		135	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,697,428	lbs
11	AWA N Uptake			186	lbs/ac
12	Total N Removed	1,235,890		1,175,169	lbs
13	AWA N Removed	126		120	lbs/ac
14	AWA N Balance	9		15	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,844	lbs
17	Total N Runoff			7,758	lbs
18	Total Denitrification			30,132	lbs
19	Total Ammonia Volatilization			34,311	lbs
20	Total Change in Soil Organic N			-17,702	lbs
21	Total Perennial Tissue N			87,895	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			3.8	lbs/ac
26	AWA Change in Soil Organic N			-1.9	lbs/ac
27	AWA Perennial Tissue N			9.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			211	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,461	acre-ft
31	Total Applied water			24,098	acre-ft
32	Total Evapotranspiration (ET)			24,575	acre-ft
33	Total Runoff			666	acre-ft
34	Total Percolation			5,304	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			31.7	inches
37	AWA Evapotranspiration (ET)			32.3	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			6.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M11S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC, WSJRWC			
2	Percent HVA	13			%
3	Reported Acreage	3,103			acres
4	Parcels	105			number
5	Reported Crops	14			number
6	Reported N Applied	411,446			lbs
7	Total N Applied	413,522		421,872	lbs
8	AWA N Applied	133		136	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			574,228	lbs
11	AWA N Uptake			192	lbs/ac
12	Total N Removed	412,720		396,481	lbs
13	AWA N Removed	133		128	lbs/ac
14	AWA N Balance	0		10	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,837	lbs
17	Total N Runoff			2,931	lbs
18	Total Denitrification			9,641	lbs
19	Total Ammonia Volatilization			9,475	lbs
20	Total Change in Soil Organic N			8,955	lbs
21	Total Perennial Tissue N			11,610	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			3.2	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			3.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			402	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,119	acre-ft
31	Total Applied water			7,766	acre-ft
32	Total Evapotranspiration (ET)			8,127	acre-ft
33	Total Runoff			183	acre-ft
34	Total Percolation			1,617	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			31.2	inches
37	AWA Evapotranspiration (ET)			32.6	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M11S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	23			%
3	Reported Acreage	8,093			acres
4	Parcels	136			number
5	Reported Crops	14			number
6	Reported N Applied	1,074,610			lbs
7	Total N Applied	1,087,339		1,062,029	lbs
8	AWA N Applied	134		131	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,149,170	lbs
11	AWA N Uptake			147	lbs/ac
12	Total N Removed	749,215		751,834	lbs
13	AWA N Removed	93		93	lbs/ac
14	AWA N Balance	42		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,046	lbs
17	Total N Runoff			5,643	lbs
18	Total Denitrification			34,366	lbs
19	Total Ammonia Volatilization			19,363	lbs
20	Total Change in Soil Organic N			7,452	lbs
21	Total Perennial Tissue N			56,252	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			4.4	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			1	lbs/ac
27	AWA Perennial Tissue N			7.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			116	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,853	acre-ft
31	Total Applied water			19,104	acre-ft
32	Total Evapotranspiration (ET)			21,431	acre-ft
33	Total Runoff			441	acre-ft
34	Total Percolation			3,099	acre-ft
35	AWA Precipitation			9	inches
36	AWA Applied water			29.3	inches
37	AWA Evapotranspiration (ET)			32.9	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: M11S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	56			%
3	Reported Acreage	16,271			acres
4	Parcels	30			number
5	Reported Crops	4			number
6	Reported N Applied	2,244,560			lbs
7	Total N Applied	2,564,854		2,580,630	lbs
8	AWA N Applied	158		159	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,905,969	lbs
11	AWA N Uptake			190	lbs/ac
12	Total N Removed	1,517,635		1,520,319	lbs
13	AWA N Removed	93		93	lbs/ac
14	AWA N Balance	64		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,720	lbs
17	Total N Runoff			18,049	lbs
18	Total Denitrification			52,714	lbs
19	Total Ammonia Volatilization			69,800	lbs
20	Total Change in Soil Organic N			84,719	lbs
21	Total Perennial Tissue N			348,201	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			4.6	lbs/ac
26	AWA Change in Soil Organic N			5.5	lbs/ac
27	AWA Perennial Tissue N			22.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,018	acre-ft
31	Total Applied water			51,804	acre-ft
32	Total Evapotranspiration (ET)			54,126	acre-ft
33	Total Runoff			1,254	acre-ft
34	Total Percolation			8,969	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			40.7	inches
37	AWA Evapotranspiration (ET)			42.5	inches
38	AWA Runoff			1	inches
39	AWA Percolation			6.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M11S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	44			%
3	Reported Acreage	8,002			acres
4	Parcels	43			number
5	Reported Crops	11			number
6	Reported N Applied	1,130,657			lbs
7	Total N Applied	1,150,115		1,114,629	lbs
8	AWA N Applied	144		139	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			1,382,532	lbs
11	AWA N Uptake			178	lbs/ac
12	Total N Removed	859,186		844,536	lbs
13	AWA N Removed	107		106	lbs/ac
14	AWA N Balance	36		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,803	lbs
17	Total N Runoff			9,406	lbs
18	Total Denitrification			24,047	lbs
19	Total Ammonia Volatilization			36,245	lbs
20	Total Change in Soil Organic N			54,988	lbs
21	Total Perennial Tissue N			122,194	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			4.7	lbs/ac
26	AWA Change in Soil Organic N			7.1	lbs/ac
27	AWA Perennial Tissue N			15.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			38	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			112	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,773	acre-ft
31	Total Applied water			22,332	acre-ft
32	Total Evapotranspiration (ET)			22,004	acre-ft
33	Total Runoff			727	acre-ft
34	Total Percolation			5,492	acre-ft
35	AWA Precipitation			8.9	inches
36	AWA Applied water			34.5	inches
37	AWA Evapotranspiration (ET)			34	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M11S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	95			%
3	Reported Acreage	13,169			acres
4	Parcels	214			number
5	Reported Crops	20			number
6	Reported N Applied	2,117,599			lbs
7	Total N Applied	2,141,516		2,146,774	lbs
8	AWA N Applied	163		163	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,351,974	lbs
11	AWA N Uptake			192	lbs/ac
12	Total N Removed	1,401,873		1,328,100	lbs
13	AWA N Removed	106		101	lbs/ac
14	AWA N Balance	56		62	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,373	lbs
17	Total N Runoff			18,252	lbs
18	Total Denitrification			44,034	lbs
19	Total Ammonia Volatilization			64,269	lbs
20	Total Change in Soil Organic N			36,918	lbs
21	Total Perennial Tissue N			274,400	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			3.6	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,833	acre-ft
31	Total Applied water			40,971	acre-ft
32	Total Evapotranspiration (ET)			41,135	acre-ft
33	Total Runoff			1,354	acre-ft
34	Total Percolation			7,815	acre-ft
35	AWA Precipitation			8.6	inches
36	AWA Applied water			40.1	inches
37	AWA Evapotranspiration (ET)			40.3	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M11S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	54			%
3	Reported Acreage	8,599			acres
4	Parcels	169			number
5	Reported Crops	14			number
6	Reported N Applied	1,257,876			lbs
7	Total N Applied	1,324,850		1,325,816	lbs
8	AWA N Applied	154		154	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,457,194	lbs
11	AWA N Uptake			177	lbs/ac
12	Total N Removed	795,498		774,362	lbs
13	AWA N Removed	93		90	lbs/ac
14	AWA N Balance	62		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,900	lbs
17	Total N Runoff			12,411	lbs
18	Total Denitrification			25,842	lbs
19	Total Ammonia Volatilization			35,806	lbs
20	Total Change in Soil Organic N			52,666	lbs
21	Total Perennial Tissue N			174,579	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			21.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,164	acre-ft
31	Total Applied water			27,097	acre-ft
32	Total Evapotranspiration (ET)			27,218	acre-ft
33	Total Runoff			908	acre-ft
34	Total Percolation			5,352	acre-ft
35	AWA Precipitation			9	inches
36	AWA Applied water			39.6	inches
37	AWA Evapotranspiration (ET)			39.8	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M11S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	20			%
3	Reported Acreage	5,502			acres
4	Parcels	91			number
5	Reported Crops	12			number
6	Reported N Applied	803,025			lbs
7	Total N Applied	826,074		818,393	lbs
8	AWA N Applied	150		149	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			864,808	lbs
11	AWA N Uptake			169	lbs/ac
12	Total N Removed	452,072		440,419	lbs
13	AWA N Removed	82		80	lbs/ac
14	AWA N Balance	68		69	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,933	lbs
17	Total N Runoff			7,384	lbs
18	Total Denitrification			13,213	lbs
19	Total Ammonia Volatilization			20,182	lbs
20	Total Change in Soil Organic N			37,166	lbs
21	Total Perennial Tissue N			104,293	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			2.6	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			7.3	lbs/ac
27	AWA Perennial Tissue N			20.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,014	acre-ft
31	Total Applied water			16,227	acre-ft
32	Total Evapotranspiration (ET)			16,551	acre-ft
33	Total Runoff			480	acre-ft
34	Total Percolation			3,402	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			7.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: M11S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	23			%
3	Reported Acreage	2,891			acres
4	Parcels	19			number
5	Reported Crops	5			number
6	Reported N Applied	300,462			lbs
7	Total N Applied	304,103		302,498	lbs
8	AWA N Applied	105		105	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			294,919	lbs
11	AWA N Uptake			102	lbs/ac
12	Total N Removed	152,023		139,776	lbs
13	AWA N Removed	53		48	lbs/ac
14	AWA N Balance	53		56	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			6,190	lbs
17	Total N Runoff			3,931	lbs
18	Total Denitrification			3,833	lbs
19	Total Ammonia Volatilization			6,961	lbs
20	Total Change in Soil Organic N			14,357	lbs
21	Total Perennial Tissue N			50,200	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			17.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,274	acre-ft
31	Total Applied water			8,642	acre-ft
32	Total Evapotranspiration (ET)			9,238	acre-ft
33	Total Runoff			284	acre-ft
34	Total Percolation			1,385	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			35.9	inches
37	AWA Evapotranspiration (ET)			38.3	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			5.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M11S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	24			%
3	Reported Acreage	3,650			acres
4	Parcels	40			number
5	Reported Crops	10			number
6	Reported N Applied	404,233			lbs
7	Total N Applied	419,343		423,080	lbs
8	AWA N Applied	115		116	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			418,145	lbs
11	AWA N Uptake			122	lbs/ac
12	Total N Removed	149,288		148,442	lbs
13	AWA N Removed	41		41	lbs/ac
14	AWA N Balance	74		75	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,337	lbs
17	Total N Runoff			11,130	lbs
18	Total Denitrification			7,222	lbs
19	Total Ammonia Volatilization			9,982	lbs
20	Total Change in Soil Organic N			29,563	lbs
21	Total Perennial Tissue N			75,796	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3.3	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			8.6	lbs/ac
27	AWA Perennial Tissue N			22.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,695	acre-ft
31	Total Applied water			10,760	acre-ft
32	Total Evapotranspiration (ET)			11,350	acre-ft
33	Total Runoff			396	acre-ft
34	Total Percolation			1,808	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			39.8	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			5.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			31	mg/L

AWA: Acre-Weighted Average

Township: M11S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	34			%
3	Reported Acreage	341			acres
4	Parcels	2			number
5	Reported Crops	1			number
6	Reported N Applied	57,969			lbs
7	Total N Applied	57,969		58,781	lbs
8	AWA N Applied	170		172	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			62,208	lbs
11	AWA N Uptake			182	lbs/ac
12	Total N Removed	14,466		16,481	lbs
13	AWA N Removed	42		48	lbs/ac
14	AWA N Balance	128		124	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			730	lbs
17	Total N Runoff			2,420	lbs
18	Total Denitrification			1,742	lbs
19	Total Ammonia Volatilization			1,319	lbs
20	Total Change in Soil Organic N			5,862	lbs
21	Total Perennial Tissue N			10,027	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			7.1	lbs/ac
24	AWA Denitrification			5.1	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			17.2	lbs/ac
27	AWA Perennial Tissue N			29.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			62	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			268	acre-ft
31	Total Applied water			1,147	acre-ft
32	Total Evapotranspiration (ET)			1,180	acre-ft
33	Total Runoff			54	acre-ft
34	Total Percolation			179	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			40.4	inches
37	AWA Evapotranspiration (ET)			41.5	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: M12S11E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC			
2	Percent HVA	34			%
3	Reported Acreage	7,846			acres
4	Parcels	45			number
5	Reported Crops	13			number
6	Reported N Applied	1,085,774			lbs
7	Total N Applied	1,116,608		1,077,104	lbs
8	AWA N Applied	142		137	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			1,150,511	lbs
11	AWA N Uptake			170	lbs/ac
12	Total N Removed	862,826		814,150	lbs
13	AWA N Removed	110		104	lbs/ac
14	AWA N Balance	32		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			13,353	lbs
17	Total N Runoff			2,212	lbs
18	Total Denitrification			11,804	lbs
19	Total Ammonia Volatilization			27,960	lbs
20	Total Change in Soil Organic N			11,569	lbs
21	Total Perennial Tissue N			48,431	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			1.7	lbs/ac
27	AWA Perennial Tissue N			7.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			74	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,803	acre-ft
31	Total Applied water			17,214	acre-ft
32	Total Evapotranspiration (ET)			18,536	acre-ft
33	Total Runoff			414	acre-ft
34	Total Percolation			3,171	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			30.5	inches
37	AWA Evapotranspiration (ET)			32.8	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M12S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC			
2	Percent HVA	22			%
3	Reported Acreage	7,314			acres
4	Parcels	50			number
5	Reported Crops	16			number
6	Reported N Applied	593,583			lbs
7	Total N Applied	656,472		610,347	lbs
8	AWA N Applied	90		83	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			898,524	lbs
11	AWA N Uptake			149	lbs/ac
12	Total N Removed	674,351		633,408	lbs
13	AWA N Removed	92		87	lbs/ac
14	AWA N Balance	-2		1	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,833	lbs
17	Total N Runoff			1,684	lbs
18	Total Denitrification			9,316	lbs
19	Total Ammonia Volatilization			16,441	lbs
20	Total Change in Soil Organic N			1,941	lbs
21	Total Perennial Tissue N			49,164	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			0.3	lbs/ac
27	AWA Perennial Tissue N			8.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			2,615	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,278	acre-ft
31	Total Applied water			12,378	acre-ft
32	Total Evapotranspiration (ET)			13,647	acre-ft
33	Total Runoff			404	acre-ft
34	Total Percolation			3,059	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			24.6	inches
37	AWA Evapotranspiration (ET)			27.2	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M12S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC, WSJRWC			
2	Percent HVA	13			%
3	Reported Acreage	4,530			acres
4	Parcels	31			number
5	Reported Crops	9			number
6	Reported N Applied	544,750			lbs
7	Total N Applied	546,396		547,686	lbs
8	AWA N Applied	121		121	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			644,064	lbs
11	AWA N Uptake			144	lbs/ac
12	Total N Removed	332,567		347,597	lbs
13	AWA N Removed	73		77	lbs/ac
14	AWA N Balance	47		44	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,816	lbs
17	Total N Runoff			1,745	lbs
18	Total Denitrification			13,355	lbs
19	Total Ammonia Volatilization			18,742	lbs
20	Total Change in Soil Organic N			16,474	lbs
21	Total Perennial Tissue N			60,134	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			13.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			38	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			86	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,190	acre-ft
31	Total Applied water			11,119	acre-ft
32	Total Evapotranspiration (ET)			12,333	acre-ft
33	Total Runoff			251	acre-ft
34	Total Percolation			1,717	acre-ft
35	AWA Precipitation			8.6	inches
36	AWA Applied water			29.8	inches
37	AWA Evapotranspiration (ET)			33.1	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M12S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	71			%
3	Reported Acreage	9,312			acres
4	Parcels	95			number
5	Reported Crops	8			number
6	Reported N Applied	1,501,362			lbs
7	Total N Applied	1,525,225		1,517,190	lbs
8	AWA N Applied	164		163	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,580,645	lbs
11	AWA N Uptake			180	lbs/ac
12	Total N Removed	850,009		861,043	lbs
13	AWA N Removed	91		92	lbs/ac
14	AWA N Balance	73		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,893	lbs
17	Total N Runoff			9,769	lbs
18	Total Denitrification			34,676	lbs
19	Total Ammonia Volatilization			31,246	lbs
20	Total Change in Soil Organic N			16,621	lbs
21	Total Perennial Tissue N			195,053	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			4	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			1.9	lbs/ac
27	AWA Perennial Tissue N			22.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,513	acre-ft
31	Total Applied water			27,159	acre-ft
32	Total Evapotranspiration (ET)			28,935	acre-ft
33	Total Runoff			712	acre-ft
34	Total Percolation			4,022	acre-ft
35	AWA Precipitation			8.9	inches
36	AWA Applied water			37.2	inches
37	AWA Evapotranspiration (ET)			39.6	inches
38	AWA Runoff			1	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			34	mg/L

AWA: Acre-Weighted Average

Township: M12S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, WSJRWC			
2	Percent HVA	16			%
3	Reported Acreage	14,491			acres
4	Parcels	45			number
5	Reported Crops	8			number
6	Reported N Applied	1,968,304			lbs
7	Total N Applied	2,082,955		2,088,532	lbs
8	AWA N Applied	144		144	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,101,827	lbs
11	AWA N Uptake			161	lbs/ac
12	Total N Removed	1,127,784		1,140,113	lbs
13	AWA N Removed	78		79	lbs/ac
14	AWA N Balance	66		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,971	lbs
17	Total N Runoff			17,821	lbs
18	Total Denitrification			41,865	lbs
19	Total Ammonia Volatilization			53,982	lbs
20	Total Change in Soil Organic N			81,857	lbs
21	Total Perennial Tissue N			259,998	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			3.2	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			6.3	lbs/ac
27	AWA Perennial Tissue N			20	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,850	acre-ft
31	Total Applied water			40,840	acre-ft
32	Total Evapotranspiration (ET)			39,791	acre-ft
33	Total Runoff			1,399	acre-ft
34	Total Percolation			10,532	acre-ft
35	AWA Precipitation			9.1	inches
36	AWA Applied water			37.6	inches
37	AWA Evapotranspiration (ET)			36.7	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			8.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M12S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	12			%
3	Reported Acreage	5,364			acres
4	Parcels	34			number
5	Reported Crops	5			number
6	Reported N Applied	614,463			lbs
7	Total N Applied	631,342		627,043	lbs
8	AWA N Applied	118		117	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			673,253	lbs
11	AWA N Uptake			146	lbs/ac
12	Total N Removed	432,957		415,549	lbs
13	AWA N Removed	81		77	lbs/ac
14	AWA N Balance	37		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,807	lbs
17	Total N Runoff			3,977	lbs
18	Total Denitrification			8,859	lbs
19	Total Ammonia Volatilization			14,351	lbs
20	Total Change in Soil Organic N			18,352	lbs
21	Total Perennial Tissue N			79,324	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			4	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,598	acre-ft
31	Total Applied water			14,636	acre-ft
32	Total Evapotranspiration (ET)			14,631	acre-ft
33	Total Runoff			471	acre-ft
34	Total Percolation			3,637	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			38.1	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M12S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC			
2	Percent HVA	63			%
3	Reported Acreage	17,860			acres
4	Parcels	304			number
5	Reported Crops	15			number
6	Reported N Applied	2,252,488			lbs
7	Total N Applied	1,798,314		1,795,811	lbs
8	AWA N Applied	101		101	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,050,721	lbs
11	AWA N Uptake			132	lbs/ac
12	Total N Removed	1,180,762		1,111,067	lbs
13	AWA N Removed	66		62	lbs/ac
14	AWA N Balance	35		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			33,242	lbs
17	Total N Runoff			15,840	lbs
18	Total Denitrification			23,262	lbs
19	Total Ammonia Volatilization			51,300	lbs
20	Total Change in Soil Organic N			35,706	lbs
21	Total Perennial Tissue N			295,680	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			2.3	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			18	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,209	acre-ft
31	Total Applied water			48,113	acre-ft
32	Total Evapotranspiration (ET)			47,788	acre-ft
33	Total Runoff			1,570	acre-ft
34	Total Percolation			12,331	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			37.2	inches
37	AWA Evapotranspiration (ET)			36.9	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			8.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M12S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	66			%
3	Reported Acreage	15,692			acres
4	Parcels	287			number
5	Reported Crops	18			number
6	Reported N Applied	1,566,991			lbs
7	Total N Applied	1,703,500		1,717,527	lbs
8	AWA N Applied	109		109	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,904,601	lbs
11	AWA N Uptake			131	lbs/ac
12	Total N Removed	1,151,848		1,082,789	lbs
13	AWA N Removed	73		69	lbs/ac
14	AWA N Balance	35		40	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,160	lbs
17	Total N Runoff			14,591	lbs
18	Total Denitrification			15,511	lbs
19	Total Ammonia Volatilization			42,679	lbs
20	Total Change in Soil Organic N			36,087	lbs
21	Total Perennial Tissue N			265,860	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			2.5	lbs/ac
27	AWA Perennial Tissue N			18.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,444	acre-ft
31	Total Applied water			45,187	acre-ft
32	Total Evapotranspiration (ET)			45,317	acre-ft
33	Total Runoff			1,316	acre-ft
34	Total Percolation			10,757	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			37.3	inches
37	AWA Evapotranspiration (ET)			37.4	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M12S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	58			%
3	Reported Acreage	12,571			acres
4	Parcels	197			number
5	Reported Crops	19			number
6	Reported N Applied	1,670,755			lbs
7	Total N Applied	1,726,210		1,724,751	lbs
8	AWA N Applied	137		137	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,750,117	lbs
11	AWA N Uptake			148	lbs/ac
12	Total N Removed	827,062		809,979	lbs
13	AWA N Removed	66		64	lbs/ac
14	AWA N Balance	72		73	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,416	lbs
17	Total N Runoff			22,870	lbs
18	Total Denitrification			23,097	lbs
19	Total Ammonia Volatilization			34,005	lbs
20	Total Change in Soil Organic N			100,066	lbs
21	Total Perennial Tissue N			258,195	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			8.5	lbs/ac
27	AWA Perennial Tissue N			21.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,333	acre-ft
31	Total Applied water			38,747	acre-ft
32	Total Evapotranspiration (ET)			40,423	acre-ft
33	Total Runoff			1,156	acre-ft
34	Total Percolation			6,716	acre-ft
35	AWA Precipitation			9.5	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			41	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			6.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			28	mg/L

AWA: Acre-Weighted Average

Township: M12S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	81			%
3	Reported Acreage	3,737			acres
4	Parcels	38			number
5	Reported Crops	10			number
6	Reported N Applied	492,226			lbs
7	Total N Applied	502,102		503,344	lbs
8	AWA N Applied	134		135	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			521,627	lbs
11	AWA N Uptake			140	lbs/ac
12	Total N Removed	283,254		245,080	lbs
13	AWA N Removed	76		66	lbs/ac
14	AWA N Balance	59		69	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,183	lbs
17	Total N Runoff			8,056	lbs
18	Total Denitrification			7,444	lbs
19	Total Ammonia Volatilization			10,687	lbs
20	Total Change in Soil Organic N			29,112	lbs
21	Total Perennial Tissue N			80,207	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			7.8	lbs/ac
27	AWA Perennial Tissue N			21.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,006	acre-ft
31	Total Applied water			12,444	acre-ft
32	Total Evapotranspiration (ET)			12,842	acre-ft
33	Total Runoff			453	acre-ft
34	Total Percolation			2,150	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			40	inches
37	AWA Evapotranspiration (ET)			41.2	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			6.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M12S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	95			%
3	Reported Acreage	1,794			acres
4	Parcels	63			number
5	Reported Crops	12			number
6	Reported N Applied	275,636			lbs
7	Total N Applied	281,596		277,398	lbs
8	AWA N Applied	157		155	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			272,770	lbs
11	AWA N Uptake			153	lbs/ac
12	Total N Removed	70,600		74,279	lbs
13	AWA N Removed	39		41	lbs/ac
14	AWA N Balance	118		113	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			4,792	lbs
17	Total N Runoff			7,800	lbs
18	Total Denitrification			8,171	lbs
19	Total Ammonia Volatilization			4,607	lbs
20	Total Change in Soil Organic N			18,773	lbs
21	Total Perennial Tissue N			37,306	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			4.4	lbs/ac
24	AWA Denitrification			4.6	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			10.5	lbs/ac
27	AWA Perennial Tissue N			20.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			73	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,739	acre-ft
31	Total Applied water			5,974	acre-ft
32	Total Evapotranspiration (ET)			6,125	acre-ft
33	Total Runoff			303	acre-ft
34	Total Percolation			1,292	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			40.2	inches
37	AWA Evapotranspiration (ET)			41.2	inches
38	AWA Runoff			2	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M12S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	67			%
3	Reported Acreage	406			acres
4	Parcels	8			number
5	Reported Crops	5			number
6	Reported N Applied	61,169			lbs
7	Total N Applied	61,169		61,224	lbs
8	AWA N Applied	150		151	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			64,568	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	27,298		28,224	lbs
13	AWA N Removed	67		69	lbs/ac
14	AWA N Balance	83		81	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			1,094	lbs
17	Total N Runoff			646	lbs
18	Total Denitrification			446	lbs
19	Total Ammonia Volatilization			1,405	lbs
20	Total Change in Soil Organic N			3,771	lbs
21	Total Perennial Tissue N			9,090	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			9.3	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			46	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			396	acre-ft
31	Total Applied water			1,481	acre-ft
32	Total Evapotranspiration (ET)			1,445	acre-ft
33	Total Runoff			75	acre-ft
34	Total Percolation			359	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			43.7	inches
37	AWA Evapotranspiration (ET)			42.7	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			10.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M13S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC, WSC, WSJRWC			
2	Percent HVA	53			%
3	Reported Acreage	13,405			acres
4	Parcels	100			number
5	Reported Crops	16			number
6	Reported N Applied	1,856,464			lbs
7	Total N Applied	1,871,043		1,871,172	lbs
8	AWA N Applied	140		140	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,032,472	lbs
11	AWA N Uptake			168	lbs/ac
12	Total N Removed	1,157,277		1,137,095	lbs
13	AWA N Removed	86		85	lbs/ac
14	AWA N Balance	53		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,758	lbs
17	Total N Runoff			4,596	lbs
18	Total Denitrification			26,560	lbs
19	Total Ammonia Volatilization			43,912	lbs
20	Total Change in Soil Organic N			55,884	lbs
21	Total Perennial Tissue N			227,081	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			4.6	lbs/ac
27	AWA Perennial Tissue N			18.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,577	acre-ft
31	Total Applied water			35,595	acre-ft
32	Total Evapotranspiration (ET)			36,885	acre-ft
33	Total Runoff			916	acre-ft
34	Total Percolation			6,668	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			35.3	inches
37	AWA Evapotranspiration (ET)			36.6	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M13S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	GDAC, WSC			
2	Percent HVA	54			%
3	Reported Acreage	10,581			acres
4	Parcels	62			number
5	Reported Crops	11			number
6	Reported N Applied	1,632,237			lbs
7	Total N Applied	1,644,623		1,650,721	lbs
8	AWA N Applied	155		156	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,597,054	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	930,076		952,469	lbs
13	AWA N Removed	88		90	lbs/ac
14	AWA N Balance	68		66	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,249	lbs
17	Total N Runoff			5,663	lbs
18	Total Denitrification			31,622	lbs
19	Total Ammonia Volatilization			39,884	lbs
20	Total Change in Soil Organic N			46,881	lbs
21	Total Perennial Tissue N			69,810	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			3.8	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			6.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,712	acre-ft
31	Total Applied water			23,944	acre-ft
32	Total Evapotranspiration (ET)			26,835	acre-ft
33	Total Runoff			678	acre-ft
34	Total Percolation			4,166	acre-ft
35	AWA Precipitation			8.7	inches
36	AWA Applied water			27.2	inches
37	AWA Evapotranspiration (ET)			30.4	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			4.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			44	mg/L

AWA: Acre-Weighted Average

Township: M13S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, GDAC, WSC, WSJRWC			
2	Percent HVA	52			%
3	Reported Acreage	7,478			acres
4	Parcels	39			number
5	Reported Crops	12			number
6	Reported N Applied	858,947			lbs
7	Total N Applied	859,736		876,730	lbs
8	AWA N Applied	115		117	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			977,964	lbs
11	AWA N Uptake			136	lbs/ac
12	Total N Removed	611,405		600,248	lbs
13	AWA N Removed	82		80	lbs/ac
14	AWA N Balance	33		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,285	lbs
17	Total N Runoff			4,255	lbs
18	Total Denitrification			15,815	lbs
19	Total Ammonia Volatilization			21,081	lbs
20	Total Change in Soil Organic N			4,434	lbs
21	Total Perennial Tissue N			94,232	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			0.6	lbs/ac
27	AWA Perennial Tissue N			13.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			97	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,614	acre-ft
31	Total Applied water			18,670	acre-ft
32	Total Evapotranspiration (ET)			20,727	acre-ft
33	Total Runoff			423	acre-ft
34	Total Percolation			3,260	acre-ft
35	AWA Precipitation			9.4	inches
36	AWA Applied water			31.3	inches
37	AWA Evapotranspiration (ET)			34.7	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M13S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, GDAC, WSJRWC			
2	Percent HVA	38			%
3	Reported Acreage	11,748			acres
4	Parcels	55			number
5	Reported Crops	10			number
6	Reported N Applied	2,269,403			lbs
7	Total N Applied	2,283,766		2,283,191	lbs
8	AWA N Applied	194		194	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,413,362	lbs
11	AWA N Uptake			210	lbs/ac
12	Total N Removed	1,552,637		1,583,688	lbs
13	AWA N Removed	132		135	lbs/ac
14	AWA N Balance	62		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,619	lbs
17	Total N Runoff			15,087	lbs
18	Total Denitrification			31,975	lbs
19	Total Ammonia Volatilization			52,146	lbs
20	Total Change in Soil Organic N			47,811	lbs
21	Total Perennial Tissue N			235,667	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			4.5	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			20.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,646	acre-ft
31	Total Applied water			37,853	acre-ft
32	Total Evapotranspiration (ET)			38,474	acre-ft
33	Total Runoff			1,041	acre-ft
34	Total Percolation			6,958	acre-ft
35	AWA Precipitation			9	inches
36	AWA Applied water			39.5	inches
37	AWA Evapotranspiration (ET)			40.1	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M13S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	12			%
3	Reported Acreage	12,690			acres
4	Parcels	75			number
5	Reported Crops	13			number
6	Reported N Applied	1,552,305			lbs
7	Total N Applied	1,587,020		1,617,569	lbs
8	AWA N Applied	125		127	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,021,625	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	1,354,415		1,267,537	lbs
13	AWA N Removed	107		100	lbs/ac
14	AWA N Balance	18		28	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-9		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			28,180	lbs
17	Total N Runoff			15,728	lbs
18	Total Denitrification			19,570	lbs
19	Total Ammonia Volatilization			32,786	lbs
20	Total Change in Soil Organic N			51,072	lbs
21	Total Perennial Tissue N			238,827	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			19.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			75	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,298	acre-ft
31	Total Applied water			40,452	acre-ft
32	Total Evapotranspiration (ET)			38,705	acre-ft
33	Total Runoff			1,504	acre-ft
34	Total Percolation			10,492	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			38.9	inches
37	AWA Evapotranspiration (ET)			37.2	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			9.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M13S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	10			%
3	Reported Acreage	12,326			acres
4	Parcels	333			number
5	Reported Crops	13			number
6	Reported N Applied	1,168,114			lbs
7	Total N Applied	1,279,789		1,291,046	lbs
8	AWA N Applied	104		105	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,359,236	lbs
11	AWA N Uptake			111	lbs/ac
12	Total N Removed	644,773		616,978	lbs
13	AWA N Removed	52		50	lbs/ac
14	AWA N Balance	52		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,837	lbs
17	Total N Runoff			15,382	lbs
18	Total Denitrification			25,956	lbs
19	Total Ammonia Volatilization			27,320	lbs
20	Total Change in Soil Organic N			47,907	lbs
21	Total Perennial Tissue N			226,632	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			2.2	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			18.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,881	acre-ft
31	Total Applied water			37,836	acre-ft
32	Total Evapotranspiration (ET)			37,535	acre-ft
33	Total Runoff			1,354	acre-ft
34	Total Percolation			9,919	acre-ft
35	AWA Precipitation			10.7	inches
36	AWA Applied water			37.2	inches
37	AWA Evapotranspiration (ET)			36.9	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			9.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M13S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	ESJWQC, KRWQC			
2	Percent HVA	97			%
3	Reported Acreage	15,881			acres
4	Parcels	576			number
5	Reported Crops	18			number
6	Reported N Applied	1,606,586			lbs
7	Total N Applied	1,486,210		1,513,044	lbs
8	AWA N Applied	94		95	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,648,464	lbs
11	AWA N Uptake			105	lbs/ac
12	Total N Removed	793,501		760,858	lbs
13	AWA N Removed	50		48	lbs/ac
14	AWA N Balance	44		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			41,029	lbs
17	Total N Runoff			14,900	lbs
18	Total Denitrification			24,542	lbs
19	Total Ammonia Volatilization			29,020	lbs
20	Total Change in Soil Organic N			49,391	lbs
21	Total Perennial Tissue N			282,063	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			3.2	lbs/ac
27	AWA Perennial Tissue N			18	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,917	acre-ft
31	Total Applied water			47,708	acre-ft
32	Total Evapotranspiration (ET)			47,722	acre-ft
33	Total Runoff			1,831	acre-ft
34	Total Percolation			13,255	acre-ft
35	AWA Precipitation			11.4	inches
36	AWA Applied water			36.6	inches
37	AWA Evapotranspiration (ET)			36.6	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			10	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M13S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	3,849			acres
4	Parcels	143			number
5	Reported Crops	16			number
6	Reported N Applied	452,923			lbs
7	Total N Applied	469,940		479,152	lbs
8	AWA N Applied	122		124	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			511,700	lbs
11	AWA N Uptake			136	lbs/ac
12	Total N Removed	279,319		268,171	lbs
13	AWA N Removed	73		70	lbs/ac
14	AWA N Balance	50		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,108	lbs
17	Total N Runoff			14,155	lbs
18	Total Denitrification			4,642	lbs
19	Total Ammonia Volatilization			10,407	lbs
20	Total Change in Soil Organic N			18,026	lbs
21	Total Perennial Tissue N			63,098	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			3.8	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			4.8	lbs/ac
27	AWA Perennial Tissue N			16.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,662	acre-ft
31	Total Applied water			12,471	acre-ft
32	Total Evapotranspiration (ET)			12,392	acre-ft
33	Total Runoff			728	acre-ft
34	Total Percolation			3,071	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.9	inches
37	AWA Evapotranspiration (ET)			39.6	inches
38	AWA Runoff			2.3	inches
39	AWA Percolation			9.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M13S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	187			acres
4	Parcels	4			number
5	Reported Crops	6			number
6	Reported N Applied	12,942			lbs
7	Total N Applied	14,873		15,145	lbs
8	AWA N Applied	80		81	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			17,484	lbs
11	AWA N Uptake			94	lbs/ac
12	Total N Removed	7,681		7,469	lbs
13	AWA N Removed	41		40	lbs/ac
14	AWA N Balance	39		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			501	lbs
17	Total N Runoff			233	lbs
18	Total Denitrification			306	lbs
19	Total Ammonia Volatilization			259	lbs
20	Total Change in Soil Organic N			688	lbs
21	Total Perennial Tissue N			2,911	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			1.4	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			15.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			182	acre-ft
31	Total Applied water			571	acre-ft
32	Total Evapotranspiration (ET)			599	acre-ft
33	Total Runoff			29	acre-ft
34	Total Percolation			124	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			38.5	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M13S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	789			acres
4	Parcels	39			number
5	Reported Crops	20			number
6	Reported N Applied	108,152			lbs
7	Total N Applied	116,713		113,974	lbs
8	AWA N Applied	148		144	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			109,906	lbs
11	AWA N Uptake			143	lbs/ac
12	Total N Removed	49,538		48,576	lbs
13	AWA N Removed	63		62	lbs/ac
14	AWA N Balance	81		83	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,068	lbs
17	Total N Runoff			1,582	lbs
18	Total Denitrification			1,686	lbs
19	Total Ammonia Volatilization			2,806	lbs
20	Total Change in Soil Organic N			6,338	lbs
21	Total Perennial Tissue N			13,910	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			2.1	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			8.2	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			55	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			750	acre-ft
31	Total Applied water			2,509	acre-ft
32	Total Evapotranspiration (ET)			2,489	acre-ft
33	Total Runoff			102	acre-ft
34	Total Percolation			685	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.2	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			10.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M13S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	5,774			acres
4	Parcels	187			number
5	Reported Crops	32			number
6	Reported N Applied	674,452			lbs
7	Total N Applied	708,705		734,807	lbs
8	AWA N Applied	123		127	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			648,376	lbs
11	AWA N Uptake			113	lbs/ac
12	Total N Removed	318,316		308,192	lbs
13	AWA N Removed	55		53	lbs/ac
14	AWA N Balance	67		74	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,389	lbs
17	Total N Runoff			10,533	lbs
18	Total Denitrification			9,616	lbs
19	Total Ammonia Volatilization			16,705	lbs
20	Total Change in Soil Organic N			34,812	lbs
21	Total Perennial Tissue N			103,321	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.8	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			6.1	lbs/ac
27	AWA Perennial Tissue N			18	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			46	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,595	acre-ft
31	Total Applied water			18,826	acre-ft
32	Total Evapotranspiration (ET)			19,476	acre-ft
33	Total Runoff			934	acre-ft
34	Total Percolation			4,042	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.4	inches
37	AWA Evapotranspiration (ET)			40.7	inches
38	AWA Runoff			2	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M13S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	75			%
3	Reported Acreage	5,729			acres
4	Parcels	121			number
5	Reported Crops	10			number
6	Reported N Applied	645,143			lbs
7	Total N Applied	646,787		647,329	lbs
8	AWA N Applied	113		113	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			522,696	lbs
11	AWA N Uptake			91	lbs/ac
12	Total N Removed	251,700		235,545	lbs
13	AWA N Removed	44		41	lbs/ac
14	AWA N Balance	69		72	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,113	lbs
17	Total N Runoff			6,703	lbs
18	Total Denitrification			5,600	lbs
19	Total Ammonia Volatilization			14,265	lbs
20	Total Change in Soil Organic N			25,072	lbs
21	Total Perennial Tissue N			117,048	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			20.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,230	acre-ft
31	Total Applied water			19,463	acre-ft
32	Total Evapotranspiration (ET)			20,082	acre-ft
33	Total Runoff			789	acre-ft
34	Total Percolation			3,823	acre-ft
35	AWA Precipitation			11	inches
36	AWA Applied water			40.8	inches
37	AWA Evapotranspiration (ET)			42.1	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M13S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	33			%
3	Reported Acreage	1,315			acres
4	Parcels	29			number
5	Reported Crops	4			number
6	Reported N Applied	129,035			lbs
7	Total N Applied	130,311		130,399	lbs
8	AWA N Applied	99		99	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			117,778	lbs
11	AWA N Uptake			90	lbs/ac
12	Total N Removed	56,386		52,325	lbs
13	AWA N Removed	43		40	lbs/ac
14	AWA N Balance	56		59	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,240	lbs
17	Total N Runoff			1,291	lbs
18	Total Denitrification			1,169	lbs
19	Total Ammonia Volatilization			3,183	lbs
20	Total Change in Soil Organic N			5,109	lbs
21	Total Perennial Tissue N			26,554	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			20.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,203	acre-ft
31	Total Applied water			4,518	acre-ft
32	Total Evapotranspiration (ET)			4,701	acre-ft
33	Total Runoff			187	acre-ft
34	Total Percolation			836	acre-ft
35	AWA Precipitation			11	inches
36	AWA Applied water			41.2	inches
37	AWA Evapotranspiration (ET)			42.9	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M14N03E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	81			%
3	Reported Acreage	10,795			acres
4	Parcels	445			number
5	Reported Crops	16			number
6	Reported N Applied	1,161,000			lbs
7	Total N Applied	1,202,966		1,148,367	lbs
8	AWA N Applied	111		106	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			1,174,152	lbs
11	AWA N Uptake			116	lbs/ac
12	Total N Removed	449,258		444,978	lbs
13	AWA N Removed	42		41	lbs/ac
14	AWA N Balance	66		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,033	lbs
17	Total N Runoff			9,799	lbs
18	Total Denitrification			33,050	lbs
19	Total Ammonia Volatilization			31,956	lbs
20	Total Change in Soil Organic N			-37,268	lbs
21	Total Perennial Tissue N			209,983	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			-3.7	lbs/ac
27	AWA Perennial Tissue N			20.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			47	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,954	acre-ft
31	Total Applied water			31,005	acre-ft
32	Total Evapotranspiration (ET)			32,832	acre-ft
33	Total Runoff			2,532	acre-ft
34	Total Percolation			10,244	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			3	inches
39	AWA Percolation			11.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M14S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	41			%
3	Reported Acreage	9,139			acres
4	Parcels	98			number
5	Reported Crops	11			number
6	Reported N Applied	1,713,744			lbs
7	Total N Applied	1,730,943		1,750,849	lbs
8	AWA N Applied	189		192	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,738,144	lbs
11	AWA N Uptake			194	lbs/ac
12	Total N Removed	1,121,483		1,114,247	lbs
13	AWA N Removed	123		122	lbs/ac
14	AWA N Balance	67		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,656	lbs
17	Total N Runoff			5,231	lbs
18	Total Denitrification			27,662	lbs
19	Total Ammonia Volatilization			35,043	lbs
20	Total Change in Soil Organic N			44,939	lbs
21	Total Perennial Tissue N			139,981	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			15.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			61	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,374	acre-ft
31	Total Applied water			27,454	acre-ft
32	Total Evapotranspiration (ET)			27,565	acre-ft
33	Total Runoff			724	acre-ft
34	Total Percolation			5,536	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			36.9	inches
38	AWA Runoff			1	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: M14S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	69			%
3	Reported Acreage	20,875			acres
4	Parcels	174			number
5	Reported Crops	15			number
6	Reported N Applied	3,065,035			lbs
7	Total N Applied	3,166,796		3,264,401	lbs
8	AWA N Applied	152		156	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			3,350,125	lbs
11	AWA N Uptake			160	lbs/ac
12	Total N Removed	2,086,490		2,045,825	lbs
13	AWA N Removed	100		98	lbs/ac
14	AWA N Balance	52		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			42,092	lbs
17	Total N Runoff			13,612	lbs
18	Total Denitrification			62,681	lbs
19	Total Ammonia Volatilization			47,948	lbs
20	Total Change in Soil Organic N			113,344	lbs
21	Total Perennial Tissue N			189,213	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			5.4	lbs/ac
27	AWA Perennial Tissue N			9.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			38	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,345	acre-ft
31	Total Applied water			50,419	acre-ft
32	Total Evapotranspiration (ET)			55,554	acre-ft
33	Total Runoff			1,365	acre-ft
34	Total Percolation			8,870	acre-ft
35	AWA Precipitation			8.8	inches
36	AWA Applied water			29	inches
37	AWA Evapotranspiration (ET)			31.9	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			33	mg/L

AWA: Acre-Weighted Average

Township: M14S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	91			%
3	Reported Acreage	11,848			acres
4	Parcels	90			number
5	Reported Crops	12			number
6	Reported N Applied	1,390,923			lbs
7	Total N Applied	1,432,860		1,443,746	lbs
8	AWA N Applied	121		122	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,536,246	lbs
11	AWA N Uptake			130	lbs/ac
12	Total N Removed	719,374		708,014	lbs
13	AWA N Removed	61		60	lbs/ac
14	AWA N Balance	60		62	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,696	lbs
17	Total N Runoff			6,461	lbs
18	Total Denitrification			41,198	lbs
19	Total Ammonia Volatilization			28,375	lbs
20	Total Change in Soil Organic N			61,296	lbs
21	Total Perennial Tissue N			171,662	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			3.5	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			14.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,266	acre-ft
31	Total Applied water			29,600	acre-ft
32	Total Evapotranspiration (ET)			33,141	acre-ft
33	Total Runoff			689	acre-ft
34	Total Percolation			4,029	acre-ft
35	AWA Precipitation			8.4	inches
36	AWA Applied water			30	inches
37	AWA Evapotranspiration (ET)			33.6	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M14S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC, WSJRWC			
2	Percent HVA	44			%
3	Reported Acreage	2,450			acres
4	Parcels	24			number
5	Reported Crops	6			number
6	Reported N Applied	256,249			lbs
7	Total N Applied	261,116		259,445	lbs
8	AWA N Applied	107		106	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			222,238	lbs
11	AWA N Uptake			99	lbs/ac
12	Total N Removed	87,900		89,963	lbs
13	AWA N Removed	36		37	lbs/ac
14	AWA N Balance	71		69	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,802	lbs
17	Total N Runoff			693	lbs
18	Total Denitrification			11,451	lbs
19	Total Ammonia Volatilization			6,635	lbs
20	Total Change in Soil Organic N			2,886	lbs
21	Total Perennial Tissue N			40,860	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			5.1	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			1.3	lbs/ac
27	AWA Perennial Tissue N			18.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,369	acre-ft
31	Total Applied water			6,394	acre-ft
32	Total Evapotranspiration (ET)			7,227	acre-ft
33	Total Runoff			76	acre-ft
34	Total Percolation			460	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			34.2	inches
37	AWA Evapotranspiration (ET)			38.7	inches
38	AWA Runoff			0.4	inches
39	AWA Percolation			2.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			72	mg/L

AWA: Acre-Weighted Average

Township: M14S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	56			%
3	Reported Acreage	11,064			acres
4	Parcels	67			number
5	Reported Crops	9			number
6	Reported N Applied	2,350,379			lbs
7	Total N Applied	2,452,802		2,420,922	lbs
8	AWA N Applied	222		219	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			2,020,260	lbs
11	AWA N Uptake			183	lbs/ac
12	Total N Removed	971,144		1,015,100	lbs
13	AWA N Removed	88		92	lbs/ac
14	AWA N Balance	134		127	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			28,437	lbs
17	Total N Runoff			27,167	lbs
18	Total Denitrification			43,256	lbs
19	Total Ammonia Volatilization			60,832	lbs
20	Total Change in Soil Organic N			82,584	lbs
21	Total Perennial Tissue N			234,602	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.5	lbs/ac
24	AWA Denitrification			3.9	lbs/ac
25	AWA Ammonia Volatilization			5.5	lbs/ac
26	AWA Change in Soil Organic N			7.5	lbs/ac
27	AWA Perennial Tissue N			21.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			89	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,712	acre-ft
31	Total Applied water			37,694	acre-ft
32	Total Evapotranspiration (ET)			36,985	acre-ft
33	Total Runoff			1,730	acre-ft
34	Total Percolation			9,659	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			40.9	inches
37	AWA Evapotranspiration (ET)			40.1	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			10.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M14S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	25			%
3	Reported Acreage	8,857			acres
4	Parcels	157			number
5	Reported Crops	12			number
6	Reported N Applied	1,117,635			lbs
7	Total N Applied	1,127,836		1,181,120	lbs
8	AWA N Applied	127		133	lbs/ac
9	AWA N Applied Difference		-6		lbs/ac
10	Total N Uptake			1,260,403	lbs
11	AWA N Uptake			142	lbs/ac
12	Total N Removed	743,902		689,323	lbs
13	AWA N Removed	84		78	lbs/ac
14	AWA N Balance	43		56	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-12		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,832	lbs
17	Total N Runoff			13,719	lbs
18	Total Denitrification			11,750	lbs
19	Total Ammonia Volatilization			22,177	lbs
20	Total Change in Soil Organic N			46,482	lbs
21	Total Perennial Tissue N			164,144	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			18.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,637	acre-ft
31	Total Applied water			29,133	acre-ft
32	Total Evapotranspiration (ET)			28,748	acre-ft
33	Total Runoff			1,273	acre-ft
34	Total Percolation			7,732	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.5	inches
37	AWA Evapotranspiration (ET)			38.9	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			10.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M14S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	17,332			acres
4	Parcels	386			number
5	Reported Crops	18			number
6	Reported N Applied	2,322,609			lbs
7	Total N Applied	2,514,129		2,530,241	lbs
8	AWA N Applied	145		146	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,761,012	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	1,689,948		1,637,309	lbs
13	AWA N Removed	98		94	lbs/ac
14	AWA N Balance	48		52	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			46,438	lbs
17	Total N Runoff			24,598	lbs
18	Total Denitrification			30,026	lbs
19	Total Ammonia Volatilization			48,412	lbs
20	Total Change in Soil Organic N			92,391	lbs
21	Total Perennial Tissue N			311,453	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			5.3	lbs/ac
27	AWA Perennial Tissue N			18	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			16,902	acre-ft
31	Total Applied water			58,194	acre-ft
32	Total Evapotranspiration (ET)			56,682	acre-ft
33	Total Runoff			2,085	acre-ft
34	Total Percolation			16,328	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			40.3	inches
37	AWA Evapotranspiration (ET)			39.2	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			11.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M14S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	11,444			acres
4	Parcels	274			number
5	Reported Crops	41			number
6	Reported N Applied	1,505,348			lbs
7	Total N Applied	1,612,330		1,615,812	lbs
8	AWA N Applied	141		141	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,706,521	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	1,054,215		1,006,784	lbs
13	AWA N Removed	92		88	lbs/ac
14	AWA N Balance	48		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,463	lbs
17	Total N Runoff			17,040	lbs
18	Total Denitrification			22,234	lbs
19	Total Ammonia Volatilization			41,051	lbs
20	Total Change in Soil Organic N			56,226	lbs
21	Total Perennial Tissue N			190,564	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			16.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,052	acre-ft
31	Total Applied water			36,591	acre-ft
32	Total Evapotranspiration (ET)			35,996	acre-ft
33	Total Runoff			1,358	acre-ft
34	Total Percolation			10,390	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			38.7	inches
37	AWA Evapotranspiration (ET)			38.1	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			10.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M14S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	3,668			acres
4	Parcels	204			number
5	Reported Crops	20			number
6	Reported N Applied	448,855			lbs
7	Total N Applied	519,180		521,070	lbs
8	AWA N Applied	142		142	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			551,651	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	331,141		330,187	lbs
13	AWA N Removed	90		90	lbs/ac
14	AWA N Balance	48		52	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,170	lbs
17	Total N Runoff			5,895	lbs
18	Total Denitrification			8,075	lbs
19	Total Ammonia Volatilization			9,368	lbs
20	Total Change in Soil Organic N			18,530	lbs
21	Total Perennial Tissue N			58,522	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			5.4	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,323	acre-ft
31	Total Applied water			11,157	acre-ft
32	Total Evapotranspiration (ET)			10,860	acre-ft
33	Total Runoff			403	acre-ft
34	Total Percolation			3,463	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			38.2	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			11.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M14S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	8,517			acres
4	Parcels	301			number
5	Reported Crops	29			number
6	Reported N Applied	925,718			lbs
7	Total N Applied	973,016		961,463	lbs
8	AWA N Applied	114		113	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			821,422	lbs
11	AWA N Uptake			100	lbs/ac
12	Total N Removed	392,006		377,931	lbs
13	AWA N Removed	46		44	lbs/ac
14	AWA N Balance	67		69	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,005	lbs
17	Total N Runoff			35,052	lbs
18	Total Denitrification			10,519	lbs
19	Total Ammonia Volatilization			21,168	lbs
20	Total Change in Soil Organic N			43,246	lbs
21	Total Perennial Tissue N			149,500	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			4.3	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			5.3	lbs/ac
27	AWA Perennial Tissue N			18.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,003	acre-ft
31	Total Applied water			26,079	acre-ft
32	Total Evapotranspiration (ET)			27,278	acre-ft
33	Total Runoff			1,370	acre-ft
34	Total Percolation			5,638	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			2	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M14S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	10,973			acres
4	Parcels	448			number
5	Reported Crops	27			number
6	Reported N Applied	1,214,754			lbs
7	Total N Applied	1,281,876		1,268,678	lbs
8	AWA N Applied	117		116	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,151,591	lbs
11	AWA N Uptake			108	lbs/ac
12	Total N Removed	542,764		526,236	lbs
13	AWA N Removed	49		48	lbs/ac
14	AWA N Balance	66		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,504	lbs
17	Total N Runoff			27,679	lbs
18	Total Denitrification			19,377	lbs
19	Total Ammonia Volatilization			30,370	lbs
20	Total Change in Soil Organic N			54,918	lbs
21	Total Perennial Tissue N			206,150	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.6	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			5.1	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,037	acre-ft
31	Total Applied water			34,963	acre-ft
32	Total Evapotranspiration (ET)			36,373	acre-ft
33	Total Runoff			1,660	acre-ft
34	Total Percolation			7,154	acre-ft
35	AWA Precipitation			11.3	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			40.9	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M14S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	8,619			acres
4	Parcels	201			number
5	Reported Crops	23			number
6	Reported N Applied	721,594			lbs
7	Total N Applied	763,094		764,610	lbs
8	AWA N Applied	89		89	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			825,911	lbs
11	AWA N Uptake			96	lbs/ac
12	Total N Removed	403,278		365,380	lbs
13	AWA N Removed	47		42	lbs/ac
14	AWA N Balance	42		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,756	lbs
17	Total N Runoff			8,784	lbs
18	Total Denitrification			7,687	lbs
19	Total Ammonia Volatilization			21,998	lbs
20	Total Change in Soil Organic N			31,677	lbs
21	Total Perennial Tissue N			160,704	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			18.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			22	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,733	acre-ft
31	Total Applied water			27,687	acre-ft
32	Total Evapotranspiration (ET)			28,754	acre-ft
33	Total Runoff			1,113	acre-ft
34	Total Percolation			5,510	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			40.1	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			7.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M14S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	89			%
3	Reported Acreage	6,857			acres
4	Parcels	168			number
5	Reported Crops	16			number
6	Reported N Applied	638,154			lbs
7	Total N Applied	658,641		657,823	lbs
8	AWA N Applied	96		96	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			492,830	lbs
11	AWA N Uptake			74	lbs/ac
12	Total N Removed	196,884		188,455	lbs
13	AWA N Removed	29		27	lbs/ac
14	AWA N Balance	67		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,602	lbs
17	Total N Runoff			6,984	lbs
18	Total Denitrification			6,778	lbs
19	Total Ammonia Volatilization			12,789	lbs
20	Total Change in Soil Organic N			22,056	lbs
21	Total Perennial Tissue N			121,673	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			3.3	lbs/ac
27	AWA Perennial Tissue N			18.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			47	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,502	acre-ft
31	Total Applied water			21,907	acre-ft
32	Total Evapotranspiration (ET)			23,484	acre-ft
33	Total Runoff			981	acre-ft
34	Total Percolation			4,055	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			42.2	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			29	mg/L

AWA: Acre-Weighted Average

Township: M14S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	16			%
3	Reported Acreage	1,023			acres
4	Parcels	14			number
5	Reported Crops	3			number
6	Reported N Applied	96,494			lbs
7	Total N Applied	106,209		106,055	lbs
8	AWA N Applied	104		104	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			84,684	lbs
11	AWA N Uptake			83	lbs/ac
12	Total N Removed	41,638		39,906	lbs
13	AWA N Removed	41		39	lbs/ac
14	AWA N Balance	63		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,738	lbs
17	Total N Runoff			1,801	lbs
18	Total Denitrification			971	lbs
19	Total Ammonia Volatilization			1,824	lbs
20	Total Change in Soil Organic N			3,016	lbs
21	Total Perennial Tissue N			18,089	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.8	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			1.8	lbs/ac
26	AWA Change in Soil Organic N			2.9	lbs/ac
27	AWA Perennial Tissue N			17.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,008	acre-ft
31	Total Applied water			3,496	acre-ft
32	Total Evapotranspiration (ET)			3,720	acre-ft
33	Total Runoff			174	acre-ft
34	Total Percolation			610	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			41	inches
37	AWA Evapotranspiration (ET)			43.6	inches
38	AWA Runoff			2	inches
39	AWA Percolation			7.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: M15N01W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	53			%
3	Reported Acreage	7,934			acres
4	Parcels	124			number
5	Reported Crops	17			number
6	Reported N Applied	1,122,267			lbs
7	Total N Applied	1,153,212		1,133,539	lbs
8	AWA N Applied	145		143	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,470,162	lbs
11	AWA N Uptake			193	lbs/ac
12	Total N Removed	887,011		887,821	lbs
13	AWA N Removed	112		112	lbs/ac
14	AWA N Balance	30		31	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,019	lbs
17	Total N Runoff			9,554	lbs
18	Total Denitrification			16,430	lbs
19	Total Ammonia Volatilization			11,948	lbs
20	Total Change in Soil Organic N			-33,064	lbs
21	Total Perennial Tissue N			45,414	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			1.6	lbs/ac
26	AWA Change in Soil Organic N			-4.3	lbs/ac
27	AWA Perennial Tissue N			6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			50	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			163	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,494	acre-ft
31	Total Applied water			15,857	acre-ft
32	Total Evapotranspiration (ET)			18,720	acre-ft
33	Total Runoff			1,686	acre-ft
34	Total Percolation			6,073	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			25	inches
37	AWA Evapotranspiration (ET)			29.5	inches
38	AWA Runoff			2.7	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M15S12E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	54			%
3	Reported Acreage	4,077			acres
4	Parcels	28			number
5	Reported Crops	11			number
6	Reported N Applied	467,309			lbs
7	Total N Applied	469,377		491,997	lbs
8	AWA N Applied	115		121	lbs/ac
9	AWA N Applied Difference		-6		lbs/ac
10	Total N Uptake			470,200	lbs
11	AWA N Uptake			131	lbs/ac
12	Total N Removed	234,974		232,649	lbs
13	AWA N Removed	58		57	lbs/ac
14	AWA N Balance	57		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,549	lbs
17	Total N Runoff			3,794	lbs
18	Total Denitrification			10,237	lbs
19	Total Ammonia Volatilization			10,796	lbs
20	Total Change in Soil Organic N			18,242	lbs
21	Total Perennial Tissue N			68,764	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			5.1	lbs/ac
27	AWA Perennial Tissue N			19.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,767	acre-ft
31	Total Applied water			10,381	acre-ft
32	Total Evapotranspiration (ET)			11,096	acre-ft
33	Total Runoff			284	acre-ft
34	Total Percolation			1,764	acre-ft
35	AWA Precipitation			9.2	inches
36	AWA Applied water			34.6	inches
37	AWA Evapotranspiration (ET)			37	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			32	mg/L

AWA: Acre-Weighted Average

Township: M15S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	92			%
3	Reported Acreage	18,110			acres
4	Parcels	168			number
5	Reported Crops	13			number
6	Reported N Applied	3,722,104			lbs
7	Total N Applied	3,739,252		3,770,145	lbs
8	AWA N Applied	206		208	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			3,427,737	lbs
11	AWA N Uptake			189	lbs/ac
12	Total N Removed	2,174,899		2,117,075	lbs
13	AWA N Removed	120		117	lbs/ac
14	AWA N Balance	86		91	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,144	lbs
17	Total N Runoff			12,349	lbs
18	Total Denitrification			89,671	lbs
19	Total Ammonia Volatilization			97,910	lbs
20	Total Change in Soil Organic N			107,800	lbs
21	Total Perennial Tissue N			261,955	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			5	lbs/ac
25	AWA Ammonia Volatilization			5.4	lbs/ac
26	AWA Change in Soil Organic N			6	lbs/ac
27	AWA Perennial Tissue N			14.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			58	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,231	acre-ft
31	Total Applied water			50,344	acre-ft
32	Total Evapotranspiration (ET)			53,411	acre-ft
33	Total Runoff			890	acre-ft
34	Total Percolation			7,238	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			33.4	inches
37	AWA Evapotranspiration (ET)			35.4	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			53	mg/L

AWA: Acre-Weighted Average

Township: M15S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	96			%
3	Reported Acreage	8,474			acres
4	Parcels	109			number
5	Reported Crops	13			number
6	Reported N Applied	1,216,410			lbs
7	Total N Applied	1,247,947		1,211,805	lbs
8	AWA N Applied	147		143	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			1,213,761	lbs
11	AWA N Uptake			146	lbs/ac
12	Total N Removed	719,440		681,741	lbs
13	AWA N Removed	85		80	lbs/ac
14	AWA N Balance	62		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,107	lbs
17	Total N Runoff			2,862	lbs
18	Total Denitrification			31,492	lbs
19	Total Ammonia Volatilization			26,649	lbs
20	Total Change in Soil Organic N			32,457	lbs
21	Total Perennial Tissue N			123,943	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			3.8	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			14.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,080	acre-ft
31	Total Applied water			22,532	acre-ft
32	Total Evapotranspiration (ET)			24,792	acre-ft
33	Total Runoff			332	acre-ft
34	Total Percolation			2,523	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			32.5	inches
37	AWA Evapotranspiration (ET)			35.8	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			3.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			46	mg/L

AWA: Acre-Weighted Average

Township: M15S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	87			%
3	Reported Acreage	1,698			acres
4	Parcels	15			number
5	Reported Crops	6			number
6	Reported N Applied	222,386			lbs
7	Total N Applied	222,386		223,562	lbs
8	AWA N Applied	131		132	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			193,520	lbs
11	AWA N Uptake			138	lbs/ac
12	Total N Removed	97,207		104,528	lbs
13	AWA N Removed	57		62	lbs/ac
14	AWA N Balance	74		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,370	lbs
17	Total N Runoff			469	lbs
18	Total Denitrification			6,805	lbs
19	Total Ammonia Volatilization			7,449	lbs
20	Total Change in Soil Organic N			9,478	lbs
21	Total Perennial Tissue N			13,117	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			4.9	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			6.8	lbs/ac
27	AWA Perennial Tissue N			9.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			38	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			853	acre-ft
31	Total Applied water			2,879	acre-ft
32	Total Evapotranspiration (ET)			3,367	acre-ft
33	Total Runoff			46	acre-ft
34	Total Percolation			388	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			24.7	inches
37	AWA Evapotranspiration (ET)			28.9	inches
38	AWA Runoff			0.4	inches
39	AWA Percolation			2.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			62	mg/L

AWA: Acre-Weighted Average

Township: M15S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	35			%
3	Reported Acreage	9,212			acres
4	Parcels	116			number
5	Reported Crops	10			number
6	Reported N Applied	1,568,785			lbs
7	Total N Applied	1,599,952		1,606,105	lbs
8	AWA N Applied	174		174	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,465,975	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	778,299		780,530	lbs
13	AWA N Removed	84		85	lbs/ac
14	AWA N Balance	89		90	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,264	lbs
17	Total N Runoff			8,007	lbs
18	Total Denitrification			35,146	lbs
19	Total Ammonia Volatilization			47,752	lbs
20	Total Change in Soil Organic N			19,524	lbs
21	Total Perennial Tissue N			117,610	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			3.8	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			12.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			66	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			74	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,772	acre-ft
31	Total Applied water			27,049	acre-ft
32	Total Evapotranspiration (ET)			28,458	acre-ft
33	Total Runoff			1,020	acre-ft
34	Total Percolation			6,325	acre-ft
35	AWA Precipitation			11.4	inches
36	AWA Applied water			35.2	inches
37	AWA Evapotranspiration (ET)			37.1	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			36	mg/L

AWA: Acre-Weighted Average

Township: M15S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	42			%
3	Reported Acreage	11,428			acres
4	Parcels	76			number
5	Reported Crops	13			number
6	Reported N Applied	1,464,068			lbs
7	Total N Applied	1,637,325		1,635,289	lbs
8	AWA N Applied	143		143	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,686,525	lbs
11	AWA N Uptake			148	lbs/ac
12	Total N Removed	943,221		917,660	lbs
13	AWA N Removed	83		80	lbs/ac
14	AWA N Balance	61		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,717	lbs
17	Total N Runoff			26,035	lbs
18	Total Denitrification			23,884	lbs
19	Total Ammonia Volatilization			39,231	lbs
20	Total Change in Soil Organic N			65,689	lbs
21	Total Perennial Tissue N			182,724	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			5.7	lbs/ac
27	AWA Perennial Tissue N			16	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,146	acre-ft
31	Total Applied water			35,759	acre-ft
32	Total Evapotranspiration (ET)			35,241	acre-ft
33	Total Runoff			1,719	acre-ft
34	Total Percolation			9,924	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			37.5	inches
37	AWA Evapotranspiration (ET)			37	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			10.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M15S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	97			%
3	Reported Acreage	16,369			acres
4	Parcels	312			number
5	Reported Crops	15			number
6	Reported N Applied	1,952,094			lbs
7	Total N Applied	1,921,310		1,941,708	lbs
8	AWA N Applied	117		119	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,133,188	lbs
11	AWA N Uptake			130	lbs/ac
12	Total N Removed	978,433		983,063	lbs
13	AWA N Removed	60		60	lbs/ac
14	AWA N Balance	58		59	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			44,002	lbs
17	Total N Runoff			23,510	lbs
18	Total Denitrification			32,340	lbs
19	Total Ammonia Volatilization			34,986	lbs
20	Total Change in Soil Organic N			96,415	lbs
21	Total Perennial Tissue N			311,204	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			5.9	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,963	acre-ft
31	Total Applied water			52,849	acre-ft
32	Total Evapotranspiration (ET)			51,832	acre-ft
33	Total Runoff			2,162	acre-ft
34	Total Percolation			14,807	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			38.7	inches
37	AWA Evapotranspiration (ET)			38	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			10.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M15S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	14,140			acres
4	Parcels	558			number
5	Reported Crops	23			number
6	Reported N Applied	1,036,415			lbs
7	Total N Applied	1,161,952		1,176,779	lbs
8	AWA N Applied	82		83	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,239,851	lbs
11	AWA N Uptake			88	lbs/ac
12	Total N Removed	557,623		530,269	lbs
13	AWA N Removed	39		38	lbs/ac
14	AWA N Balance	42		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			37,571	lbs
17	Total N Runoff			19,489	lbs
18	Total Denitrification			22,574	lbs
19	Total Ammonia Volatilization			23,656	lbs
20	Total Change in Soil Organic N			43,229	lbs
21	Total Perennial Tissue N			237,962	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			1.7	lbs/ac
26	AWA Change in Soil Organic N			3.1	lbs/ac
27	AWA Perennial Tissue N			16.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,705	acre-ft
31	Total Applied water			41,167	acre-ft
32	Total Evapotranspiration (ET)			42,095	acre-ft
33	Total Runoff			2,231	acre-ft
34	Total Percolation			10,588	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			35.2	inches
37	AWA Evapotranspiration (ET)			35.9	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M15S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	13,037			acres
4	Parcels	490			number
5	Reported Crops	22			number
6	Reported N Applied	911,460			lbs
7	Total N Applied	1,049,877		1,049,748	lbs
8	AWA N Applied	81		81	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,075,608	lbs
11	AWA N Uptake			84	lbs/ac
12	Total N Removed	454,433		438,094	lbs
13	AWA N Removed	35		34	lbs/ac
14	AWA N Balance	45		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,008	lbs
17	Total N Runoff			17,669	lbs
18	Total Denitrification			24,044	lbs
19	Total Ammonia Volatilization			24,244	lbs
20	Total Change in Soil Organic N			38,217	lbs
21	Total Perennial Tissue N			220,603	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.4	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,286	acre-ft
31	Total Applied water			38,015	acre-ft
32	Total Evapotranspiration (ET)			39,550	acre-ft
33	Total Runoff			1,782	acre-ft
34	Total Percolation			8,068	acre-ft
35	AWA Precipitation			10.5	inches
36	AWA Applied water			35.5	inches
37	AWA Evapotranspiration (ET)			36.9	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M15S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	12,967			acres
4	Parcels	395			number
5	Reported Crops	28			number
6	Reported N Applied	978,703			lbs
7	Total N Applied	1,060,526		1,076,856	lbs
8	AWA N Applied	82		83	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,104,891	lbs
11	AWA N Uptake			87	lbs/ac
12	Total N Removed	464,443		441,320	lbs
13	AWA N Removed	36		34	lbs/ac
14	AWA N Balance	46		49	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,043	lbs
17	Total N Runoff			16,895	lbs
18	Total Denitrification			20,990	lbs
19	Total Ammonia Volatilization			51,578	lbs
20	Total Change in Soil Organic N			37,311	lbs
21	Total Perennial Tissue N			220,421	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			17.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,072	acre-ft
31	Total Applied water			39,823	acre-ft
32	Total Evapotranspiration (ET)			41,713	acre-ft
33	Total Runoff			1,244	acre-ft
34	Total Percolation			5,014	acre-ft
35	AWA Precipitation			7.7	inches
36	AWA Applied water			37.8	inches
37	AWA Evapotranspiration (ET)			39.6	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			4.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M15S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	12,564			acres
4	Parcels	438			number
5	Reported Crops	37			number
6	Reported N Applied	916,081			lbs
7	Total N Applied	1,020,741		1,016,263	lbs
8	AWA N Applied	81		81	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,126,001	lbs
11	AWA N Uptake			91	lbs/ac
12	Total N Removed	402,420		389,877	lbs
13	AWA N Removed	32		31	lbs/ac
14	AWA N Balance	49		50	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			28,213	lbs
17	Total N Runoff			18,271	lbs
18	Total Denitrification			15,447	lbs
19	Total Ammonia Volatilization			35,154	lbs
20	Total Change in Soil Organic N			48,964	lbs
21	Total Perennial Tissue N			227,976	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			18.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,465	acre-ft
31	Total Applied water			39,802	acre-ft
32	Total Evapotranspiration (ET)			41,912	acre-ft
33	Total Runoff			1,625	acre-ft
34	Total Percolation			6,732	acre-ft
35	AWA Precipitation			10.1	inches
36	AWA Applied water			38.4	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			6.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M15S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	13,603			acres
4	Parcels	443			number
5	Reported Crops	27			number
6	Reported N Applied	1,163,166			lbs
7	Total N Applied	1,208,494		1,208,791	lbs
8	AWA N Applied	89		89	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,021,948	lbs
11	AWA N Uptake			76	lbs/ac
12	Total N Removed	437,961		403,973	lbs
13	AWA N Removed	32		30	lbs/ac
14	AWA N Balance	57		59	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			36,204	lbs
17	Total N Runoff			13,633	lbs
18	Total Denitrification			13,246	lbs
19	Total Ammonia Volatilization			24,412	lbs
20	Total Change in Soil Organic N			57,929	lbs
21	Total Perennial Tissue N			240,501	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			1.8	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			17.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,320	acre-ft
31	Total Applied water			44,474	acre-ft
32	Total Evapotranspiration (ET)			47,946	acre-ft
33	Total Runoff			2,018	acre-ft
34	Total Percolation			7,863	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			39.5	inches
37	AWA Evapotranspiration (ET)			42.5	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			6.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M15S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	51			%
3	Reported Acreage	7,251			acres
4	Parcels	240			number
5	Reported Crops	12			number
6	Reported N Applied	728,296			lbs
7	Total N Applied	753,997		754,663	lbs
8	AWA N Applied	104		104	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			582,413	lbs
11	AWA N Uptake			81	lbs/ac
12	Total N Removed	277,818		259,118	lbs
13	AWA N Removed	38		36	lbs/ac
14	AWA N Balance	65		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,328	lbs
17	Total N Runoff			7,214	lbs
18	Total Denitrification			5,483	lbs
19	Total Ammonia Volatilization			11,993	lbs
20	Total Change in Soil Organic N			35,906	lbs
21	Total Perennial Tissue N			127,244	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			1.7	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			17.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,112	acre-ft
31	Total Applied water			24,700	acre-ft
32	Total Evapotranspiration (ET)			26,387	acre-ft
33	Total Runoff			1,012	acre-ft
34	Total Percolation			4,437	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			41	inches
37	AWA Evapotranspiration (ET)			43.8	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			27	mg/L

AWA: Acre-Weighted Average

Township: M16N03E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	73			%
3	Reported Acreage	11,689			acres
4	Parcels	351			number
5	Reported Crops	14			number
6	Reported N Applied	1,173,322			lbs
7	Total N Applied	1,241,668		1,199,631	lbs
8	AWA N Applied	106		103	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			1,184,501	lbs
11	AWA N Uptake			106	lbs/ac
12	Total N Removed	459,280		444,778	lbs
13	AWA N Removed	39		38	lbs/ac
14	AWA N Balance	67		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,978	lbs
17	Total N Runoff			11,180	lbs
18	Total Denitrification			28,093	lbs
19	Total Ammonia Volatilization			29,370	lbs
20	Total Change in Soil Organic N			-38,426	lbs
21	Total Perennial Tissue N			230,456	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			-3.4	lbs/ac
27	AWA Perennial Tissue N			20.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			47	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,403	acre-ft
31	Total Applied water			35,420	acre-ft
32	Total Evapotranspiration (ET)			36,170	acre-ft
33	Total Runoff			3,054	acre-ft
34	Total Percolation			12,054	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			38	inches
37	AWA Evapotranspiration (ET)			38.8	inches
38	AWA Runoff			3.3	inches
39	AWA Percolation			12.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M16S13E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	44			%
3	Reported Acreage	1,527			acres
4	Parcels	16			number
5	Reported Crops	3			number
6	Reported N Applied	372,130			lbs
7	Total N Applied	374,047		379,178	lbs
8	AWA N Applied	245		248	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			389,385	lbs
11	AWA N Uptake			255	lbs/ac
12	Total N Removed	276,958		258,588	lbs
13	AWA N Removed	181		169	lbs/ac
14	AWA N Balance	64		79	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-15		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,588	lbs
17	Total N Runoff			1,796	lbs
18	Total Denitrification			6,582	lbs
19	Total Ammonia Volatilization			10,577	lbs
20	Total Change in Soil Organic N			12,272	lbs
21	Total Perennial Tissue N			34,723	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			4.3	lbs/ac
25	AWA Ammonia Volatilization			6.9	lbs/ac
26	AWA Change in Soil Organic N			8	lbs/ac
27	AWA Perennial Tissue N			22.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			42	%
CV-SWAT Water Budget Results					
30	Total Precipitation			932	acre-ft
31	Total Applied water			5,289	acre-ft
32	Total Evapotranspiration (ET)			5,504	acre-ft
33	Total Runoff			82	acre-ft
34	Total Percolation			633	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			41.6	inches
37	AWA Evapotranspiration (ET)			43.3	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M16S14E

Row (R)	Category	INMP/NMP	CV-SWAT	Units
INMP/NMP Data and N Balance Results				
1	Coalitions	WSC		
2	Percent HVA	82		%
3	Reported Acreage	12,871		acres
4	Parcels	158		number
5	Reported Crops	8		number
6	Reported N Applied	2,535,391		lbs
7	Total N Applied	2,613,691	2,576,816	lbs
8	AWA N Applied	203	200	lbs/ac
9	AWA N Applied Difference	3		lbs/ac
10	Total N Uptake		2,548,843	lbs
11	AWA N Uptake		200	lbs/ac
12	Total N Removed	1,732,808	1,632,345	lbs
13	AWA N Removed	135	127	lbs/ac
14	AWA N Balance	68	74	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)	-6		lbs/ac
CV-SWAT Nitrogen Budget Results				
16	Total N in Rain		21,557	lbs
17	Total N Runoff		5,164	lbs
18	Total Denitrification		36,944	lbs
19	Total Ammonia Volatilization		92,130	lbs
20	Total Change in Soil Organic N		86,145	lbs
21	Total Perennial Tissue N		244,192	lbs
22	AWA N in Rain		1.7	lbs/ac
23	AWA N Runoff		0.4	lbs/ac
24	AWA Denitrification		2.9	lbs/ac
25	AWA Ammonia Volatilization		7.2	lbs/ac
26	AWA Change in Soil Organic N		6.8	lbs/ac
27	AWA Perennial Tissue N		19.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)		39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone		53	%
CV-SWAT Water Budget Results				
30	Total Precipitation		7,761	acre-ft
31	Total Applied water		41,316	acre-ft
32	Total Evapotranspiration (ET)		42,663	acre-ft
33	Total Runoff		553	acre-ft
34	Total Percolation		5,890	acre-ft
35	AWA Precipitation		7.3	inches
36	AWA Applied water		39	inches
37	AWA Evapotranspiration (ET)		40.3	inches
38	AWA Runoff		0.5	inches
39	AWA Percolation		5.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone		32	mg/L

AWA: Acre-Weighted Average

Township: M16S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	61			%
3	Reported Acreage	15,961			acres
4	Parcels	152			number
5	Reported Crops	13			number
6	Reported N Applied	2,855,050			lbs
7	Total N Applied	2,938,006		2,874,448	lbs
8	AWA N Applied	184		180	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			2,772,144	lbs
11	AWA N Uptake			176	lbs/ac
12	Total N Removed	1,877,042		1,760,057	lbs
13	AWA N Removed	118		110	lbs/ac
14	AWA N Balance	66		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,609	lbs
17	Total N Runoff			4,452	lbs
18	Total Denitrification			56,118	lbs
19	Total Ammonia Volatilization			78,104	lbs
20	Total Change in Soil Organic N			56,374	lbs
21	Total Perennial Tissue N			255,346	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			3.6	lbs/ac
25	AWA Ammonia Volatilization			5	lbs/ac
26	AWA Change in Soil Organic N			3.6	lbs/ac
27	AWA Perennial Tissue N			16.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,593	acre-ft
31	Total Applied water			45,881	acre-ft
32	Total Evapotranspiration (ET)			48,535	acre-ft
33	Total Runoff			675	acre-ft
34	Total Percolation			6,325	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			35	inches
37	AWA Evapotranspiration (ET)			37	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			39	mg/L

AWA: Acre-Weighted Average

Township: M16S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	76			%
3	Reported Acreage	11,454			acres
4	Parcels	53			number
5	Reported Crops	9			number
6	Reported N Applied	1,514,785			lbs
7	Total N Applied	1,601,905		1,607,170	lbs
8	AWA N Applied	140		140	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,638,169	lbs
11	AWA N Uptake			143	lbs/ac
12	Total N Removed	953,060		940,174	lbs
13	AWA N Removed	83		82	lbs/ac
14	AWA N Balance	57		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,168	lbs
17	Total N Runoff			3,814	lbs
18	Total Denitrification			46,649	lbs
19	Total Ammonia Volatilization			32,624	lbs
20	Total Change in Soil Organic N			47,014	lbs
21	Total Perennial Tissue N			94,035	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			4.1	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			8.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,148	acre-ft
31	Total Applied water			28,351	acre-ft
32	Total Evapotranspiration (ET)			31,802	acre-ft
33	Total Runoff			512	acre-ft
34	Total Percolation			3,168	acre-ft
35	AWA Precipitation			7.5	inches
36	AWA Applied water			29.7	inches
37	AWA Evapotranspiration (ET)			33.3	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			3.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			48	mg/L

AWA: Acre-Weighted Average

Township: M16S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	19			%
3	Reported Acreage	7,201			acres
4	Parcels	49			number
5	Reported Crops	15			number
6	Reported N Applied	1,155,037			lbs
7	Total N Applied	1,173,031		1,182,848	lbs
8	AWA N Applied	163		164	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,249,722	lbs
11	AWA N Uptake			174	lbs/ac
12	Total N Removed	704,799		708,568	lbs
13	AWA N Removed	98		98	lbs/ac
14	AWA N Balance	65		66	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,475	lbs
17	Total N Runoff			5,872	lbs
18	Total Denitrification			22,945	lbs
19	Total Ammonia Volatilization			37,255	lbs
20	Total Change in Soil Organic N			15,249	lbs
21	Total Perennial Tissue N			110,832	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			3.2	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			15.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			57	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			87	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,330	acre-ft
31	Total Applied water			20,659	acre-ft
32	Total Evapotranspiration (ET)			21,422	acre-ft
33	Total Runoff			790	acre-ft
34	Total Percolation			4,754	acre-ft
35	AWA Precipitation			10.5	inches
36	AWA Applied water			34.4	inches
37	AWA Evapotranspiration (ET)			35.7	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			32	mg/L

AWA: Acre-Weighted Average

Township: M16S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	58			%
3	Reported Acreage	17,119			acres
4	Parcels	290			number
5	Reported Crops	12			number
6	Reported N Applied	1,738,463			lbs
7	Total N Applied	1,838,487		1,853,758	lbs
8	AWA N Applied	107		108	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,066,120	lbs
11	AWA N Uptake			121	lbs/ac
12	Total N Removed	613,206		639,502	lbs
13	AWA N Removed	36		37	lbs/ac
14	AWA N Balance	72		71	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			45,989	lbs
17	Total N Runoff			27,456	lbs
18	Total Denitrification			30,026	lbs
19	Total Ammonia Volatilization			44,848	lbs
20	Total Change in Soil Organic N			129,440	lbs
21	Total Perennial Tissue N			341,808	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			2.6	lbs/ac
26	AWA Change in Soil Organic N			7.6	lbs/ac
27	AWA Perennial Tissue N			20	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			16,695	acre-ft
31	Total Applied water			54,430	acre-ft
32	Total Evapotranspiration (ET)			53,496	acre-ft
33	Total Runoff			2,519	acre-ft
34	Total Percolation			15,087	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			38.2	inches
37	AWA Evapotranspiration (ET)			37.5	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			10.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M16S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	17,858			acres
4	Parcels	389			number
5	Reported Crops	17			number
6	Reported N Applied	1,893,961			lbs
7	Total N Applied	2,093,340		2,082,627	lbs
8	AWA N Applied	117		117	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			2,227,164	lbs
11	AWA N Uptake			125	lbs/ac
12	Total N Removed	1,352,008		1,246,665	lbs
13	AWA N Removed	76		70	lbs/ac
14	AWA N Balance	42		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			42,395	lbs
17	Total N Runoff			22,413	lbs
18	Total Denitrification			26,701	lbs
19	Total Ammonia Volatilization			49,149	lbs
20	Total Change in Soil Organic N			69,205	lbs
21	Total Perennial Tissue N			310,220	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			17.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,410	acre-ft
31	Total Applied water			58,213	acre-ft
32	Total Evapotranspiration (ET)			56,643	acre-ft
33	Total Runoff			2,501	acre-ft
34	Total Percolation			14,537	acre-ft
35	AWA Precipitation			10.4	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			38.2	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M16S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	15,974			acres
4	Parcels	425			number
5	Reported Crops	27			number
6	Reported N Applied	1,769,407			lbs
7	Total N Applied	1,811,547		1,652,793	lbs
8	AWA N Applied	113		103	lbs/ac
9	AWA N Applied Difference		10		lbs/ac
10	Total N Uptake			1,671,215	lbs
11	AWA N Uptake			109	lbs/ac
12	Total N Removed	828,465		788,948	lbs
13	AWA N Removed	52		49	lbs/ac
14	AWA N Balance	52		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,132	lbs
17	Total N Runoff			23,226	lbs
18	Total Denitrification			42,000	lbs
19	Total Ammonia Volatilization			34,502	lbs
20	Total Change in Soil Organic N			66,519	lbs
21	Total Perennial Tissue N			271,954	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			17.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,878	acre-ft
31	Total Applied water			47,968	acre-ft
32	Total Evapotranspiration (ET)			48,324	acre-ft
33	Total Runoff			1,596	acre-ft
34	Total Percolation			8,225	acre-ft
35	AWA Precipitation			7.7	inches
36	AWA Applied water			37.6	inches
37	AWA Evapotranspiration (ET)			37.8	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			6.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M16S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	11,359			acres
4	Parcels	507			number
5	Reported Crops	29			number
6	Reported N Applied	868,026			lbs
7	Total N Applied	979,638		986,583	lbs
8	AWA N Applied	86		87	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,140,836	lbs
11	AWA N Uptake			102	lbs/ac
12	Total N Removed	531,217		514,351	lbs
13	AWA N Removed	47		45	lbs/ac
14	AWA N Balance	39		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,235	lbs
17	Total N Runoff			11,431	lbs
18	Total Denitrification			15,835	lbs
19	Total Ammonia Volatilization			37,268	lbs
20	Total Change in Soil Organic N			34,479	lbs
21	Total Perennial Tissue N			195,491	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			3.1	lbs/ac
27	AWA Perennial Tissue N			17.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			17	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			41	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,079	acre-ft
31	Total Applied water			36,016	acre-ft
32	Total Evapotranspiration (ET)			36,576	acre-ft
33	Total Runoff			1,061	acre-ft
34	Total Percolation			5,476	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			38.5	inches
37	AWA Evapotranspiration (ET)			39.1	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			5.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M16S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	15,336			acres
4	Parcels	725			number
5	Reported Crops	27			number
6	Reported N Applied	1,242,825			lbs
7	Total N Applied	1,330,679		1,325,837	lbs
8	AWA N Applied	87		86	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,459,901	lbs
11	AWA N Uptake			96	lbs/ac
12	Total N Removed	615,074		572,972	lbs
13	AWA N Removed	40		37	lbs/ac
14	AWA N Balance	46		49	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			38,725	lbs
17	Total N Runoff			18,916	lbs
18	Total Denitrification			15,220	lbs
19	Total Ammonia Volatilization			37,637	lbs
20	Total Change in Soil Organic N			64,021	lbs
21	Total Perennial Tissue N			264,712	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			17.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,283	acre-ft
31	Total Applied water			50,028	acre-ft
32	Total Evapotranspiration (ET)			52,946	acre-ft
33	Total Runoff			2,046	acre-ft
34	Total Percolation			9,289	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			41.6	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M16S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	13,039			acres
4	Parcels	478			number
5	Reported Crops	41			number
6	Reported N Applied	1,155,325			lbs
7	Total N Applied	1,206,541		1,198,465	lbs
8	AWA N Applied	93		92	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,077,382	lbs
11	AWA N Uptake			84	lbs/ac
12	Total N Removed	476,310		445,825	lbs
13	AWA N Removed	37		34	lbs/ac
14	AWA N Balance	55		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			34,105	lbs
17	Total N Runoff			30,493	lbs
18	Total Denitrification			12,681	lbs
19	Total Ammonia Volatilization			29,487	lbs
20	Total Change in Soil Organic N			36,850	lbs
21	Total Perennial Tissue N			218,119	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			2.4	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			2.9	lbs/ac
27	AWA Perennial Tissue N			17.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			61	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,556	acre-ft
31	Total Applied water			41,259	acre-ft
32	Total Evapotranspiration (ET)			44,496	acre-ft
33	Total Runoff			2,030	acre-ft
34	Total Percolation			7,396	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			38.8	inches
37	AWA Evapotranspiration (ET)			41.9	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			6.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M16S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, KRWQC			
2	Percent HVA	89			%
3	Reported Acreage	11,295			acres
4	Parcels	410			number
5	Reported Crops	23			number
6	Reported N Applied	1,084,633			lbs
7	Total N Applied	1,111,734		1,114,490	lbs
8	AWA N Applied	98		99	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			851,688	lbs
11	AWA N Uptake			79	lbs/ac
12	Total N Removed	415,961		394,213	lbs
13	AWA N Removed	37		35	lbs/ac
14	AWA N Balance	62		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			28,688	lbs
17	Total N Runoff			8,147	lbs
18	Total Denitrification			7,980	lbs
19	Total Ammonia Volatilization			19,479	lbs
20	Total Change in Soil Organic N			44,896	lbs
21	Total Perennial Tissue N			185,136	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			1.8	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			17.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,556	acre-ft
31	Total Applied water			35,756	acre-ft
32	Total Evapotranspiration (ET)			38,342	acre-ft
33	Total Runoff			1,470	acre-ft
34	Total Percolation			6,531	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			40	inches
37	AWA Evapotranspiration (ET)			42.9	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			6.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			27	mg/L

AWA: Acre-Weighted Average

Township: M17N03E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	53			%
3	Reported Acreage	8,965			acres
4	Parcels	229			number
5	Reported Crops	18			number
6	Reported N Applied	1,020,928			lbs
7	Total N Applied	1,120,607		1,078,085	lbs
8	AWA N Applied	125		120	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			982,793	lbs
11	AWA N Uptake			113	lbs/ac
12	Total N Removed	472,613		467,462	lbs
13	AWA N Removed	53		52	lbs/ac
14	AWA N Balance	72		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,261	lbs
17	Total N Runoff			8,320	lbs
18	Total Denitrification			18,629	lbs
19	Total Ammonia Volatilization			30,746	lbs
20	Total Change in Soil Organic N			-12,027	lbs
21	Total Perennial Tissue N			165,071	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			-1.4	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			71	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,940	acre-ft
31	Total Applied water			27,588	acre-ft
32	Total Evapotranspiration (ET)			27,798	acre-ft
33	Total Runoff			2,247	acre-ft
34	Total Percolation			9,777	acre-ft
35	AWA Precipitation			16.5	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			38.4	inches
38	AWA Runoff			3.1	inches
39	AWA Percolation			13.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M17S14E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	58			%
3	Reported Acreage	1,939			acres
4	Parcels	20			number
5	Reported Crops	4			number
6	Reported N Applied	333,344			lbs
7	Total N Applied	341,896		341,426	lbs
8	AWA N Applied	176		176	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			370,729	lbs
11	AWA N Uptake			191	lbs/ac
12	Total N Removed	271,189		231,167	lbs
13	AWA N Removed	140		119	lbs/ac
14	AWA N Balance	36		57	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-20		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,256	lbs
17	Total N Runoff			1,123	lbs
18	Total Denitrification			3,937	lbs
19	Total Ammonia Volatilization			9,808	lbs
20	Total Change in Soil Organic N			11,918	lbs
21	Total Perennial Tissue N			31,656	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			5.1	lbs/ac
26	AWA Change in Soil Organic N			6.1	lbs/ac
27	AWA Perennial Tissue N			16.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,177	acre-ft
31	Total Applied water			5,881	acre-ft
32	Total Evapotranspiration (ET)			6,111	acre-ft
33	Total Runoff			119	acre-ft
34	Total Percolation			824	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			36.4	inches
37	AWA Evapotranspiration (ET)			37.8	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M17S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	49			%
3	Reported Acreage	18,926			acres
4	Parcels	183			number
5	Reported Crops	18			number
6	Reported N Applied	3,382,127			lbs
7	Total N Applied	3,487,144		3,524,485	lbs
8	AWA N Applied	184		186	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			3,361,397	lbs
11	AWA N Uptake			178	lbs/ac
12	Total N Removed	2,068,494		2,000,249	lbs
13	AWA N Removed	109		106	lbs/ac
14	AWA N Balance	74		81	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,538	lbs
17	Total N Runoff			9,186	lbs
18	Total Denitrification			86,766	lbs
19	Total Ammonia Volatilization			79,454	lbs
20	Total Change in Soil Organic N			112,483	lbs
21	Total Perennial Tissue N			233,233	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			4.6	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			6	lbs/ac
27	AWA Perennial Tissue N			12.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			52	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,998	acre-ft
31	Total Applied water			51,685	acre-ft
32	Total Evapotranspiration (ET)			54,614	acre-ft
33	Total Runoff			937	acre-ft
34	Total Percolation			7,130	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			32.9	inches
37	AWA Evapotranspiration (ET)			34.8	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			4.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			51	mg/L

AWA: Acre-Weighted Average

Township: M17S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	76			%
3	Reported Acreage	10,922			acres
4	Parcels	51			number
5	Reported Crops	13			number
6	Reported N Applied	1,772,180			lbs
7	Total N Applied	1,849,733		1,772,285	lbs
8	AWA N Applied	169		162	lbs/ac
9	AWA N Applied Difference		7		lbs/ac
10	Total N Uptake			1,425,782	lbs
11	AWA N Uptake			131	lbs/ac
12	Total N Removed	858,695		863,346	lbs
13	AWA N Removed	79		79	lbs/ac
14	AWA N Balance	91		83	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,522	lbs
17	Total N Runoff			3,031	lbs
18	Total Denitrification			57,939	lbs
19	Total Ammonia Volatilization			32,096	lbs
20	Total Change in Soil Organic N			34,216	lbs
21	Total Perennial Tissue N			65,401	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			5.3	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			3.1	lbs/ac
27	AWA Perennial Tissue N			6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			61	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			74	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,260	acre-ft
31	Total Applied water			23,175	acre-ft
32	Total Evapotranspiration (ET)			26,053	acre-ft
33	Total Runoff			407	acre-ft
34	Total Percolation			2,953	acre-ft
35	AWA Precipitation			6.9	inches
36	AWA Applied water			25.5	inches
37	AWA Evapotranspiration (ET)			28.6	inches
38	AWA Runoff			0.4	inches
39	AWA Percolation			3.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			84	mg/L

AWA: Acre-Weighted Average

Township: M17S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	80			%
3	Reported Acreage	14,477			acres
4	Parcels	70			number
5	Reported Crops	14			number
6	Reported N Applied	1,898,501			lbs
7	Total N Applied	1,953,715		1,965,769	lbs
8	AWA N Applied	135		136	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,020,621	lbs
11	AWA N Uptake			140	lbs/ac
12	Total N Removed	1,162,999		1,100,558	lbs
13	AWA N Removed	80		76	lbs/ac
14	AWA N Balance	55		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,067	lbs
17	Total N Runoff			4,268	lbs
18	Total Denitrification			47,585	lbs
19	Total Ammonia Volatilization			43,441	lbs
20	Total Change in Soil Organic N			59,171	lbs
21	Total Perennial Tissue N			162,483	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			11.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			61	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,526	acre-ft
31	Total Applied water			36,253	acre-ft
32	Total Evapotranspiration (ET)			40,467	acre-ft
33	Total Runoff			721	acre-ft
34	Total Percolation			4,585	acre-ft
35	AWA Precipitation			7.9	inches
36	AWA Applied water			30.1	inches
37	AWA Evapotranspiration (ET)			33.5	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			3.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			42	mg/L

AWA: Acre-Weighted Average

Township: M17S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	16			%
3	Reported Acreage	11,068			acres
4	Parcels	75			number
5	Reported Crops	8			number
6	Reported N Applied	1,574,701			lbs
7	Total N Applied	1,589,051		1,604,657	lbs
8	AWA N Applied	144		145	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,667,213	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	950,008		902,762	lbs
13	AWA N Removed	86		82	lbs/ac
14	AWA N Balance	58		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,594	lbs
17	Total N Runoff			5,230	lbs
18	Total Denitrification			25,513	lbs
19	Total Ammonia Volatilization			31,575	lbs
20	Total Change in Soil Organic N			29,395	lbs
21	Total Perennial Tissue N			156,998	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.3	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			2.7	lbs/ac
27	AWA Perennial Tissue N			14.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			46	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,792	acre-ft
31	Total Applied water			31,275	acre-ft
32	Total Evapotranspiration (ET)			33,765	acre-ft
33	Total Runoff			995	acre-ft
34	Total Percolation			6,265	acre-ft
35	AWA Precipitation			10.6	inches
36	AWA Applied water			33.9	inches
37	AWA Evapotranspiration (ET)			36.6	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			6.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M17S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	42			%
3	Reported Acreage	7,578			acres
4	Parcels	95			number
5	Reported Crops	16			number
6	Reported N Applied	906,562			lbs
7	Total N Applied	993,870		1,017,315	lbs
8	AWA N Applied	131		134	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			1,027,847	lbs
11	AWA N Uptake			136	lbs/ac
12	Total N Removed	574,964		559,075	lbs
13	AWA N Removed	76		74	lbs/ac
14	AWA N Balance	55		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,058	lbs
17	Total N Runoff			5,870	lbs
18	Total Denitrification			18,325	lbs
19	Total Ammonia Volatilization			19,034	lbs
20	Total Change in Soil Organic N			9,845	lbs
21	Total Perennial Tissue N			118,341	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			1.3	lbs/ac
27	AWA Perennial Tissue N			15.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,806	acre-ft
31	Total Applied water			22,532	acre-ft
32	Total Evapotranspiration (ET)			23,537	acre-ft
33	Total Runoff			798	acre-ft
34	Total Percolation			4,986	acre-ft
35	AWA Precipitation			10.8	inches
36	AWA Applied water			35.7	inches
37	AWA Evapotranspiration (ET)			37.3	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M17S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	47			%
3	Reported Acreage	11,739			acres
4	Parcels	195			number
5	Reported Crops	17			number
6	Reported N Applied	1,483,447			lbs
7	Total N Applied	1,701,943		1,684,283	lbs
8	AWA N Applied	145		143	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,779,341	lbs
11	AWA N Uptake			153	lbs/ac
12	Total N Removed	1,107,189		1,047,512	lbs
13	AWA N Removed	94		89	lbs/ac
14	AWA N Balance	51		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,422	lbs
17	Total N Runoff			15,679	lbs
18	Total Denitrification			27,990	lbs
19	Total Ammonia Volatilization			39,800	lbs
20	Total Change in Soil Organic N			51,444	lbs
21	Total Perennial Tissue N			197,729	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			17	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			52	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,426	acre-ft
31	Total Applied water			38,432	acre-ft
32	Total Evapotranspiration (ET)			37,842	acre-ft
33	Total Runoff			1,147	acre-ft
34	Total Percolation			6,890	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39.5	inches
37	AWA Evapotranspiration (ET)			38.9	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M17S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	15,688			acres
4	Parcels	283			number
5	Reported Crops	30			number
6	Reported N Applied	1,938,081			lbs
7	Total N Applied	2,124,730		2,107,916	lbs
8	AWA N Applied	135		134	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			2,090,510	lbs
11	AWA N Uptake			134	lbs/ac
12	Total N Removed	1,268,659		1,203,285	lbs
13	AWA N Removed	81		77	lbs/ac
14	AWA N Balance	54		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,680	lbs
17	Total N Runoff			20,113	lbs
18	Total Denitrification			45,765	lbs
19	Total Ammonia Volatilization			61,479	lbs
20	Total Change in Soil Organic N			62,687	lbs
21	Total Perennial Tissue N			256,316	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			4	lbs/ac
27	AWA Perennial Tissue N			16.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,749	acre-ft
31	Total Applied water			51,860	acre-ft
32	Total Evapotranspiration (ET)			51,524	acre-ft
33	Total Runoff			1,471	acre-ft
34	Total Percolation			8,610	acre-ft
35	AWA Precipitation			7.5	inches
36	AWA Applied water			39.9	inches
37	AWA Evapotranspiration (ET)			39.7	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			6.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M17S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	15,954			acres
4	Parcels	409			number
5	Reported Crops	30			number
6	Reported N Applied	1,496,586			lbs
7	Total N Applied	1,641,711		1,668,991	lbs
8	AWA N Applied	103		105	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,826,245	lbs
11	AWA N Uptake			115	lbs/ac
12	Total N Removed	1,026,563		937,128	lbs
13	AWA N Removed	64		59	lbs/ac
14	AWA N Balance	39		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			34,896	lbs
17	Total N Runoff			20,154	lbs
18	Total Denitrification			26,818	lbs
19	Total Ammonia Volatilization			48,823	lbs
20	Total Change in Soil Organic N			52,057	lbs
21	Total Perennial Tissue N			257,046	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			3.3	lbs/ac
27	AWA Perennial Tissue N			16.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			22	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,040	acre-ft
31	Total Applied water			50,692	acre-ft
32	Total Evapotranspiration (ET)			50,946	acre-ft
33	Total Runoff			1,959	acre-ft
34	Total Percolation			10,772	acre-ft
35	AWA Precipitation			9.8	inches
36	AWA Applied water			38.2	inches
37	AWA Evapotranspiration (ET)			38.4	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M17S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	93			%
3	Reported Acreage	14,860			acres
4	Parcels	206			number
5	Reported Crops	18			number
6	Reported N Applied	1,178,772			lbs
7	Total N Applied	1,387,890		1,389,131	lbs
8	AWA N Applied	93		93	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,452,473	lbs
11	AWA N Uptake			98	lbs/ac
12	Total N Removed	741,527		683,515	lbs
13	AWA N Removed	50		46	lbs/ac
14	AWA N Balance	43		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			39,749	lbs
17	Total N Runoff			11,890	lbs
18	Total Denitrification			17,678	lbs
19	Total Ammonia Volatilization			43,493	lbs
20	Total Change in Soil Organic N			52,303	lbs
21	Total Perennial Tissue N			223,790	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			3.5	lbs/ac
27	AWA Perennial Tissue N			15.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,616	acre-ft
31	Total Applied water			46,850	acre-ft
32	Total Evapotranspiration (ET)			50,071	acre-ft
33	Total Runoff			2,067	acre-ft
34	Total Percolation			9,259	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			37.9	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M17S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, KRWQC			
2	Percent HVA	112			%
3	Reported Acreage	4,492			acres
4	Parcels	63			number
5	Reported Crops	19			number
6	Reported N Applied	507,365			lbs
7	Total N Applied	595,928		599,704	lbs
8	AWA N Applied	133		134	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			527,401	lbs
11	AWA N Uptake			117	lbs/ac
12	Total N Removed	321,730		308,458	lbs
13	AWA N Removed	72		69	lbs/ac
14	AWA N Balance	61		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,771	lbs
17	Total N Runoff			4,103	lbs
18	Total Denitrification			9,937	lbs
19	Total Ammonia Volatilization			13,441	lbs
20	Total Change in Soil Organic N			9,131	lbs
21	Total Perennial Tissue N			69,745	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			2	lbs/ac
27	AWA Perennial Tissue N			15.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			67	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,389	acre-ft
31	Total Applied water			13,990	acre-ft
32	Total Evapotranspiration (ET)			14,436	acre-ft
33	Total Runoff			592	acre-ft
34	Total Percolation			3,338	acre-ft
35	AWA Precipitation			11.7	inches
36	AWA Applied water			37.4	inches
37	AWA Evapotranspiration (ET)			38.6	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			8.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M17S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	12,004			acres
4	Parcels	300			number
5	Reported Crops	32			number
6	Reported N Applied	1,199,356			lbs
7	Total N Applied	1,287,135		1,298,152	lbs
8	AWA N Applied	107		108	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,144,256	lbs
11	AWA N Uptake			100	lbs/ac
12	Total N Removed	701,526		640,218	lbs
13	AWA N Removed	58		53	lbs/ac
14	AWA N Balance	49		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,662	lbs
17	Total N Runoff			23,094	lbs
18	Total Denitrification			11,900	lbs
19	Total Ammonia Volatilization			38,442	lbs
20	Total Change in Soil Organic N			44,708	lbs
21	Total Perennial Tissue N			188,967	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			16.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			38	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			69	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,306	acre-ft
31	Total Applied water			37,223	acre-ft
32	Total Evapotranspiration (ET)			39,828	acre-ft
33	Total Runoff			1,766	acre-ft
34	Total Percolation			6,993	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			38.9	inches
37	AWA Evapotranspiration (ET)			41.6	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M17S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	69			%
3	Reported Acreage	12,956			acres
4	Parcels	378			number
5	Reported Crops	16			number
6	Reported N Applied	1,241,107			lbs
7	Total N Applied	1,262,015		1,239,306	lbs
8	AWA N Applied	97		96	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			946,396	lbs
11	AWA N Uptake			81	lbs/ac
12	Total N Removed	469,807		439,201	lbs
13	AWA N Removed	36		34	lbs/ac
14	AWA N Balance	61		62	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,128	lbs
17	Total N Runoff			11,059	lbs
18	Total Denitrification			8,603	lbs
19	Total Ammonia Volatilization			26,020	lbs
20	Total Change in Soil Organic N			54,765	lbs
21	Total Perennial Tissue N			208,339	lbs
22	AWA N in Rain			2.7	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			2.2	lbs/ac
26	AWA Change in Soil Organic N			4.7	lbs/ac
27	AWA Perennial Tissue N			17.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,488	acre-ft
31	Total Applied water			39,894	acre-ft
32	Total Evapotranspiration (ET)			42,294	acre-ft
33	Total Runoff			1,636	acre-ft
34	Total Percolation			7,719	acre-ft
35	AWA Precipitation			11.8	inches
36	AWA Applied water			40.9	inches
37	AWA Evapotranspiration (ET)			43.3	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: M17S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	25			%
3	Reported Acreage	3,241			acres
4	Parcels	116			number
5	Reported Crops	14			number
6	Reported N Applied	173,615			lbs
7	Total N Applied	177,982		194,659	lbs
8	AWA N Applied	55		60	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			210,712	lbs
11	AWA N Uptake			68	lbs/ac
12	Total N Removed	60,078		57,120	lbs
13	AWA N Removed	19		18	lbs/ac
14	AWA N Balance	36		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,132	lbs
17	Total N Runoff			2,719	lbs
18	Total Denitrification			1,889	lbs
19	Total Ammonia Volatilization			16,294	lbs
20	Total Change in Soil Organic N			15,529	lbs
21	Total Perennial Tissue N			31,761	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			10.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,660	acre-ft
31	Total Applied water			7,551	acre-ft
32	Total Evapotranspiration (ET)			8,422	acre-ft
33	Total Runoff			382	acre-ft
34	Total Percolation			1,408	acre-ft
35	AWA Precipitation			10.2	inches
36	AWA Applied water			29	inches
37	AWA Evapotranspiration (ET)			32.4	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M18N01W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	56			%
3	Reported Acreage	7,850			acres
4	Parcels	129			number
5	Reported Crops	19			number
6	Reported N Applied	892,254			lbs
7	Total N Applied	930,893		924,186	lbs
8	AWA N Applied	119		118	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,223,569	lbs
11	AWA N Uptake			158	lbs/ac
12	Total N Removed	835,918		835,646	lbs
13	AWA N Removed	106		106	lbs/ac
14	AWA N Balance	11		11	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,586	lbs
17	Total N Runoff			6,762	lbs
18	Total Denitrification			6,683	lbs
19	Total Ammonia Volatilization			17,310	lbs
20	Total Change in Soil Organic N			-10,448	lbs
21	Total Perennial Tissue N			95,124	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			2.2	lbs/ac
26	AWA Change in Soil Organic N			-1.3	lbs/ac
27	AWA Perennial Tissue N			12.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			369	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,319	acre-ft
31	Total Applied water			21,161	acre-ft
32	Total Evapotranspiration (ET)			21,182	acre-ft
33	Total Runoff			2,970	acre-ft
34	Total Percolation			11,416	acre-ft
35	AWA Precipitation			22.2	inches
36	AWA Applied water			32.8	inches
37	AWA Evapotranspiration (ET)			32.8	inches
38	AWA Runoff			4.6	inches
39	AWA Percolation			17.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M18S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	60			%
3	Reported Acreage	8,286			acres
4	Parcels	53			number
5	Reported Crops	18			number
6	Reported N Applied	1,520,122			lbs
7	Total N Applied	1,527,192		1,517,048	lbs
8	AWA N Applied	184		183	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,332,853	lbs
11	AWA N Uptake			164	lbs/ac
12	Total N Removed	896,013		851,643	lbs
13	AWA N Removed	108		103	lbs/ac
14	AWA N Balance	74		80	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,324	lbs
17	Total N Runoff			4,712	lbs
18	Total Denitrification			32,615	lbs
19	Total Ammonia Volatilization			41,474	lbs
20	Total Change in Soil Organic N			36,043	lbs
21	Total Perennial Tissue N			114,544	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			4	lbs/ac
25	AWA Ammonia Volatilization			5.1	lbs/ac
26	AWA Change in Soil Organic N			4.4	lbs/ac
27	AWA Perennial Tissue N			14.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			53	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,652	acre-ft
31	Total Applied water			22,913	acre-ft
32	Total Evapotranspiration (ET)			23,843	acre-ft
33	Total Runoff			500	acre-ft
34	Total Percolation			3,273	acre-ft
35	AWA Precipitation			6.9	inches
36	AWA Applied water			33.8	inches
37	AWA Evapotranspiration (ET)			35.2	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			49	mg/L

AWA: Acre-Weighted Average

Township: M18S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	71			%
3	Reported Acreage	14,785			acres
4	Parcels	89			number
5	Reported Crops	17			number
6	Reported N Applied	2,536,013			lbs
7	Total N Applied	2,562,445		2,469,698	lbs
8	AWA N Applied	173		167	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			2,195,967	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	1,286,816		1,250,097	lbs
13	AWA N Removed	87		85	lbs/ac
14	AWA N Balance	83		82	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,964	lbs
17	Total N Runoff			5,321	lbs
18	Total Denitrification			94,291	lbs
19	Total Ammonia Volatilization			50,294	lbs
20	Total Change in Soil Organic N			75,776	lbs
21	Total Perennial Tissue N			136,118	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			6.5	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			9.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			55	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,312	acre-ft
31	Total Applied water			34,680	acre-ft
32	Total Evapotranspiration (ET)			38,350	acre-ft
33	Total Runoff			705	acre-ft
34	Total Percolation			3,988	acre-ft
35	AWA Precipitation			6.9	inches
36	AWA Applied water			28.7	inches
37	AWA Evapotranspiration (ET)			31.7	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			3.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			75	mg/L

AWA: Acre-Weighted Average

Township: M18S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	68			%
3	Reported Acreage	20,061			acres
4	Parcels	115			number
5	Reported Crops	23			number
6	Reported N Applied	2,948,226			lbs
7	Total N Applied	3,074,639		2,997,131	lbs
8	AWA N Applied	153		149	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			3,269,082	lbs
11	AWA N Uptake			164	lbs/ac
12	Total N Removed	2,223,079		2,124,999	lbs
13	AWA N Removed	111		106	lbs/ac
14	AWA N Balance	42		44	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,535	lbs
17	Total N Runoff			7,415	lbs
18	Total Denitrification			69,744	lbs
19	Total Ammonia Volatilization			46,661	lbs
20	Total Change in Soil Organic N			103,738	lbs
21	Total Perennial Tissue N			78,399	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			3.5	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			3.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			82	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,568	acre-ft
31	Total Applied water			42,953	acre-ft
32	Total Evapotranspiration (ET)			48,277	acre-ft
33	Total Runoff			858	acre-ft
34	Total Percolation			5,357	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			25.8	inches
37	AWA Evapotranspiration (ET)			29.1	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			3.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			49	mg/L

AWA: Acre-Weighted Average

Township: M18S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	89			%
3	Reported Acreage	18,149			acres
4	Parcels	127			number
5	Reported Crops	10			number
6	Reported N Applied	3,015,569			lbs
7	Total N Applied	3,026,742		3,015,406	lbs
8	AWA N Applied	167		166	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			3,009,732	lbs
11	AWA N Uptake			166	lbs/ac
12	Total N Removed	1,937,520		1,918,859	lbs
13	AWA N Removed	107		106	lbs/ac
14	AWA N Balance	60		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			34,257	lbs
17	Total N Runoff			7,744	lbs
18	Total Denitrification			85,141	lbs
19	Total Ammonia Volatilization			41,525	lbs
20	Total Change in Soil Organic N			86,318	lbs
21	Total Perennial Tissue N			63,043	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			4.7	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			4.8	lbs/ac
27	AWA Perennial Tissue N			3.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			54	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			89	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,107	acre-ft
31	Total Applied water			38,132	acre-ft
32	Total Evapotranspiration (ET)			44,120	acre-ft
33	Total Runoff			954	acre-ft
34	Total Percolation			6,121	acre-ft
35	AWA Precipitation			8.7	inches
36	AWA Applied water			25.2	inches
37	AWA Evapotranspiration (ET)			29.2	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			59	mg/L

AWA: Acre-Weighted Average

Township: M18S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	25			%
3	Reported Acreage	6,756			acres
4	Parcels	112			number
5	Reported Crops	16			number
6	Reported N Applied	881,842			lbs
7	Total N Applied	899,078		912,538	lbs
8	AWA N Applied	133		135	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			889,400	lbs
11	AWA N Uptake			132	lbs/ac
12	Total N Removed	520,937		507,128	lbs
13	AWA N Removed	77		75	lbs/ac
14	AWA N Balance	56		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,949	lbs
17	Total N Runoff			6,907	lbs
18	Total Denitrification			23,123	lbs
19	Total Ammonia Volatilization			19,677	lbs
20	Total Change in Soil Organic N			13,929	lbs
21	Total Perennial Tissue N			66,276	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			9.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,299	acre-ft
31	Total Applied water			17,744	acre-ft
32	Total Evapotranspiration (ET)			18,950	acre-ft
33	Total Runoff			471	acre-ft
34	Total Percolation			2,599	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			31.6	inches
37	AWA Evapotranspiration (ET)			33.7	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			4.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			40	mg/L

AWA: Acre-Weighted Average

Township: M18S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	41			%
3	Reported Acreage	11,885			acres
4	Parcels	301			number
5	Reported Crops	18			number
6	Reported N Applied	1,590,074			lbs
7	Total N Applied	1,789,824		1,800,876	lbs
8	AWA N Applied	151		152	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,729,742	lbs
11	AWA N Uptake			146	lbs/ac
12	Total N Removed	1,140,992		1,077,163	lbs
13	AWA N Removed	96		91	lbs/ac
14	AWA N Balance	55		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,090	lbs
17	Total N Runoff			20,652	lbs
18	Total Denitrification			38,635	lbs
19	Total Ammonia Volatilization			51,697	lbs
20	Total Change in Soil Organic N			42,234	lbs
21	Total Perennial Tissue N			161,658	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			4.3	lbs/ac
26	AWA Change in Soil Organic N			3.6	lbs/ac
27	AWA Perennial Tissue N			13.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,341	acre-ft
31	Total Applied water			36,335	acre-ft
32	Total Evapotranspiration (ET)			35,896	acre-ft
33	Total Runoff			1,094	acre-ft
34	Total Percolation			6,648	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			36.2	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			6.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M18S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	10,641			acres
4	Parcels	283			number
5	Reported Crops	29			number
6	Reported N Applied	1,386,594			lbs
7	Total N Applied	1,515,388		1,519,011	lbs
8	AWA N Applied	142		143	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,425,959	lbs
11	AWA N Uptake			135	lbs/ac
12	Total N Removed	877,141		830,912	lbs
13	AWA N Removed	82		78	lbs/ac
14	AWA N Balance	59		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,900	lbs
17	Total N Runoff			20,751	lbs
18	Total Denitrification			28,600	lbs
19	Total Ammonia Volatilization			66,077	lbs
20	Total Change in Soil Organic N			38,498	lbs
21	Total Perennial Tissue N			164,318	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			6.3	lbs/ac
26	AWA Change in Soil Organic N			3.6	lbs/ac
27	AWA Perennial Tissue N			15.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,392	acre-ft
31	Total Applied water			31,878	acre-ft
32	Total Evapotranspiration (ET)			31,312	acre-ft
33	Total Runoff			1,197	acre-ft
34	Total Percolation			6,747	acre-ft
35	AWA Precipitation			8.4	inches
36	AWA Applied water			36.2	inches
37	AWA Evapotranspiration (ET)			35.6	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			7.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M18S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	100			%
3	Reported Acreage	9,285			acres
4	Parcels	199			number
5	Reported Crops	22			number
6	Reported N Applied	1,835,375			lbs
7	Total N Applied	1,343,742		1,335,459	lbs
8	AWA N Applied	145		144	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,289,951	lbs
11	AWA N Uptake			139	lbs/ac
12	Total N Removed	820,155		768,348	lbs
13	AWA N Removed	88		83	lbs/ac
14	AWA N Balance	56		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,571	lbs
17	Total N Runoff			21,324	lbs
18	Total Denitrification			23,355	lbs
19	Total Ammonia Volatilization			30,003	lbs
20	Total Change in Soil Organic N			37,707	lbs
21	Total Perennial Tissue N			115,583	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			12.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,812	acre-ft
31	Total Applied water			26,975	acre-ft
32	Total Evapotranspiration (ET)			26,861	acre-ft
33	Total Runoff			1,417	acre-ft
34	Total Percolation			7,464	acre-ft
35	AWA Precipitation			11.4	inches
36	AWA Applied water			34.9	inches
37	AWA Evapotranspiration (ET)			34.7	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			9.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M18S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, KRWQC			
2	Percent HVA	91			%
3	Reported Acreage	4,180			acres
4	Parcels	63			number
5	Reported Crops	16			number
6	Reported N Applied	531,585			lbs
7	Total N Applied	564,996		560,260	lbs
8	AWA N Applied	135		134	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			556,844	lbs
11	AWA N Uptake			135	lbs/ac
12	Total N Removed	341,938		317,187	lbs
13	AWA N Removed	82		76	lbs/ac
14	AWA N Balance	53		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			10,470	lbs
17	Total N Runoff			3,846	lbs
18	Total Denitrification			11,997	lbs
19	Total Ammonia Volatilization			16,163	lbs
20	Total Change in Soil Organic N			13,448	lbs
21	Total Perennial Tissue N			63,536	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			3.3	lbs/ac
27	AWA Perennial Tissue N			15.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			45	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			78	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,986	acre-ft
31	Total Applied water			12,040	acre-ft
32	Total Evapotranspiration (ET)			12,651	acre-ft
33	Total Runoff			559	acre-ft
34	Total Percolation			2,823	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			35	inches
37	AWA Evapotranspiration (ET)			36.7	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: M18S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	86			%
3	Reported Acreage	8,324			acres
4	Parcels	80			number
5	Reported Crops	18			number
6	Reported N Applied	1,244,185			lbs
7	Total N Applied	1,260,911		1,282,109	lbs
8	AWA N Applied	151		154	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			1,375,364	lbs
11	AWA N Uptake			183	lbs/ac
12	Total N Removed	903,642		886,963	lbs
13	AWA N Removed	109		107	lbs/ac
14	AWA N Balance	43		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,242	lbs
17	Total N Runoff			9,321	lbs
18	Total Denitrification			17,319	lbs
19	Total Ammonia Volatilization			39,933	lbs
20	Total Change in Soil Organic N			6,575	lbs
21	Total Perennial Tissue N			111,766	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			2.3	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			0.9	lbs/ac
27	AWA Perennial Tissue N			14.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			77	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,244	acre-ft
31	Total Applied water			22,763	acre-ft
32	Total Evapotranspiration (ET)			21,782	acre-ft
33	Total Runoff			1,010	acre-ft
34	Total Percolation			7,183	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			36.4	inches
37	AWA Evapotranspiration (ET)			34.8	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			10.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M18S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	62			%
3	Reported Acreage	7,585			acres
4	Parcels	306			number
5	Reported Crops	27			number
6	Reported N Applied	969,406			lbs
7	Total N Applied	982,121		988,928	lbs
8	AWA N Applied	129		130	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			905,650	lbs
11	AWA N Uptake			123	lbs/ac
12	Total N Removed	506,727		487,253	lbs
13	AWA N Removed	67		64	lbs/ac
14	AWA N Balance	63		66	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,168	lbs
17	Total N Runoff			17,378	lbs
18	Total Denitrification			20,323	lbs
19	Total Ammonia Volatilization			22,123	lbs
20	Total Change in Soil Organic N			3,225	lbs
21	Total Perennial Tissue N			131,374	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.4	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			0.4	lbs/ac
27	AWA Perennial Tissue N			17.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			73	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,119	acre-ft
31	Total Applied water			25,290	acre-ft
32	Total Evapotranspiration (ET)			23,983	acre-ft
33	Total Runoff			1,235	acre-ft
34	Total Percolation			7,233	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			41.3	inches
37	AWA Evapotranspiration (ET)			39.2	inches
38	AWA Runoff			2	inches
39	AWA Percolation			11.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M18S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	60			%
3	Reported Acreage	12,683			acres
4	Parcels	498			number
5	Reported Crops	34			number
6	Reported N Applied	1,182,179			lbs
7	Total N Applied	1,221,901		1,187,045	lbs
8	AWA N Applied	96		94	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,072,092	lbs
11	AWA N Uptake			95	lbs/ac
12	Total N Removed	589,539		559,161	lbs
13	AWA N Removed	46		44	lbs/ac
14	AWA N Balance	46		50	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,346	lbs
17	Total N Runoff			38,971	lbs
18	Total Denitrification			16,513	lbs
19	Total Ammonia Volatilization			32,644	lbs
20	Total Change in Soil Organic N			24,061	lbs
21	Total Perennial Tissue N			191,721	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			3.4	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			16.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			73	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,933	acre-ft
31	Total Applied water			38,409	acre-ft
32	Total Evapotranspiration (ET)			37,624	acre-ft
33	Total Runoff			2,261	acre-ft
34	Total Percolation			10,305	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			40.7	inches
37	AWA Evapotranspiration (ET)			39.8	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			9.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			16	mg/L

AWA: Acre-Weighted Average

Township: M18S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	62			%
3	Reported Acreage	6,913			acres
4	Parcels	291			number
5	Reported Crops	18			number
6	Reported N Applied	681,932			lbs
7	Total N Applied	690,965		691,719	lbs
8	AWA N Applied	100		100	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			561,861	lbs
11	AWA N Uptake			85	lbs/ac
12	Total N Removed	278,208		258,491	lbs
13	AWA N Removed	40		37	lbs/ac
14	AWA N Balance	60		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,007	lbs
17	Total N Runoff			8,356	lbs
18	Total Denitrification			7,185	lbs
19	Total Ammonia Volatilization			12,648	lbs
20	Total Change in Soil Organic N			30,584	lbs
21	Total Perennial Tissue N			114,936	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			4.7	lbs/ac
27	AWA Perennial Tissue N			17.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,341	acre-ft
31	Total Applied water			21,885	acre-ft
32	Total Evapotranspiration (ET)			22,436	acre-ft
33	Total Runoff			952	acre-ft
34	Total Percolation			4,897	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			40	inches
37	AWA Evapotranspiration (ET)			41	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			8.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M19S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	50			%
3	Reported Acreage	15,047			acres
4	Parcels	136			number
5	Reported Crops	13			number
6	Reported N Applied	3,073,888			lbs
7	Total N Applied	3,162,671		3,139,627	lbs
8	AWA N Applied	210		209	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			3,173,181	lbs
11	AWA N Uptake			211	lbs/ac
12	Total N Removed	2,310,102		2,138,618	lbs
13	AWA N Removed	154		142	lbs/ac
14	AWA N Balance	57		67	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,805	lbs
17	Total N Runoff			16,259	lbs
18	Total Denitrification			64,864	lbs
19	Total Ammonia Volatilization			71,062	lbs
20	Total Change in Soil Organic N			86,176	lbs
21	Total Perennial Tissue N			251,578	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			4.3	lbs/ac
25	AWA Ammonia Volatilization			4.7	lbs/ac
26	AWA Change in Soil Organic N			5.7	lbs/ac
27	AWA Perennial Tissue N			16.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,617	acre-ft
31	Total Applied water			46,787	acre-ft
32	Total Evapotranspiration (ET)			49,684	acre-ft
33	Total Runoff			1,006	acre-ft
34	Total Percolation			4,693	acre-ft
35	AWA Precipitation			6.9	inches
36	AWA Applied water			37.3	inches
37	AWA Evapotranspiration (ET)			39.6	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			3.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			39	mg/L

AWA: Acre-Weighted Average

Township: M19S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	52			%
3	Reported Acreage	18,310			acres
4	Parcels	147			number
5	Reported Crops	18			number
6	Reported N Applied	3,069,338			lbs
7	Total N Applied	3,395,348		3,463,882	lbs
8	AWA N Applied	185		189	lbs/ac
9	AWA N Applied Difference		-4		lbs/ac
10	Total N Uptake			3,595,679	lbs
11	AWA N Uptake			197	lbs/ac
12	Total N Removed	2,488,879		2,413,853	lbs
13	AWA N Removed	136		132	lbs/ac
14	AWA N Balance	49		57	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,576	lbs
17	Total N Runoff			11,446	lbs
18	Total Denitrification			80,708	lbs
19	Total Ammonia Volatilization			55,898	lbs
20	Total Change in Soil Organic N			95,938	lbs
21	Total Perennial Tissue N			204,283	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			4.4	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			11.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,148	acre-ft
31	Total Applied water			48,450	acre-ft
32	Total Evapotranspiration (ET)			53,203	acre-ft
33	Total Runoff			1,139	acre-ft
34	Total Percolation			5,226	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			31.8	inches
37	AWA Evapotranspiration (ET)			34.9	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			3.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: M19S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	89			%
3	Reported Acreage	20,758			acres
4	Parcels	76			number
5	Reported Crops	12			number
6	Reported N Applied	4,267,219			lbs
7	Total N Applied	4,335,376		4,210,081	lbs
8	AWA N Applied	209		203	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			3,998,396	lbs
11	AWA N Uptake			193	lbs/ac
12	Total N Removed	2,264,881		2,431,754	lbs
13	AWA N Removed	109		117	lbs/ac
14	AWA N Balance	100		86	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		14		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			40,778	lbs
17	Total N Runoff			11,204	lbs
18	Total Denitrification			144,313	lbs
19	Total Ammonia Volatilization			50,287	lbs
20	Total Change in Soil Organic N			132,689	lbs
21	Total Perennial Tissue N			128,541	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			7	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			6.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			67	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			78	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,115	acre-ft
31	Total Applied water			47,424	acre-ft
32	Total Evapotranspiration (ET)			53,973	acre-ft
33	Total Runoff			1,493	acre-ft
34	Total Percolation			7,046	acre-ft
35	AWA Precipitation			8.7	inches
36	AWA Applied water			27.4	inches
37	AWA Evapotranspiration (ET)			31.2	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			4.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			72	mg/L

AWA: Acre-Weighted Average

Township: M19S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	77			%
3	Reported Acreage	9,609			acres
4	Parcels	150			number
5	Reported Crops	10			number
6	Reported N Applied	1,408,911			lbs
7	Total N Applied	1,466,338		1,468,031	lbs
8	AWA N Applied	153		153	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,297,262	lbs
11	AWA N Uptake			135	lbs/ac
12	Total N Removed	700,596		704,978	lbs
13	AWA N Removed	73		73	lbs/ac
14	AWA N Balance	80		79	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			17,651	lbs
17	Total N Runoff			3,972	lbs
18	Total Denitrification			64,595	lbs
19	Total Ammonia Volatilization			22,959	lbs
20	Total Change in Soil Organic N			5,739	lbs
21	Total Perennial Tissue N			90,215	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			6.7	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			0.6	lbs/ac
27	AWA Perennial Tissue N			9.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			61	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			77	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,806	acre-ft
31	Total Applied water			23,816	acre-ft
32	Total Evapotranspiration (ET)			27,271	acre-ft
33	Total Runoff			603	acre-ft
34	Total Percolation			2,723	acre-ft
35	AWA Precipitation			8.5	inches
36	AWA Applied water			29.7	inches
37	AWA Evapotranspiration (ET)			34.1	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			3.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			80	mg/L

AWA: Acre-Weighted Average

Township: M19S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	39			%
3	Reported Acreage	5,328			acres
4	Parcels	91			number
5	Reported Crops	15			number
6	Reported N Applied	697,242			lbs
7	Total N Applied	706,715		706,887	lbs
8	AWA N Applied	133		133	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			692,414	lbs
11	AWA N Uptake			130	lbs/ac
12	Total N Removed	366,827		363,767	lbs
13	AWA N Removed	69		68	lbs/ac
14	AWA N Balance	64		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,910	lbs
17	Total N Runoff			8,335	lbs
18	Total Denitrification			20,200	lbs
19	Total Ammonia Volatilization			23,601	lbs
20	Total Change in Soil Organic N			17,849	lbs
21	Total Perennial Tissue N			75,148	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			3.8	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			3.4	lbs/ac
27	AWA Perennial Tissue N			14.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			55	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,515	acre-ft
31	Total Applied water			13,883	acre-ft
32	Total Evapotranspiration (ET)			14,616	acre-ft
33	Total Runoff			465	acre-ft
34	Total Percolation			2,295	acre-ft
35	AWA Precipitation			7.9	inches
36	AWA Applied water			31.4	inches
37	AWA Evapotranspiration (ET)			33.1	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M19S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	53			%
3	Reported Acreage	9,617			acres
4	Parcels	177			number
5	Reported Crops	18			number
6	Reported N Applied	1,400,997			lbs
7	Total N Applied	1,450,698		1,440,443	lbs
8	AWA N Applied	151		150	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,358,510	lbs
11	AWA N Uptake			145	lbs/ac
12	Total N Removed	1,078,422		938,077	lbs
13	AWA N Removed	112		98	lbs/ac
14	AWA N Balance	39		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-16		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,777	lbs
17	Total N Runoff			20,118	lbs
18	Total Denitrification			24,964	lbs
19	Total Ammonia Volatilization			38,243	lbs
20	Total Change in Soil Organic N			28,105	lbs
21	Total Perennial Tissue N			94,565	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			10.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,694	acre-ft
31	Total Applied water			25,513	acre-ft
32	Total Evapotranspiration (ET)			25,405	acre-ft
33	Total Runoff			1,218	acre-ft
34	Total Percolation			6,725	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			32.7	inches
37	AWA Evapotranspiration (ET)			32.6	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M19S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	105			%
3	Reported Acreage	7,544			acres
4	Parcels	103			number
5	Reported Crops	14			number
6	Reported N Applied	1,013,515			lbs
7	Total N Applied	1,060,351		1,073,679	lbs
8	AWA N Applied	141		142	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,038,575	lbs
11	AWA N Uptake			138	lbs/ac
12	Total N Removed	735,773		666,994	lbs
13	AWA N Removed	98		88	lbs/ac
14	AWA N Balance	43		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,863	lbs
17	Total N Runoff			14,702	lbs
18	Total Denitrification			16,714	lbs
19	Total Ammonia Volatilization			26,461	lbs
20	Total Change in Soil Organic N			22,972	lbs
21	Total Perennial Tissue N			86,046	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			3.5	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			11.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,276	acre-ft
31	Total Applied water			20,428	acre-ft
32	Total Evapotranspiration (ET)			20,871	acre-ft
33	Total Runoff			1,154	acre-ft
34	Total Percolation			5,637	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			32.5	inches
37	AWA Evapotranspiration (ET)			33.2	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M19S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, KRWQC			
2	Percent HVA	96			%
3	Reported Acreage	7,480			acres
4	Parcels	97			number
5	Reported Crops	14			number
6	Reported N Applied	883,194			lbs
7	Total N Applied	1,032,610		1,047,457	lbs
8	AWA N Applied	138		140	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,267,735	lbs
11	AWA N Uptake			170	lbs/ac
12	Total N Removed	985,662		901,510	lbs
13	AWA N Removed	132		121	lbs/ac
14	AWA N Balance	6		20	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-13		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,367	lbs
17	Total N Runoff			7,345	lbs
18	Total Denitrification			9,435	lbs
19	Total Ammonia Volatilization			31,202	lbs
20	Total Change in Soil Organic N			-16,521	lbs
21	Total Perennial Tissue N			86,099	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			-2.2	lbs/ac
27	AWA Perennial Tissue N			11.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			149	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,216	acre-ft
31	Total Applied water			21,369	acre-ft
32	Total Evapotranspiration (ET)			21,869	acre-ft
33	Total Runoff			964	acre-ft
34	Total Percolation			5,700	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			34.3	inches
37	AWA Evapotranspiration (ET)			35.1	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M19S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	80			%
3	Reported Acreage	7,398			acres
4	Parcels	190			number
5	Reported Crops	26			number
6	Reported N Applied	965,967			lbs
7	Total N Applied	1,058,420		1,048,457	lbs
8	AWA N Applied	143		142	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,121,298	lbs
11	AWA N Uptake			157	lbs/ac
12	Total N Removed	838,950		788,384	lbs
13	AWA N Removed	113		107	lbs/ac
14	AWA N Balance	30		35	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,483	lbs
17	Total N Runoff			10,451	lbs
18	Total Denitrification			15,587	lbs
19	Total Ammonia Volatilization			34,925	lbs
20	Total Change in Soil Organic N			16,867	lbs
21	Total Perennial Tissue N			88,050	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			4.9	lbs/ac
26	AWA Change in Soil Organic N			2.4	lbs/ac
27	AWA Perennial Tissue N			12.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			117	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,877	acre-ft
31	Total Applied water			22,441	acre-ft
32	Total Evapotranspiration (ET)			21,082	acre-ft
33	Total Runoff			1,012	acre-ft
34	Total Percolation			7,331	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			37.8	inches
37	AWA Evapotranspiration (ET)			35.5	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			11.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M19S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	60			%
3	Reported Acreage	12,162			acres
4	Parcels	312			number
5	Reported Crops	26			number
6	Reported N Applied	1,409,014			lbs
7	Total N Applied	1,470,336		1,492,597	lbs
8	AWA N Applied	121		123	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,403,684	lbs
11	AWA N Uptake			119	lbs/ac
12	Total N Removed	823,993		790,187	lbs
13	AWA N Removed	68		65	lbs/ac
14	AWA N Balance	53		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,548	lbs
17	Total N Runoff			19,270	lbs
18	Total Denitrification			33,245	lbs
19	Total Ammonia Volatilization			49,734	lbs
20	Total Change in Soil Organic N			26,218	lbs
21	Total Perennial Tissue N			196,885	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			2.2	lbs/ac
27	AWA Perennial Tissue N			16.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,378	acre-ft
31	Total Applied water			38,608	acre-ft
32	Total Evapotranspiration (ET)			35,288	acre-ft
33	Total Runoff			1,981	acre-ft
34	Total Percolation			12,876	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			35.9	inches
38	AWA Runoff			2	inches
39	AWA Percolation			12.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M19S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	87			%
3	Reported Acreage	12,305			acres
4	Parcels	496			number
5	Reported Crops	26			number
6	Reported N Applied	1,045,975			lbs
7	Total N Applied	1,109,298		1,111,734	lbs
8	AWA N Applied	90		90	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,017,997	lbs
11	AWA N Uptake			86	lbs/ac
12	Total N Removed	476,081		458,053	lbs
13	AWA N Removed	39		37	lbs/ac
14	AWA N Balance	50		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,497	lbs
17	Total N Runoff			28,899	lbs
18	Total Denitrification			13,354	lbs
19	Total Ammonia Volatilization			24,074	lbs
20	Total Change in Soil Organic N			8,886	lbs
21	Total Perennial Tissue N			210,473	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.5	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			0.8	lbs/ac
27	AWA Perennial Tissue N			17.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,360	acre-ft
31	Total Applied water			38,210	acre-ft
32	Total Evapotranspiration (ET)			39,071	acre-ft
33	Total Runoff			2,055	acre-ft
34	Total Percolation			8,634	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			38.9	inches
37	AWA Evapotranspiration (ET)			39.8	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M19S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	37			%
3	Reported Acreage	2,257			acres
4	Parcels	111			number
5	Reported Crops	13			number
6	Reported N Applied	187,988			lbs
7	Total N Applied	189,721		191,814	lbs
8	AWA N Applied	84		85	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			152,969	lbs
11	AWA N Uptake			72	lbs/ac
12	Total N Removed	50,476		50,353	lbs
13	AWA N Removed	22		22	lbs/ac
14	AWA N Balance	61		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,507	lbs
17	Total N Runoff			1,474	lbs
18	Total Denitrification			1,174	lbs
19	Total Ammonia Volatilization			2,943	lbs
20	Total Change in Soil Organic N			4,898	lbs
21	Total Perennial Tissue N			39,252	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			1.4	lbs/ac
26	AWA Change in Soil Organic N			2.3	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			69	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,052	acre-ft
31	Total Applied water			6,925	acre-ft
32	Total Evapotranspiration (ET)			7,144	acre-ft
33	Total Runoff			296	acre-ft
34	Total Percolation			1,540	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			39.1	inches
37	AWA Evapotranspiration (ET)			40.3	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M20N03W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	60			%
3	Reported Acreage	10,536			acres
4	Parcels	107			number
5	Reported Crops	20			number
6	Reported N Applied	1,002,419			lbs
7	Total N Applied	1,130,130		1,152,201	lbs
8	AWA N Applied	107		109	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,669,343	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	1,186,574		1,168,968	lbs
13	AWA N Removed	113		111	lbs/ac
14	AWA N Balance	-5		-2	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,198	lbs
17	Total N Runoff			7,193	lbs
18	Total Denitrification			7,571	lbs
19	Total Ammonia Volatilization			40,468	lbs
20	Total Change in Soil Organic N			4,580	lbs
21	Total Perennial Tissue N			128,202	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			0.4	lbs/ac
27	AWA Perennial Tissue N			12.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-1,897	%
CV-SWAT Water Budget Results					
30	Total Precipitation			17,739	acre-ft
31	Total Applied water			26,867	acre-ft
32	Total Evapotranspiration (ET)			29,052	acre-ft
33	Total Runoff			3,778	acre-ft
34	Total Percolation			11,729	acre-ft
35	AWA Precipitation			20.3	inches
36	AWA Applied water			30.7	inches
37	AWA Evapotranspiration (ET)			33.2	inches
38	AWA Runoff			4.3	inches
39	AWA Percolation			13.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M20S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	76			%
3	Reported Acreage	4,683			acres
4	Parcels	41			number
5	Reported Crops	5			number
6	Reported N Applied	588,859			lbs
7	Total N Applied	588,859		643,959	lbs
8	AWA N Applied	126		138	lbs/ac
9	AWA N Applied Difference		-12		lbs/ac
10	Total N Uptake			584,681	lbs
11	AWA N Uptake			125	lbs/ac
12	Total N Removed	265,062		267,646	lbs
13	AWA N Removed	57		57	lbs/ac
14	AWA N Balance	69		80	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,518	lbs
17	Total N Runoff			2,334	lbs
18	Total Denitrification			25,578	lbs
19	Total Ammonia Volatilization			15,910	lbs
20	Total Change in Soil Organic N			24,368	lbs
21	Total Perennial Tissue N			60,156	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			5.5	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			12.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			53	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,735	acre-ft
31	Total Applied water			11,713	acre-ft
32	Total Evapotranspiration (ET)			13,104	acre-ft
33	Total Runoff			192	acre-ft
34	Total Percolation			1,132	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			30	inches
37	AWA Evapotranspiration (ET)			33.6	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			2.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			80	mg/L

AWA: Acre-Weighted Average

Township: M20S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	84			%
3	Reported Acreage	9,559			acres
4	Parcels	79			number
5	Reported Crops	12			number
6	Reported N Applied	1,699,584			lbs
7	Total N Applied	1,762,930		1,765,427	lbs
8	AWA N Applied	184		185	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,720,709	lbs
11	AWA N Uptake			184	lbs/ac
12	Total N Removed	1,109,701		1,037,187	lbs
13	AWA N Removed	116		109	lbs/ac
14	AWA N Balance	68		76	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,416	lbs
17	Total N Runoff			10,006	lbs
18	Total Denitrification			47,828	lbs
19	Total Ammonia Volatilization			39,847	lbs
20	Total Change in Soil Organic N			56,077	lbs
21	Total Perennial Tissue N			161,652	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			5.1	lbs/ac
25	AWA Ammonia Volatilization			4.3	lbs/ac
26	AWA Change in Soil Organic N			6	lbs/ac
27	AWA Perennial Tissue N			17.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,395	acre-ft
31	Total Applied water			28,593	acre-ft
32	Total Evapotranspiration (ET)			30,437	acre-ft
33	Total Runoff			581	acre-ft
34	Total Percolation			3,017	acre-ft
35	AWA Precipitation			6.9	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			39.1	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			3.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			48	mg/L

AWA: Acre-Weighted Average

Township: M20S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	51			%
3	Reported Acreage	17,941			acres
4	Parcels	144			number
5	Reported Crops	17			number
6	Reported N Applied	2,277,083			lbs
7	Total N Applied	2,449,110		2,466,806	lbs
8	AWA N Applied	137		137	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,715,992	lbs
11	AWA N Uptake			155	lbs/ac
12	Total N Removed	1,841,034		1,718,690	lbs
13	AWA N Removed	103		96	lbs/ac
14	AWA N Balance	34		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,765	lbs
17	Total N Runoff			8,010	lbs
18	Total Denitrification			43,787	lbs
19	Total Ammonia Volatilization			55,191	lbs
20	Total Change in Soil Organic N			75,323	lbs
21	Total Perennial Tissue N			165,354	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			9.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			69	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,870	acre-ft
31	Total Applied water			42,249	acre-ft
32	Total Evapotranspiration (ET)			46,309	acre-ft
33	Total Runoff			1,071	acre-ft
34	Total Percolation			5,786	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			28.9	inches
37	AWA Evapotranspiration (ET)			31.7	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			3.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			33	mg/L

AWA: Acre-Weighted Average

Township: M20S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	66			%
3	Reported Acreage	19,209			acres
4	Parcels	115			number
5	Reported Crops	14			number
6	Reported N Applied	2,879,331			lbs
7	Total N Applied	2,917,032		2,956,230	lbs
8	AWA N Applied	152		154	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,858,094	lbs
11	AWA N Uptake			150	lbs/ac
12	Total N Removed	1,732,065		1,741,908	lbs
13	AWA N Removed	90		91	lbs/ac
14	AWA N Balance	62		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,299	lbs
17	Total N Runoff			8,314	lbs
18	Total Denitrification			96,321	lbs
19	Total Ammonia Volatilization			46,648	lbs
20	Total Change in Soil Organic N			57,937	lbs
21	Total Perennial Tissue N			181,112	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			5.1	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			9.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,725	acre-ft
31	Total Applied water			46,894	acre-ft
32	Total Evapotranspiration (ET)			51,999	acre-ft
33	Total Runoff			1,187	acre-ft
34	Total Percolation			5,402	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			29.6	inches
37	AWA Evapotranspiration (ET)			32.8	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			3.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			58	mg/L

AWA: Acre-Weighted Average

Township: M20S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC, WSC			
2	Percent HVA	75			%
3	Reported Acreage	8,648			acres
4	Parcels	73			number
5	Reported Crops	12			number
6	Reported N Applied	1,096,346			lbs
7	Total N Applied	1,110,575		1,161,085	lbs
8	AWA N Applied	128		134	lbs/ac
9	AWA N Applied Difference		-6		lbs/ac
10	Total N Uptake			1,276,745	lbs
11	AWA N Uptake			148	lbs/ac
12	Total N Removed	796,134		777,687	lbs
13	AWA N Removed	92		90	lbs/ac
14	AWA N Balance	36		44	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,150	lbs
17	Total N Runoff			2,310	lbs
18	Total Denitrification			26,661	lbs
19	Total Ammonia Volatilization			31,408	lbs
20	Total Change in Soil Organic N			10,542	lbs
21	Total Perennial Tissue N			28,974	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			1.2	lbs/ac
27	AWA Perennial Tissue N			3.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			74	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,350	acre-ft
31	Total Applied water			16,863	acre-ft
32	Total Evapotranspiration (ET)			19,992	acre-ft
33	Total Runoff			407	acre-ft
34	Total Percolation			1,774	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			23.4	inches
37	AWA Evapotranspiration (ET)			27.7	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			2.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			58	mg/L

AWA: Acre-Weighted Average

Township: M20S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	17			%
3	Reported Acreage	6,737			acres
4	Parcels	85			number
5	Reported Crops	11			number
6	Reported N Applied	978,526			lbs
7	Total N Applied	1,004,696		1,021,875	lbs
8	AWA N Applied	149		152	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			909,258	lbs
11	AWA N Uptake			135	lbs/ac
12	Total N Removed	588,162		561,089	lbs
13	AWA N Removed	87		83	lbs/ac
14	AWA N Balance	62		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,969	lbs
17	Total N Runoff			5,782	lbs
18	Total Denitrification			27,201	lbs
19	Total Ammonia Volatilization			16,276	lbs
20	Total Change in Soil Organic N			-3,163	lbs
21	Total Perennial Tissue N			26,974	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			4	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			-0.5	lbs/ac
27	AWA Perennial Tissue N			4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			56	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			82	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,145	acre-ft
31	Total Applied water			16,197	acre-ft
32	Total Evapotranspiration (ET)			17,482	acre-ft
33	Total Runoff			407	acre-ft
34	Total Percolation			2,423	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			28.9	inches
37	AWA Evapotranspiration (ET)			31.2	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			57	mg/L

AWA: Acre-Weighted Average

Township: M20S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	22			%
3	Reported Acreage	2,498			acres
4	Parcels	14			number
5	Reported Crops	6			number
6	Reported N Applied	117,115			lbs
7	Total N Applied	132,608		202,238	lbs
8	AWA N Applied	53		81	lbs/ac
9	AWA N Applied Difference		-28		lbs/ac
10	Total N Uptake			205,342	lbs
11	AWA N Uptake			82	lbs/ac
12	Total N Removed	180,296		172,760	lbs
13	AWA N Removed	72		69	lbs/ac
14	AWA N Balance	-19		12	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-31		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,771	lbs
17	Total N Runoff			1,791	lbs
18	Total Denitrification			1,590	lbs
19	Total Ammonia Volatilization			7,718	lbs
20	Total Change in Soil Organic N			-13,168	lbs
21	Total Perennial Tissue N			1,430	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			-5.3	lbs/ac
27	AWA Perennial Tissue N			0.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			14	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			115	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,875	acre-ft
31	Total Applied water			3,606	acre-ft
32	Total Evapotranspiration (ET)			3,990	acre-ft
33	Total Runoff			255	acre-ft
34	Total Percolation			1,226	acre-ft
35	AWA Precipitation			9	inches
36	AWA Applied water			17.3	inches
37	AWA Evapotranspiration (ET)			19.2	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			5.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M20S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	110			%
3	Reported Acreage	4,678			acres
4	Parcels	41			number
5	Reported Crops	10			number
6	Reported N Applied	707,696			lbs
7	Total N Applied	759,609		748,357	lbs
8	AWA N Applied	162		160	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			721,947	lbs
11	AWA N Uptake			154	lbs/ac
12	Total N Removed	605,744		539,599	lbs
13	AWA N Removed	129		115	lbs/ac
14	AWA N Balance	33		45	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-12		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,551	lbs
17	Total N Runoff			3,397	lbs
18	Total Denitrification			11,134	lbs
19	Total Ammonia Volatilization			18,176	lbs
20	Total Change in Soil Organic N			7,088	lbs
21	Total Perennial Tissue N			17,720	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			1.5	lbs/ac
27	AWA Perennial Tissue N			3.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			79	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,517	acre-ft
31	Total Applied water			10,754	acre-ft
32	Total Evapotranspiration (ET)			12,291	acre-ft
33	Total Runoff			482	acre-ft
34	Total Percolation			2,475	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			27.6	inches
37	AWA Evapotranspiration (ET)			31.5	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: M20S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	100			%
3	Reported Acreage	10,516			acres
4	Parcels	167			number
5	Reported Crops	12			number
6	Reported N Applied	1,533,670			lbs
7	Total N Applied	1,614,898		1,622,546	lbs
8	AWA N Applied	154		154	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,001,072	lbs
11	AWA N Uptake			191	lbs/ac
12	Total N Removed	1,381,759		1,309,059	lbs
13	AWA N Removed	131		124	lbs/ac
14	AWA N Balance	22		30	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,209	lbs
17	Total N Runoff			5,802	lbs
18	Total Denitrification			14,714	lbs
19	Total Ammonia Volatilization			20,802	lbs
20	Total Change in Soil Organic N			23,984	lbs
21	Total Perennial Tissue N			134,014	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			2.3	lbs/ac
27	AWA Perennial Tissue N			12.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			130	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,121	acre-ft
31	Total Applied water			31,657	acre-ft
32	Total Evapotranspiration (ET)			33,076	acre-ft
33	Total Runoff			1,140	acre-ft
34	Total Percolation			7,512	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			36.2	inches
37	AWA Evapotranspiration (ET)			37.9	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M20S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA			
2	Percent HVA	90			%
3	Reported Acreage	10,112			acres
4	Parcels	155			number
5	Reported Crops	13			number
6	Reported N Applied	1,559,640			lbs
7	Total N Applied	1,609,219		1,598,932	lbs
8	AWA N Applied	159		158	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,852,456	lbs
11	AWA N Uptake			190	lbs/ac
12	Total N Removed	1,377,086		1,335,207	lbs
13	AWA N Removed	136		132	lbs/ac
14	AWA N Balance	23		26	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,023	lbs
17	Total N Runoff			6,720	lbs
18	Total Denitrification			29,924	lbs
19	Total Ammonia Volatilization			20,818	lbs
20	Total Change in Soil Organic N			23,046	lbs
21	Total Perennial Tissue N			87,681	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			2.4	lbs/ac
27	AWA Perennial Tissue N			9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			58	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			221	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,419	acre-ft
31	Total Applied water			28,896	acre-ft
32	Total Evapotranspiration (ET)			29,671	acre-ft
33	Total Runoff			1,110	acre-ft
34	Total Percolation			7,500	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			35.5	inches
37	AWA Evapotranspiration (ET)			36.5	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			8.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			29	mg/L

AWA: Acre-Weighted Average

Township: M20S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, TBWQC			
2	Percent HVA	103			%
3	Reported Acreage	5,842			acres
4	Parcels	109			number
5	Reported Crops	18			number
6	Reported N Applied	751,402			lbs
7	Total N Applied	765,147		775,728	lbs
8	AWA N Applied	131		133	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			762,489	lbs
11	AWA N Uptake			147	lbs/ac
12	Total N Removed	501,056		476,361	lbs
13	AWA N Removed	86		82	lbs/ac
14	AWA N Balance	45		51	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			13,495	lbs
17	Total N Runoff			5,268	lbs
18	Total Denitrification			13,708	lbs
19	Total Ammonia Volatilization			16,931	lbs
20	Total Change in Soil Organic N			4,456	lbs
21	Total Perennial Tissue N			62,202	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.6	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			0.9	lbs/ac
27	AWA Perennial Tissue N			12	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			80	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,022	acre-ft
31	Total Applied water			15,106	acre-ft
32	Total Evapotranspiration (ET)			15,637	acre-ft
33	Total Runoff			655	acre-ft
34	Total Percolation			3,827	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			34.8	inches
37	AWA Evapotranspiration (ET)			36.1	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			23	mg/L

AWA: Acre-Weighted Average

Township: M20S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, TBWQC			
2	Percent HVA	107			%
3	Reported Acreage	11,783			acres
4	Parcels	475			number
5	Reported Crops	30			number
6	Reported N Applied	1,232,873			lbs
7	Total N Applied	1,275,540		1,271,929	lbs
8	AWA N Applied	108		108	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,104,563	lbs
11	AWA N Uptake			95	lbs/ac
12	Total N Removed	537,833		530,672	lbs
13	AWA N Removed	46		45	lbs/ac
14	AWA N Balance	62		63	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,245	lbs
17	Total N Runoff			33,750	lbs
18	Total Denitrification			16,026	lbs
19	Total Ammonia Volatilization			24,090	lbs
20	Total Change in Soil Organic N			29,127	lbs
21	Total Perennial Tissue N			199,357	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			2.9	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			2.5	lbs/ac
27	AWA Perennial Tissue N			17.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,264	acre-ft
31	Total Applied water			38,045	acre-ft
32	Total Evapotranspiration (ET)			38,906	acre-ft
33	Total Runoff			2,038	acre-ft
34	Total Percolation			8,396	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			39.1	inches
37	AWA Evapotranspiration (ET)			40	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M20S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, TBWQC			
2	Percent HVA	85			%
3	Reported Acreage	9,690			acres
4	Parcels	575			number
5	Reported Crops	18			number
6	Reported N Applied	1,084,375			lbs
7	Total N Applied	1,104,520		1,104,575	lbs
8	AWA N Applied	114		114	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			802,070	lbs
11	AWA N Uptake			83	lbs/ac
12	Total N Removed	330,009		332,601	lbs
13	AWA N Removed	34		34	lbs/ac
14	AWA N Balance	80		80	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,875	lbs
17	Total N Runoff			9,579	lbs
18	Total Denitrification			9,638	lbs
19	Total Ammonia Volatilization			16,798	lbs
20	Total Change in Soil Organic N			51,055	lbs
21	Total Perennial Tissue N			185,820	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			1.7	lbs/ac
26	AWA Change in Soil Organic N			5.3	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			54	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			67	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,267	acre-ft
31	Total Applied water			32,564	acre-ft
32	Total Evapotranspiration (ET)			33,237	acre-ft
33	Total Runoff			1,370	acre-ft
34	Total Percolation			7,238	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			40.6	inches
37	AWA Evapotranspiration (ET)			41.5	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: M21N01E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	76			%
3	Reported Acreage	15,744			acres
4	Parcels	410			number
5	Reported Crops	17			number
6	Reported N Applied	1,649,475			lbs
7	Total N Applied	1,890,505		1,894,142	lbs
8	AWA N Applied	120		120	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,370,861	lbs
11	AWA N Uptake			154	lbs/ac
12	Total N Removed	1,150,481		1,139,116	lbs
13	AWA N Removed	73		72	lbs/ac
14	AWA N Balance	47		48	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			38,555	lbs
17	Total N Runoff			11,423	lbs
18	Total Denitrification			20,643	lbs
19	Total Ammonia Volatilization			57,141	lbs
20	Total Change in Soil Organic N			-60,998	lbs
21	Total Perennial Tissue N			368,232	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			3.7	lbs/ac
26	AWA Change in Soil Organic N			-4	lbs/ac
27	AWA Perennial Tissue N			23.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			28,800	acre-ft
31	Total Applied water			46,055	acre-ft
32	Total Evapotranspiration (ET)			49,200	acre-ft
33	Total Runoff			4,790	acre-ft
34	Total Percolation			21,236	acre-ft
35	AWA Precipitation			22.4	inches
36	AWA Applied water			35.9	inches
37	AWA Evapotranspiration (ET)			38.3	inches
38	AWA Runoff			3.7	inches
39	AWA Percolation			16.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			7	mg/L

AWA: Acre-Weighted Average

Township: M21N01W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	55			%
3	Reported Acreage	8,007			acres
4	Parcels	97			number
5	Reported Crops	8			number
6	Reported N Applied	1,100,503			lbs
7	Total N Applied	1,148,054		1,145,879	lbs
8	AWA N Applied	143		143	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,253,914	lbs
11	AWA N Uptake			159	lbs/ac
12	Total N Removed	721,975		707,562	lbs
13	AWA N Removed	90		88	lbs/ac
14	AWA N Balance	53		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,755	lbs
17	Total N Runoff			8,273	lbs
18	Total Denitrification			10,695	lbs
19	Total Ammonia Volatilization			27,008	lbs
20	Total Change in Soil Organic N			-16,235	lbs
21	Total Perennial Tissue N			178,542	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			-2.1	lbs/ac
27	AWA Perennial Tissue N			22.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,783	acre-ft
31	Total Applied water			24,721	acre-ft
32	Total Evapotranspiration (ET)			24,556	acre-ft
33	Total Runoff			3,086	acre-ft
34	Total Percolation			10,911	acre-ft
35	AWA Precipitation			21	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			37.5	inches
38	AWA Runoff			4.7	inches
39	AWA Percolation			16.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M21N02W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	56			%
3	Reported Acreage	12,995			acres
4	Parcels	117			number
5	Reported Crops	13			number
6	Reported N Applied	1,733,526			lbs
7	Total N Applied	1,781,619		1,789,315	lbs
8	AWA N Applied	137		138	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,281,725	lbs
11	AWA N Uptake			176	lbs/ac
12	Total N Removed	1,350,668		1,311,582	lbs
13	AWA N Removed	104		101	lbs/ac
14	AWA N Balance	33		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,106	lbs
17	Total N Runoff			11,702	lbs
18	Total Denitrification			14,304	lbs
19	Total Ammonia Volatilization			41,018	lbs
20	Total Change in Soil Organic N			45,844	lbs
21	Total Perennial Tissue N			253,319	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			1.1	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			3.5	lbs/ac
27	AWA Perennial Tissue N			19.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			101	%
CV-SWAT Water Budget Results					
30	Total Precipitation			21,919	acre-ft
31	Total Applied water			38,120	acre-ft
32	Total Evapotranspiration (ET)			39,430	acre-ft
33	Total Runoff			4,536	acre-ft
34	Total Percolation			15,993	acre-ft
35	AWA Precipitation			20.3	inches
36	AWA Applied water			35.2	inches
37	AWA Evapotranspiration (ET)			36.5	inches
38	AWA Runoff			4.2	inches
39	AWA Percolation			14.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M21N03W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	92			%
3	Reported Acreage	14,022			acres
4	Parcels	167			number
5	Reported Crops	14			number
6	Reported N Applied	1,661,460			lbs
7	Total N Applied	1,709,515		1,683,607	lbs
8	AWA N Applied	122		120	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,970,544	lbs
11	AWA N Uptake			144	lbs/ac
12	Total N Removed	835,413		825,498	lbs
13	AWA N Removed	60		59	lbs/ac
14	AWA N Balance	61		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,786	lbs
17	Total N Runoff			13,411	lbs
18	Total Denitrification			12,396	lbs
19	Total Ammonia Volatilization			54,553	lbs
20	Total Change in Soil Organic N			56,195	lbs
21	Total Perennial Tissue N			306,553	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			0.9	lbs/ac
25	AWA Ammonia Volatilization			4	lbs/ac
26	AWA Change in Soil Organic N			4.1	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			23,095	acre-ft
31	Total Applied water			38,250	acre-ft
32	Total Evapotranspiration (ET)			41,252	acre-ft
33	Total Runoff			5,191	acre-ft
34	Total Percolation			15,219	acre-ft
35	AWA Precipitation			20.2	inches
36	AWA Applied water			33.5	inches
37	AWA Evapotranspiration (ET)			36.1	inches
38	AWA Runoff			4.5	inches
39	AWA Percolation			13	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M21S15E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	29			%
3	Reported Acreage	1,211			acres
4	Parcels	15			number
5	Reported Crops	1			number
6	Reported N Applied	116,849			lbs
7	Total N Applied	138,592		137,626	lbs
8	AWA N Applied	114		114	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			144,550	lbs
11	AWA N Uptake			119	lbs/ac
12	Total N Removed	72,294		70,023	lbs
13	AWA N Removed	60		58	lbs/ac
14	AWA N Balance	55		56	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			1,945	lbs
17	Total N Runoff			875	lbs
18	Total Denitrification			4,530	lbs
19	Total Ammonia Volatilization			2,934	lbs
20	Total Change in Soil Organic N			6,579	lbs
21	Total Perennial Tissue N			21,710	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			3.7	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			5.4	lbs/ac
27	AWA Perennial Tissue N			17.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			42	%
CV-SWAT Water Budget Results					
30	Total Precipitation			707	acre-ft
31	Total Applied water			3,837	acre-ft
32	Total Evapotranspiration (ET)			4,236	acre-ft
33	Total Runoff			58	acre-ft
34	Total Percolation			244	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			38	inches
37	AWA Evapotranspiration (ET)			42	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			2.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: M21S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	89			%
3	Reported Acreage	7,450			acres
4	Parcels	50			number
5	Reported Crops	9			number
6	Reported N Applied	1,080,482			lbs
7	Total N Applied	1,091,856		1,088,025	lbs
8	AWA N Applied	147		146	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			934,544	lbs
11	AWA N Uptake			127	lbs/ac
12	Total N Removed	504,005		493,978	lbs
13	AWA N Removed	68		66	lbs/ac
14	AWA N Balance	79		80	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,868	lbs
17	Total N Runoff			6,839	lbs
18	Total Denitrification			41,771	lbs
19	Total Ammonia Volatilization			29,565	lbs
20	Total Change in Soil Organic N			35,382	lbs
21	Total Perennial Tissue N			108,234	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			5.7	lbs/ac
25	AWA Ammonia Volatilization			4	lbs/ac
26	AWA Change in Soil Organic N			4.8	lbs/ac
27	AWA Perennial Tissue N			14.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			51	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,315	acre-ft
31	Total Applied water			20,191	acre-ft
32	Total Evapotranspiration (ET)			22,140	acre-ft
33	Total Runoff			377	acre-ft
34	Total Percolation			1,972	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			32.9	inches
37	AWA Evapotranspiration (ET)			36	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			3.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			71	mg/L

AWA: Acre-Weighted Average

Township: M21S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	79			%
3	Reported Acreage	9,463			acres
4	Parcels	108			number
5	Reported Crops	14			number
6	Reported N Applied	1,277,453			lbs
7	Total N Applied	1,353,791		1,417,577	lbs
8	AWA N Applied	143		150	lbs/ac
9	AWA N Applied Difference		-7		lbs/ac
10	Total N Uptake			1,484,933	lbs
11	AWA N Uptake			158	lbs/ac
12	Total N Removed	885,744		842,660	lbs
13	AWA N Removed	94		89	lbs/ac
14	AWA N Balance	49		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,915	lbs
17	Total N Runoff			8,804	lbs
18	Total Denitrification			33,471	lbs
19	Total Ammonia Volatilization			39,413	lbs
20	Total Change in Soil Organic N			55,393	lbs
21	Total Perennial Tissue N			170,320	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			3.6	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			5.9	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			29	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,778	acre-ft
31	Total Applied water			27,685	acre-ft
32	Total Evapotranspiration (ET)			29,381	acre-ft
33	Total Runoff			797	acre-ft
34	Total Percolation			3,265	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			35.4	inches
37	AWA Evapotranspiration (ET)			37.6	inches
38	AWA Runoff			1	inches
39	AWA Percolation			4.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M21S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	87			%
3	Reported Acreage	20,005			acres
4	Parcels	154			number
5	Reported Crops	20			number
6	Reported N Applied	3,659,154			lbs
7	Total N Applied	3,744,912		3,746,726	lbs
8	AWA N Applied	187		187	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			3,654,009	lbs
11	AWA N Uptake			184	lbs/ac
12	Total N Removed	2,434,569		2,340,151	lbs
13	AWA N Removed	122		117	lbs/ac
14	AWA N Balance	66		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			33,652	lbs
17	Total N Runoff			14,840	lbs
18	Total Denitrification			91,866	lbs
19	Total Ammonia Volatilization			74,624	lbs
20	Total Change in Soil Organic N			111,177	lbs
21	Total Perennial Tissue N			238,831	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			4.6	lbs/ac
25	AWA Ammonia Volatilization			3.8	lbs/ac
26	AWA Change in Soil Organic N			5.6	lbs/ac
27	AWA Perennial Tissue N			12	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			45	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,217	acre-ft
31	Total Applied water			54,352	acre-ft
32	Total Evapotranspiration (ET)			57,837	acre-ft
33	Total Runoff			1,469	acre-ft
34	Total Percolation			7,234	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			32.9	inches
37	AWA Evapotranspiration (ET)			35	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			4.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			45	mg/L

AWA: Acre-Weighted Average

Township: M21S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	41			%
3	Reported Acreage	4,815			acres
4	Parcels	31			number
5	Reported Crops	8			number
6	Reported N Applied	761,422			lbs
7	Total N Applied	782,772		771,936	lbs
8	AWA N Applied	163		160	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			700,882	lbs
11	AWA N Uptake			146	lbs/ac
12	Total N Removed	557,712		495,690	lbs
13	AWA N Removed	116		103	lbs/ac
14	AWA N Balance	47		57	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,164	lbs
17	Total N Runoff			2,186	lbs
18	Total Denitrification			20,617	lbs
19	Total Ammonia Volatilization			13,801	lbs
20	Total Change in Soil Organic N			5,721	lbs
21	Total Perennial Tissue N			2,904	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			4.3	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			1.2	lbs/ac
27	AWA Perennial Tissue N			0.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			84	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,964	acre-ft
31	Total Applied water			8,947	acre-ft
32	Total Evapotranspiration (ET)			10,654	acre-ft
33	Total Runoff			255	acre-ft
34	Total Percolation			985	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			22.3	inches
37	AWA Evapotranspiration (ET)			26.6	inches
38	AWA Runoff			0.6	inches
39	AWA Percolation			2.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			86	mg/L

AWA: Acre-Weighted Average

Township: M21S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, TBWQC			
2	Percent HVA	95			%
3	Reported Acreage	4,885			acres
4	Parcels	54			number
5	Reported Crops	8			number
6	Reported N Applied	618,390			lbs
7	Total N Applied	689,968		681,256	lbs
8	AWA N Applied	141		139	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			989,662	lbs
11	AWA N Uptake			204	lbs/ac
12	Total N Removed	854,560		770,788	lbs
13	AWA N Removed	175		158	lbs/ac
14	AWA N Balance	-34		-18	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-15		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,606	lbs
17	Total N Runoff			1,979	lbs
18	Total Denitrification			4,927	lbs
19	Total Ammonia Volatilization			10,024	lbs
20	Total Change in Soil Organic N			-12,468	lbs
21	Total Perennial Tissue N			50,934	lbs
22	AWA N in Rain			2.6	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			1	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			-2.6	lbs/ac
27	AWA Perennial Tissue N			10.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-180	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,684	acre-ft
31	Total Applied water			13,454	acre-ft
32	Total Evapotranspiration (ET)			14,073	acre-ft
33	Total Runoff			557	acre-ft
34	Total Percolation			3,461	acre-ft
35	AWA Precipitation			11.6	inches
36	AWA Applied water			33.2	inches
37	AWA Evapotranspiration (ET)			34.8	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			8.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M21S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KBWQA, TBWQC			
2	Percent HVA	112			%
3	Reported Acreage	7,042			acres
4	Parcels	68			number
5	Reported Crops	9			number
6	Reported N Applied	1,044,404			lbs
7	Total N Applied	1,183,946		1,190,484	lbs
8	AWA N Applied	168		169	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,232,640	lbs
11	AWA N Uptake			176	lbs/ac
12	Total N Removed	888,890		816,869	lbs
13	AWA N Removed	126		116	lbs/ac
14	AWA N Balance	42		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-11		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,910	lbs
17	Total N Runoff			5,390	lbs
18	Total Denitrification			11,403	lbs
19	Total Ammonia Volatilization			21,753	lbs
20	Total Change in Soil Organic N			417	lbs
21	Total Perennial Tissue N			89,793	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.6	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			0.1	lbs/ac
27	AWA Perennial Tissue N			12.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			69	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,028	acre-ft
31	Total Applied water			19,837	acre-ft
32	Total Evapotranspiration (ET)			21,225	acre-ft
33	Total Runoff			755	acre-ft
34	Total Percolation			3,861	acre-ft
35	AWA Precipitation			10.3	inches
36	AWA Applied water			33.9	inches
37	AWA Evapotranspiration (ET)			36.3	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			6.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: M21S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	107			%
3	Reported Acreage	4,805			acres
4	Parcels	71			number
5	Reported Crops	11			number
6	Reported N Applied	729,987			lbs
7	Total N Applied	769,197		783,552	lbs
8	AWA N Applied	160		163	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			689,147	lbs
11	AWA N Uptake			143	lbs/ac
12	Total N Removed	345,525		337,851	lbs
13	AWA N Removed	72		70	lbs/ac
14	AWA N Balance	88		93	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,139	lbs
17	Total N Runoff			6,002	lbs
18	Total Denitrification			17,172	lbs
19	Total Ammonia Volatilization			18,944	lbs
20	Total Change in Soil Organic N			17,275	lbs
21	Total Perennial Tissue N			74,450	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			3.6	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			3.6	lbs/ac
27	AWA Perennial Tissue N			15.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			67	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,154	acre-ft
31	Total Applied water			14,587	acre-ft
32	Total Evapotranspiration (ET)			15,115	acre-ft
33	Total Runoff			495	acre-ft
34	Total Percolation			3,123	acre-ft
35	AWA Precipitation			10.4	inches
36	AWA Applied water			36.4	inches
37	AWA Evapotranspiration (ET)			37.7	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			38	mg/L

AWA: Acre-Weighted Average

Township: M21S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	12,884			acres
4	Parcels	247			number
5	Reported Crops	24			number
6	Reported N Applied	1,717,411			lbs
7	Total N Applied	1,727,169		1,742,469	lbs
8	AWA N Applied	134		135	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,564,284	lbs
11	AWA N Uptake			122	lbs/ac
12	Total N Removed	819,419		811,100	lbs
13	AWA N Removed	64		63	lbs/ac
14	AWA N Balance	70		72	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,312	lbs
17	Total N Runoff			15,877	lbs
18	Total Denitrification			32,641	lbs
19	Total Ammonia Volatilization			37,303	lbs
20	Total Change in Soil Organic N			14,280	lbs
21	Total Perennial Tissue N			218,004	lbs
22	AWA N in Rain			2.3	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			1.1	lbs/ac
27	AWA Perennial Tissue N			17	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			49	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,967	acre-ft
31	Total Applied water			41,164	acre-ft
32	Total Evapotranspiration (ET)			40,792	acre-ft
33	Total Runoff			1,464	acre-ft
34	Total Percolation			9,900	acre-ft
35	AWA Precipitation			10.3	inches
36	AWA Applied water			38.5	inches
37	AWA Evapotranspiration (ET)			38.1	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M21S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	96			%
3	Reported Acreage	6,541			acres
4	Parcels	251			number
5	Reported Crops	20			number
6	Reported N Applied	757,527			lbs
7	Total N Applied	762,911		770,008	lbs
8	AWA N Applied	117		118	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			634,543	lbs
11	AWA N Uptake			98	lbs/ac
12	Total N Removed	280,083		281,309	lbs
13	AWA N Removed	43		43	lbs/ac
14	AWA N Balance	74		75	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,220	lbs
17	Total N Runoff			21,451	lbs
18	Total Denitrification			8,540	lbs
19	Total Ammonia Volatilization			18,136	lbs
20	Total Change in Soil Organic N			21,225	lbs
21	Total Perennial Tissue N			119,384	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			3.3	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			3.3	lbs/ac
27	AWA Perennial Tissue N			18.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,038	acre-ft
31	Total Applied water			21,552	acre-ft
32	Total Evapotranspiration (ET)			21,613	acre-ft
33	Total Runoff			1,177	acre-ft
34	Total Percolation			4,821	acre-ft
35	AWA Precipitation			11.2	inches
36	AWA Applied water			39.8	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			8.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M21S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	33			%
3	Reported Acreage	1,566			acres
4	Parcels	35			number
5	Reported Crops	6			number
6	Reported N Applied	179,554			lbs
7	Total N Applied	183,272		182,092	lbs
8	AWA N Applied	117		116	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			126,216	lbs
11	AWA N Uptake			81	lbs/ac
12	Total N Removed	50,462		49,440	lbs
13	AWA N Removed	32		32	lbs/ac
14	AWA N Balance	85		85	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,734	lbs
17	Total N Runoff			5,586	lbs
18	Total Denitrification			943	lbs
19	Total Ammonia Volatilization			3,134	lbs
20	Total Change in Soil Organic N			480	lbs
21	Total Perennial Tissue N			32,291	lbs
22	AWA N in Rain			2.4	lbs/ac
23	AWA N Runoff			3.6	lbs/ac
24	AWA Denitrification			0.6	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			0.3	lbs/ac
27	AWA Perennial Tissue N			20.6	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			59	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,389	acre-ft
31	Total Applied water			5,235	acre-ft
32	Total Evapotranspiration (ET)			5,286	acre-ft
33	Total Runoff			258	acre-ft
34	Total Percolation			1,075	acre-ft
35	AWA Precipitation			10.6	inches
36	AWA Applied water			40.1	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			2	inches
39	AWA Percolation			8.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			32	mg/L

AWA: Acre-Weighted Average

Township: M21S29E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	25			%
3	Reported Acreage	422			acres
4	Parcels	40			number
5	Reported Crops	6			number
6	Reported N Applied	34,312			lbs
7	Total N Applied	35,254		36,083	lbs
8	AWA N Applied	84		86	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			29,959	lbs
11	AWA N Uptake			71	lbs/ac
12	Total N Removed	13,338		13,209	lbs
13	AWA N Removed	32		31	lbs/ac
14	AWA N Balance	52		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			941	lbs
17	Total N Runoff			2,277	lbs
18	Total Denitrification			351	lbs
19	Total Ammonia Volatilization			878	lbs
20	Total Change in Soil Organic N			474	lbs
21	Total Perennial Tissue N			7,640	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			5.4	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			1.1	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			349	acre-ft
31	Total Applied water			1,396	acre-ft
32	Total Evapotranspiration (ET)			1,401	acre-ft
33	Total Runoff			134	acre-ft
34	Total Percolation			211	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			39.7	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			3.8	inches
39	AWA Percolation			6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M22N01W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	28			%
3	Reported Acreage	8,425			acres
4	Parcels	63			number
5	Reported Crops	6			number
6	Reported N Applied	1,068,341			lbs
7	Total N Applied	1,118,383		1,051,813	lbs
8	AWA N Applied	133		125	lbs/ac
9	AWA N Applied Difference		8		lbs/ac
10	Total N Uptake			1,001,823	lbs
11	AWA N Uptake			120	lbs/ac
12	Total N Removed	527,864		512,993	lbs
13	AWA N Removed	63		61	lbs/ac
14	AWA N Balance	69		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,662	lbs
17	Total N Runoff			8,272	lbs
18	Total Denitrification			16,012	lbs
19	Total Ammonia Volatilization			18,157	lbs
20	Total Change in Soil Organic N			-32,914	lbs
21	Total Perennial Tissue N			164,066	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			2.2	lbs/ac
26	AWA Change in Soil Organic N			-4	lbs/ac
27	AWA Perennial Tissue N			19.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			46	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			15,415	acre-ft
31	Total Applied water			25,745	acre-ft
32	Total Evapotranspiration (ET)			25,873	acre-ft
33	Total Runoff			3,480	acre-ft
34	Total Percolation			11,934	acre-ft
35	AWA Precipitation			22.2	inches
36	AWA Applied water			37.1	inches
37	AWA Evapotranspiration (ET)			37.3	inches
38	AWA Runoff			5	inches
39	AWA Percolation			17	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M22S16E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	33			%
3	Reported Acreage	611			acres
4	Parcels	1			number
5	Reported Crops	2			number
6	Reported N Applied	31,400			lbs
7	Total N Applied	31,400		59,016	lbs
8	AWA N Applied	51		97	lbs/ac
9	AWA N Applied Difference		-45		lbs/ac
10	Total N Uptake			65,559	lbs
11	AWA N Uptake			107	lbs/ac
12	Total N Removed	49,649		46,605	lbs
13	AWA N Removed	81		76	lbs/ac
14	AWA N Balance	-30		20	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-50		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			981	lbs
17	Total N Runoff			115	lbs
18	Total Denitrification			506	lbs
19	Total Ammonia Volatilization			3,259	lbs
20	Total Change in Soil Organic N			1,308	lbs
21	Total Perennial Tissue N			3,256	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.2	lbs/ac
24	AWA Denitrification			0.8	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			5.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			8	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			37	%
CV-SWAT Water Budget Results					
30	Total Precipitation			357	acre-ft
31	Total Applied water			826	acre-ft
32	Total Evapotranspiration (ET)			1,060	acre-ft
33	Total Runoff			19	acre-ft
34	Total Percolation			100	acre-ft
35	AWA Precipitation			7	inches
36	AWA Applied water			16.2	inches
37	AWA Evapotranspiration (ET)			20.8	inches
38	AWA Runoff			0.4	inches
39	AWA Percolation			2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M22S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	65			%
3	Reported Acreage	345			acres
4	Parcels	2			number
5	Reported Crops	1			number
6	Reported N Applied	0			lbs
7	Total N Applied	0		21,444	lbs
8	AWA N Applied	0		62	lbs/ac
9	AWA N Applied Difference		-62		lbs/ac
10	Total N Uptake			24,110	lbs
11	AWA N Uptake			70	lbs/ac
12	Total N Removed	18,613		18,613	lbs
13	AWA N Removed	54		54	lbs/ac
14	AWA N Balance	-54		8	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-62		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			501	lbs
17	Total N Runoff			34	lbs
18	Total Denitrification			31	lbs
19	Total Ammonia Volatilization			1,972	lbs
20	Total Change in Soil Organic N			270	lbs
21	Total Perennial Tissue N			0	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.1	lbs/ac
24	AWA Denitrification			0.1	lbs/ac
25	AWA Ammonia Volatilization			5.7	lbs/ac
26	AWA Change in Soil Organic N			0.8	lbs/ac
27	AWA Perennial Tissue N			0	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			3	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			35	%
CV-SWAT Water Budget Results					
30	Total Precipitation			209	acre-ft
31	Total Applied water			257	acre-ft
32	Total Evapotranspiration (ET)			397	acre-ft
33	Total Runoff			11	acre-ft
34	Total Percolation			56	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			8.9	inches
37	AWA Evapotranspiration (ET)			13.8	inches
38	AWA Runoff			0.4	inches
39	AWA Percolation			1.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			7	mg/L

AWA: Acre-Weighted Average

Township: M22S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	35			%
3	Reported Acreage	4,293			acres
4	Parcels	182			number
5	Reported Crops	14			number
6	Reported N Applied	438,250			lbs
7	Total N Applied	466,821		466,365	lbs
8	AWA N Applied	109		109	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			536,832	lbs
11	AWA N Uptake			128	lbs/ac
12	Total N Removed	306,326		271,005	lbs
13	AWA N Removed	71		63	lbs/ac
14	AWA N Balance	37		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,138	lbs
17	Total N Runoff			2,816	lbs
18	Total Denitrification			10,007	lbs
19	Total Ammonia Volatilization			10,593	lbs
20	Total Change in Soil Organic N			24,642	lbs
21	Total Perennial Tissue N			60,387	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			5.9	lbs/ac
27	AWA Perennial Tissue N			14.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			21	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			45	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,591	acre-ft
31	Total Applied water			12,162	acre-ft
32	Total Evapotranspiration (ET)			13,195	acre-ft
33	Total Runoff			337	acre-ft
34	Total Percolation			1,226	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			34.7	inches
37	AWA Evapotranspiration (ET)			37.6	inches
38	AWA Runoff			1	inches
39	AWA Percolation			3.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			27	mg/L

AWA: Acre-Weighted Average

Township: M22S19E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWQC			
2	Percent HVA	13			%
3	Reported Acreage	1,591			acres
4	Parcels	32			number
5	Reported Crops	3			number
6	Reported N Applied	291,522			lbs
7	Total N Applied	291,522		288,658	lbs
8	AWA N Applied	183		181	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			341,078	lbs
11	AWA N Uptake			214	lbs/ac
12	Total N Removed	237,591		211,011	lbs
13	AWA N Removed	149		133	lbs/ac
14	AWA N Balance	34		49	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-15		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,704	lbs
17	Total N Runoff			1,189	lbs
18	Total Denitrification			2,894	lbs
19	Total Ammonia Volatilization			5,401	lbs
20	Total Change in Soil Organic N			3,821	lbs
21	Total Perennial Tissue N			36,069	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			2.4	lbs/ac
27	AWA Perennial Tissue N			22.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			39	%
CV-SWAT Water Budget Results					
30	Total Precipitation			982	acre-ft
31	Total Applied water			6,192	acre-ft
32	Total Evapotranspiration (ET)			5,901	acre-ft
33	Total Runoff			133	acre-ft
34	Total Percolation			1,141	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			46.7	inches
37	AWA Evapotranspiration (ET)			44.5	inches
38	AWA Runoff			1	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M22S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	76			%
3	Reported Acreage	4,393			acres
4	Parcels	38			number
5	Reported Crops	4			number
6	Reported N Applied	453,721			lbs
7	Total N Applied	469,256		471,941	lbs
8	AWA N Applied	107		107	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			457,934	lbs
11	AWA N Uptake			104	lbs/ac
12	Total N Removed	194,775		185,654	lbs
13	AWA N Removed	44		42	lbs/ac
14	AWA N Balance	62		65	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,062	lbs
17	Total N Runoff			1,295	lbs
18	Total Denitrification			15,407	lbs
19	Total Ammonia Volatilization			5,229	lbs
20	Total Change in Soil Organic N			-25,541	lbs
21	Total Perennial Tissue N			93,751	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			3.5	lbs/ac
25	AWA Ammonia Volatilization			1.2	lbs/ac
26	AWA Change in Soil Organic N			-5.8	lbs/ac
27	AWA Perennial Tissue N			21.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			44	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,990	acre-ft
31	Total Applied water			13,164	acre-ft
32	Total Evapotranspiration (ET)			14,174	acre-ft
33	Total Runoff			321	acre-ft
34	Total Percolation			1,627	acre-ft
35	AWA Precipitation			8.2	inches
36	AWA Applied water			36	inches
37	AWA Evapotranspiration (ET)			38.7	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			4.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			44	mg/L

AWA: Acre-Weighted Average

Township: M22S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	4,020			acres
4	Parcels	34			number
5	Reported Crops	10			number
6	Reported N Applied	443,041			lbs
7	Total N Applied	489,212		494,602	lbs
8	AWA N Applied	122		123	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			478,335	lbs
11	AWA N Uptake			119	lbs/ac
12	Total N Removed	286,811		282,931	lbs
13	AWA N Removed	71		70	lbs/ac
14	AWA N Balance	50		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,898	lbs
17	Total N Runoff			3,774	lbs
18	Total Denitrification			9,226	lbs
19	Total Ammonia Volatilization			19,017	lbs
20	Total Change in Soil Organic N			-8,659	lbs
21	Total Perennial Tissue N			54,202	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			2.3	lbs/ac
25	AWA Ammonia Volatilization			4.7	lbs/ac
26	AWA Change in Soil Organic N			-2.2	lbs/ac
27	AWA Perennial Tissue N			13.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,940	acre-ft
31	Total Applied water			11,259	acre-ft
32	Total Evapotranspiration (ET)			11,716	acre-ft
33	Total Runoff			363	acre-ft
34	Total Percolation			2,111	acre-ft
35	AWA Precipitation			8.8	inches
36	AWA Applied water			33.6	inches
37	AWA Evapotranspiration (ET)			35	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			6.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M22S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	5,661			acres
4	Parcels	98			number
5	Reported Crops	11			number
6	Reported N Applied	927,852			lbs
7	Total N Applied	966,390		970,436	lbs
8	AWA N Applied	171		171	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,006,747	lbs
11	AWA N Uptake			178	lbs/ac
12	Total N Removed	578,291		534,760	lbs
13	AWA N Removed	102		94	lbs/ac
14	AWA N Balance	69		77	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,398	lbs
17	Total N Runoff			9,365	lbs
18	Total Denitrification			16,109	lbs
19	Total Ammonia Volatilization			40,205	lbs
20	Total Change in Soil Organic N			17,008	lbs
21	Total Perennial Tissue N			101,235	lbs
22	AWA N in Rain			2	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			7.1	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			17.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			46	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,184	acre-ft
31	Total Applied water			17,963	acre-ft
32	Total Evapotranspiration (ET)			17,969	acre-ft
33	Total Runoff			558	acre-ft
34	Total Percolation			3,622	acre-ft
35	AWA Precipitation			8.9	inches
36	AWA Applied water			38.1	inches
37	AWA Evapotranspiration (ET)			38.1	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: M22S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	14,351			acres
4	Parcels	245			number
5	Reported Crops	18			number
6	Reported N Applied	1,970,775			lbs
7	Total N Applied	2,107,515		2,129,242	lbs
8	AWA N Applied	147		148	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,067,388	lbs
11	AWA N Uptake			144	lbs/ac
12	Total N Removed	1,250,869		1,245,645	lbs
13	AWA N Removed	87		87	lbs/ac
14	AWA N Balance	60		62	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			31,566	lbs
17	Total N Runoff			21,832	lbs
18	Total Denitrification			33,592	lbs
19	Total Ammonia Volatilization			44,405	lbs
20	Total Change in Soil Organic N			-7,737	lbs
21	Total Perennial Tissue N			255,779	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.3	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			-0.5	lbs/ac
27	AWA Perennial Tissue N			17.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,762	acre-ft
31	Total Applied water			46,494	acre-ft
32	Total Evapotranspiration (ET)			46,601	acre-ft
33	Total Runoff			1,588	acre-ft
34	Total Percolation			10,069	acre-ft
35	AWA Precipitation			9.8	inches
36	AWA Applied water			38.9	inches
37	AWA Evapotranspiration (ET)			39	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M22S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	93			%
3	Reported Acreage	9,037			acres
4	Parcels	322			number
5	Reported Crops	13			number
6	Reported N Applied	1,110,605			lbs
7	Total N Applied	1,132,226		1,139,898	lbs
8	AWA N Applied	125		126	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			863,245	lbs
11	AWA N Uptake			96	lbs/ac
12	Total N Removed	374,616		379,844	lbs
13	AWA N Removed	41		42	lbs/ac
14	AWA N Balance	84		84	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,064	lbs
17	Total N Runoff			41,746	lbs
18	Total Denitrification			12,043	lbs
19	Total Ammonia Volatilization			25,578	lbs
20	Total Change in Soil Organic N			29,258	lbs
21	Total Perennial Tissue N			171,573	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			4.6	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			3.2	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			54	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,483	acre-ft
31	Total Applied water			30,276	acre-ft
32	Total Evapotranspiration (ET)			30,749	acre-ft
33	Total Runoff			1,413	acre-ft
34	Total Percolation			5,583	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			40.2	inches
37	AWA Evapotranspiration (ET)			40.8	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			7.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			32	mg/L

AWA: Acre-Weighted Average

Township: M22S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	51			%
3	Reported Acreage	3,978			acres
4	Parcels	173			number
5	Reported Crops	10			number
6	Reported N Applied	530,548			lbs
7	Total N Applied	536,242		515,104	lbs
8	AWA N Applied	135		129	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			328,434	lbs
11	AWA N Uptake			83	lbs/ac
12	Total N Removed	141,530		142,506	lbs
13	AWA N Removed	36		36	lbs/ac
14	AWA N Balance	99		94	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,827	lbs
17	Total N Runoff			2,174	lbs
18	Total Denitrification			2,759	lbs
19	Total Ammonia Volatilization			8,439	lbs
20	Total Change in Soil Organic N			780	lbs
21	Total Perennial Tissue N			76,265	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			0.2	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			72	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			77	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,278	acre-ft
31	Total Applied water			13,386	acre-ft
32	Total Evapotranspiration (ET)			13,425	acre-ft
33	Total Runoff			479	acre-ft
34	Total Percolation			2,767	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			40.6	inches
37	AWA Evapotranspiration (ET)			40.7	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			8.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			38	mg/L

AWA: Acre-Weighted Average

Township: M23N01W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	SVWQC			
2	Percent HVA	70			%
3	Reported Acreage	10,385			acres
4	Parcels	129			number
5	Reported Crops	6			number
6	Reported N Applied	1,152,076			lbs
7	Total N Applied	1,239,526		1,239,076	lbs
8	AWA N Applied	119		119	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,333,985	lbs
11	AWA N Uptake			129	lbs/ac
12	Total N Removed	637,610		618,171	lbs
13	AWA N Removed	61		60	lbs/ac
14	AWA N Balance	58		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,715	lbs
17	Total N Runoff			10,613	lbs
18	Total Denitrification			12,923	lbs
19	Total Ammonia Volatilization			30,606	lbs
20	Total Change in Soil Organic N			-22,702	lbs
21	Total Perennial Tissue N			213,370	lbs
22	AWA N in Rain			2.5	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			3	lbs/ac
26	AWA Change in Soil Organic N			-2.2	lbs/ac
27	AWA Perennial Tissue N			20.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			19,237	acre-ft
31	Total Applied water			31,735	acre-ft
32	Total Evapotranspiration (ET)			32,497	acre-ft
33	Total Runoff			3,976	acre-ft
34	Total Percolation			14,561	acre-ft
35	AWA Precipitation			22.4	inches
36	AWA Applied water			37	inches
37	AWA Evapotranspiration (ET)			37.9	inches
38	AWA Runoff			4.6	inches
39	AWA Percolation			16.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M23S17E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WSC			
2	Percent HVA	10			%
3	Reported Acreage	343			acres
4	Parcels	2			number
5	Reported Crops	1			number
6	Reported N Applied	0			lbs
7	Total N Applied	0		23,244	lbs
8	AWA N Applied	0		68	lbs/ac
9	AWA N Applied Difference		-68		lbs/ac
10	Total N Uptake			12,427	lbs
11	AWA N Uptake			36	lbs/ac
12	Total N Removed	10,117		10,117	lbs
13	AWA N Removed	29		29	lbs/ac
14	AWA N Balance	-29		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-68		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			169	lbs
17	Total N Runoff			17	lbs
18	Total Denitrification			17	lbs
19	Total Ammonia Volatilization			1,180	lbs
20	Total Change in Soil Organic N			-337	lbs
21	Total Perennial Tissue N			0	lbs
22	AWA N in Rain			0.5	lbs/ac
23	AWA N Runoff			0	lbs/ac
24	AWA Denitrification			0	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			-1	lbs/ac
27	AWA Perennial Tissue N			0	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			5	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			12	%
CV-SWAT Water Budget Results					
30	Total Precipitation			130	acre-ft
31	Total Applied water			202	acre-ft
32	Total Evapotranspiration (ET)			242	acre-ft
33	Total Runoff			14	acre-ft
34	Total Percolation			74	acre-ft
35	AWA Precipitation			4.5	inches
36	AWA Applied water			7.1	inches
37	AWA Evapotranspiration (ET)			8.5	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			2.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M23S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	27			%
3	Reported Acreage	1,415			acres
4	Parcels	47			number
5	Reported Crops	3			number
6	Reported N Applied	70,849			lbs
7	Total N Applied	70,849		71,797	lbs
8	AWA N Applied	50		51	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			67,095	lbs
11	AWA N Uptake			47	lbs/ac
12	Total N Removed	1,253		1,275	lbs
13	AWA N Removed	1		1	lbs/ac
14	AWA N Balance	49		50	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,419	lbs
17	Total N Runoff			238	lbs
18	Total Denitrification			4,439	lbs
19	Total Ammonia Volatilization			1,242	lbs
20	Total Change in Soil Organic N			-1,628	lbs
21	Total Perennial Tissue N			29,030	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.2	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			0.9	lbs/ac
26	AWA Change in Soil Organic N			-1.2	lbs/ac
27	AWA Perennial Tissue N			20.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			887	acre-ft
31	Total Applied water			3,896	acre-ft
32	Total Evapotranspiration (ET)			4,469	acre-ft
33	Total Runoff			85	acre-ft
34	Total Percolation			222	acre-ft
35	AWA Precipitation			7.5	inches
36	AWA Applied water			33	inches
37	AWA Evapotranspiration (ET)			37.9	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			1.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			56	mg/L

AWA: Acre-Weighted Average

Township: M23S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	65			%
3	Reported Acreage	1,692			acres
4	Parcels	60			number
5	Reported Crops	6			number
6	Reported N Applied	219,471			lbs
7	Total N Applied	219,471		216,901	lbs
8	AWA N Applied	130		128	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			178,491	lbs
11	AWA N Uptake			105	lbs/ac
12	Total N Removed	45,407		47,344	lbs
13	AWA N Removed	27		28	lbs/ac
14	AWA N Balance	103		100	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,847	lbs
17	Total N Runoff			3,133	lbs
18	Total Denitrification			7,666	lbs
19	Total Ammonia Volatilization			12,586	lbs
20	Total Change in Soil Organic N			5,992	lbs
21	Total Perennial Tissue N			27,655	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			4.5	lbs/ac
25	AWA Ammonia Volatilization			7.4	lbs/ac
26	AWA Change in Soil Organic N			3.5	lbs/ac
27	AWA Perennial Tissue N			16.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			68	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,121	acre-ft
31	Total Applied water			5,267	acre-ft
32	Total Evapotranspiration (ET)			5,525	acre-ft
33	Total Runoff			169	acre-ft
34	Total Percolation			689	acre-ft
35	AWA Precipitation			8	inches
36	AWA Applied water			37.4	inches
37	AWA Evapotranspiration (ET)			39.2	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			4.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			61	mg/L

AWA: Acre-Weighted Average

Township: M23S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	98			%
3	Reported Acreage	10,662			acres
4	Parcels	188			number
5	Reported Crops	8			number
6	Reported N Applied	1,390,102			lbs
7	Total N Applied	1,468,354		1,476,224	lbs
8	AWA N Applied	138		138	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,594,827	lbs
11	AWA N Uptake			150	lbs/ac
12	Total N Removed	838,834		811,498	lbs
13	AWA N Removed	79		76	lbs/ac
14	AWA N Balance	59		62	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,557	lbs
17	Total N Runoff			10,861	lbs
18	Total Denitrification			32,296	lbs
19	Total Ammonia Volatilization			41,379	lbs
20	Total Change in Soil Organic N			28,782	lbs
21	Total Perennial Tissue N			216,658	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			2.7	lbs/ac
27	AWA Perennial Tissue N			20.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,744	acre-ft
31	Total Applied water			36,046	acre-ft
32	Total Evapotranspiration (ET)			36,541	acre-ft
33	Total Runoff			817	acre-ft
34	Total Percolation			5,422	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			40.7	inches
37	AWA Evapotranspiration (ET)			41.3	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			6.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			24	mg/L

AWA: Acre-Weighted Average

Township: M23S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	16,808			acres
4	Parcels	201			number
5	Reported Crops	12			number
6	Reported N Applied	1,886,731			lbs
7	Total N Applied	2,021,020		2,035,541	lbs
8	AWA N Applied	120		121	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			2,054,454	lbs
11	AWA N Uptake			122	lbs/ac
12	Total N Removed	1,075,133		1,061,660	lbs
13	AWA N Removed	64		63	lbs/ac
14	AWA N Balance	56		58	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,536	lbs
17	Total N Runoff			21,817	lbs
18	Total Denitrification			47,013	lbs
19	Total Ammonia Volatilization			44,767	lbs
20	Total Change in Soil Organic N			12,950	lbs
21	Total Perennial Tissue N			318,848	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			0.8	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,789	acre-ft
31	Total Applied water			53,818	acre-ft
32	Total Evapotranspiration (ET)			55,864	acre-ft
33	Total Runoff			1,530	acre-ft
34	Total Percolation			7,156	acre-ft
35	AWA Precipitation			7.7	inches
36	AWA Applied water			38.4	inches
37	AWA Evapotranspiration (ET)			39.9	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			28	mg/L

AWA: Acre-Weighted Average

Township: M23S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	82			%
3	Reported Acreage	11,442			acres
4	Parcels	334			number
5	Reported Crops	14			number
6	Reported N Applied	1,001,639			lbs
7	Total N Applied	1,020,579		1,075,968	lbs
8	AWA N Applied	89		94	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			896,838	lbs
11	AWA N Uptake			78	lbs/ac
12	Total N Removed	339,681		340,003	lbs
13	AWA N Removed	30		30	lbs/ac
14	AWA N Balance	60		64	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			22,142	lbs
17	Total N Runoff			23,706	lbs
18	Total Denitrification			16,873	lbs
19	Total Ammonia Volatilization			30,721	lbs
20	Total Change in Soil Organic N			18,323	lbs
21	Total Perennial Tissue N			195,692	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			2.1	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			1.6	lbs/ac
27	AWA Perennial Tissue N			17.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,423	acre-ft
31	Total Applied water			34,354	acre-ft
32	Total Evapotranspiration (ET)			36,512	acre-ft
33	Total Runoff			1,263	acre-ft
34	Total Percolation			4,971	acre-ft
35	AWA Precipitation			8.8	inches
36	AWA Applied water			36	inches
37	AWA Evapotranspiration (ET)			38.3	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			34	mg/L

AWA: Acre-Weighted Average

Township: M23S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	28			%
3	Reported Acreage	2,331			acres
4	Parcels	145			number
5	Reported Crops	10			number
6	Reported N Applied	245,721			lbs
7	Total N Applied	242,622		244,472	lbs
8	AWA N Applied	104		105	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			205,424	lbs
11	AWA N Uptake			88	lbs/ac
12	Total N Removed	79,443		79,191	lbs
13	AWA N Removed	34		34	lbs/ac
14	AWA N Balance	70		71	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			5,200	lbs
17	Total N Runoff			792	lbs
18	Total Denitrification			1,127	lbs
19	Total Ammonia Volatilization			4,392	lbs
20	Total Change in Soil Organic N			674	lbs
21	Total Perennial Tissue N			47,196	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			0.5	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			0.3	lbs/ac
27	AWA Perennial Tissue N			20.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			49	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,931	acre-ft
31	Total Applied water			7,752	acre-ft
32	Total Evapotranspiration (ET)			7,909	acre-ft
33	Total Runoff			255	acre-ft
34	Total Percolation			1,512	acre-ft
35	AWA Precipitation			9.9	inches
36	AWA Applied water			39.9	inches
37	AWA Evapotranspiration (ET)			40.7	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			28	mg/L

AWA: Acre-Weighted Average

Township: M24S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	34			%
3	Reported Acreage	807			acres
4	Parcels	7			number
5	Reported Crops	1			number
6	Reported N Applied	128,078			lbs
7	Total N Applied	128,078		127,866	lbs
8	AWA N Applied	159		158	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			122,892	lbs
11	AWA N Uptake			152	lbs/ac
12	Total N Removed	71,204		71,203	lbs
13	AWA N Removed	88		88	lbs/ac
14	AWA N Balance	70		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			1,512	lbs
17	Total N Runoff			563	lbs
18	Total Denitrification			1,634	lbs
19	Total Ammonia Volatilization			4,166	lbs
20	Total Change in Soil Organic N			5,326	lbs
21	Total Perennial Tissue N			14,077	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			6.6	lbs/ac
27	AWA Perennial Tissue N			17.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			555	acre-ft
31	Total Applied water			2,898	acre-ft
32	Total Evapotranspiration (ET)			2,807	acre-ft
33	Total Runoff			84	acre-ft
34	Total Percolation			560	acre-ft
35	AWA Precipitation			8.2	inches
36	AWA Applied water			43.1	inches
37	AWA Evapotranspiration (ET)			41.7	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			8.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M24S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	13			%
3	Reported Acreage	6,680			acres
4	Parcels	68			number
5	Reported Crops	7			number
6	Reported N Applied	842,081			lbs
7	Total N Applied	842,081		856,466	lbs
8	AWA N Applied	126		128	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			981,892	lbs
11	AWA N Uptake			147	lbs/ac
12	Total N Removed	545,894		517,254	lbs
13	AWA N Removed	82		77	lbs/ac
14	AWA N Balance	44		51	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,543	lbs
17	Total N Runoff			3,553	lbs
18	Total Denitrification			22,531	lbs
19	Total Ammonia Volatilization			12,565	lbs
20	Total Change in Soil Organic N			42,264	lbs
21	Total Perennial Tissue N			138,537	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			6.3	lbs/ac
27	AWA Perennial Tissue N			20.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			16	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			32	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,295	acre-ft
31	Total Applied water			22,605	acre-ft
32	Total Evapotranspiration (ET)			23,510	acre-ft
33	Total Runoff			633	acre-ft
34	Total Percolation			2,692	acre-ft
35	AWA Precipitation			7.7	inches
36	AWA Applied water			40.6	inches
37	AWA Evapotranspiration (ET)			42.2	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M24S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	89			%
3	Reported Acreage	15,181			acres
4	Parcels	231			number
5	Reported Crops	7			number
6	Reported N Applied	1,749,545			lbs
7	Total N Applied	1,765,075		1,774,175	lbs
8	AWA N Applied	116		117	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,845,681	lbs
11	AWA N Uptake			122	lbs/ac
12	Total N Removed	980,847		937,355	lbs
13	AWA N Removed	65		62	lbs/ac
14	AWA N Balance	52		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,208	lbs
17	Total N Runoff			10,358	lbs
18	Total Denitrification			56,237	lbs
19	Total Ammonia Volatilization			32,967	lbs
20	Total Change in Soil Organic N			53,544	lbs
21	Total Perennial Tissue N			277,472	lbs
22	AWA N in Rain			1.8	lbs/ac
23	AWA N Runoff			0.7	lbs/ac
24	AWA Denitrification			3.7	lbs/ac
25	AWA Ammonia Volatilization			2.2	lbs/ac
26	AWA Change in Soil Organic N			3.5	lbs/ac
27	AWA Perennial Tissue N			18.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			48	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,986	acre-ft
31	Total Applied water			47,736	acre-ft
32	Total Evapotranspiration (ET)			49,311	acre-ft
33	Total Runoff			1,347	acre-ft
34	Total Percolation			7,031	acre-ft
35	AWA Precipitation			7.9	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			39	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			5.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M24S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	TBWQC			
2	Percent HVA	100			%
3	Reported Acreage	16,680			acres
4	Parcels	194			number
5	Reported Crops	11			number
6	Reported N Applied	2,068,279			lbs
7	Total N Applied	2,120,153		2,120,421	lbs
8	AWA N Applied	127		127	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,230,021	lbs
11	AWA N Uptake			134	lbs/ac
12	Total N Removed	1,129,304		1,096,527	lbs
13	AWA N Removed	68		66	lbs/ac
14	AWA N Balance	59		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,580	lbs
17	Total N Runoff			24,640	lbs
18	Total Denitrification			48,362	lbs
19	Total Ammonia Volatilization			55,495	lbs
20	Total Change in Soil Organic N			87,364	lbs
21	Total Perennial Tissue N			334,315	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			5.2	lbs/ac
27	AWA Perennial Tissue N			20	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,517	acre-ft
31	Total Applied water			54,641	acre-ft
32	Total Evapotranspiration (ET)			54,565	acre-ft
33	Total Runoff			1,129	acre-ft
34	Total Percolation			8,414	acre-ft
35	AWA Precipitation			6.8	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			39.3	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			6.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M24S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA, TBWQC			
2	Percent HVA	45			%
3	Reported Acreage	8,310			acres
4	Parcels	112			number
5	Reported Crops	9			number
6	Reported N Applied	1,028,948			lbs
7	Total N Applied	1,028,948		1,056,602	lbs
8	AWA N Applied	124		127	lbs/ac
9	AWA N Applied Difference		-3		lbs/ac
10	Total N Uptake			873,899	lbs
11	AWA N Uptake			105	lbs/ac
12	Total N Removed	355,983		371,851	lbs
13	AWA N Removed	43		45	lbs/ac
14	AWA N Balance	81		82	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			11,684	lbs
17	Total N Runoff			17,416	lbs
18	Total Denitrification			21,798	lbs
19	Total Ammonia Volatilization			23,249	lbs
20	Total Change in Soil Organic N			25,278	lbs
21	Total Perennial Tissue N			160,322	lbs
22	AWA N in Rain			1.4	lbs/ac
23	AWA N Runoff			2.1	lbs/ac
24	AWA Denitrification			2.6	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			3	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			55	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			67	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,478	acre-ft
31	Total Applied water			26,710	acre-ft
32	Total Evapotranspiration (ET)			27,913	acre-ft
33	Total Runoff			451	acre-ft
34	Total Percolation			2,782	acre-ft
35	AWA Precipitation			6.5	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			40.3	inches
38	AWA Runoff			0.7	inches
39	AWA Percolation			4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			60	mg/L

AWA: Acre-Weighted Average

Township: M25S20E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	55			%
3	Reported Acreage	18,575			acres
4	Parcels	189			number
5	Reported Crops	5			number
6	Reported N Applied	2,137,196			lbs
7	Total N Applied	2,144,053		2,139,786	lbs
8	AWA N Applied	115		115	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,040,268	lbs
11	AWA N Uptake			137	lbs/ac
12	Total N Removed	860,922		819,510	lbs
13	AWA N Removed	46		44	lbs/ac
14	AWA N Balance	69		71	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,270	lbs
17	Total N Runoff			6,938	lbs
18	Total Denitrification			43,384	lbs
19	Total Ammonia Volatilization			65,862	lbs
20	Total Change in Soil Organic N			111,284	lbs
21	Total Perennial Tissue N			323,808	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			7.5	lbs/ac
27	AWA Perennial Tissue N			21.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,435	acre-ft
31	Total Applied water			47,230	acre-ft
32	Total Evapotranspiration (ET)			47,597	acre-ft
33	Total Runoff			1,309	acre-ft
34	Total Percolation			7,648	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			38	inches
37	AWA Evapotranspiration (ET)			38.3	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			4.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			38	mg/L

AWA: Acre-Weighted Average

Township: M25S21E

Row (R)	Category	INMP/NMP	CV-SWAT	Units
INMP/NMP Data and N Balance Results				
1	Coalitions	WWQC		
2	Percent HVA	97		%
3	Reported Acreage	2,746		acres
4	Parcels	96		number
5	Reported Crops	2		number
6	Reported N Applied	31,668		lbs
7	Total N Applied	31,668	29,314	lbs
8	AWA N Applied	12	11	lbs/ac
9	AWA N Applied Difference	1		lbs/ac
10	Total N Uptake		41,027	lbs
11	AWA N Uptake		34	lbs/ac
12	Total N Removed	0	0	lbs
13	AWA N Removed	0	0	lbs/ac
14	AWA N Balance	12	11	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)	1		lbs/ac
CV-SWAT Nitrogen Budget Results				
16	Total N in Rain		2,065	lbs
17	Total N Runoff		142	lbs
18	Total Denitrification		537	lbs
19	Total Ammonia Volatilization		944	lbs
20	Total Change in Soil Organic N		-2,557	lbs
21	Total Perennial Tissue N		24,562	lbs
22	AWA N in Rain		1.7	lbs/ac
23	AWA N Runoff		0.1	lbs/ac
24	AWA Denitrification		0.4	lbs/ac
25	AWA Ammonia Volatilization		0.8	lbs/ac
26	AWA Change in Soil Organic N		-2.1	lbs/ac
27	AWA Perennial Tissue N		20.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)		3	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone		25	%
CV-SWAT Water Budget Results				
30	Total Precipitation		771	acre-ft
31	Total Applied water		3,121	acre-ft
32	Total Evapotranspiration (ET)		3,389	acre-ft
33	Total Runoff		108	acre-ft
34	Total Percolation		387	acre-ft
35	AWA Precipitation		7.6	inches
36	AWA Applied water		30.7	inches
37	AWA Evapotranspiration (ET)		33.4	inches
38	AWA Runoff		1.1	inches
39	AWA Percolation		1.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone		7	mg/L

AWA: Acre-Weighted Average

Township: M25S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	69			%
3	Reported Acreage	3,010			acres
4	Parcels	26			number
5	Reported Crops	3			number
6	Reported N Applied	481,024			lbs
7	Total N Applied	481,024		480,302	lbs
8	AWA N Applied	160		160	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			452,372	lbs
11	AWA N Uptake			155	lbs/ac
12	Total N Removed	146,709		152,249	lbs
13	AWA N Removed	49		51	lbs/ac
14	AWA N Balance	111		109	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			4,962	lbs
17	Total N Runoff			1,038	lbs
18	Total Denitrification			20,647	lbs
19	Total Ammonia Volatilization			7,175	lbs
20	Total Change in Soil Organic N			27,241	lbs
21	Total Perennial Tissue N			59,977	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			7.1	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			9.3	lbs/ac
27	AWA Perennial Tissue N			20.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			70	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			65	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,854	acre-ft
31	Total Applied water			10,297	acre-ft
32	Total Evapotranspiration (ET)			10,566	acre-ft
33	Total Runoff			246	acre-ft
34	Total Percolation			1,301	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			42.2	inches
37	AWA Evapotranspiration (ET)			43.3	inches
38	AWA Runoff			1	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			60	mg/L

AWA: Acre-Weighted Average

Township: M25S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	26			%
3	Reported Acreage	9,823			acres
4	Parcels	104			number
5	Reported Crops	10			number
6	Reported N Applied	1,447,916			lbs
7	Total N Applied	1,480,864		1,481,571	lbs
8	AWA N Applied	151		151	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,882,105	lbs
11	AWA N Uptake			196	lbs/ac
12	Total N Removed	1,424,553		1,321,987	lbs
13	AWA N Removed	145		135	lbs/ac
14	AWA N Balance	4		16	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-12		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			16,338	lbs
17	Total N Runoff			5,119	lbs
18	Total Denitrification			19,882	lbs
19	Total Ammonia Volatilization			49,004	lbs
20	Total Change in Soil Organic N			55,617	lbs
21	Total Perennial Tissue N			151,071	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			5.1	lbs/ac
26	AWA Change in Soil Organic N			5.8	lbs/ac
27	AWA Perennial Tissue N			15.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			116	%
CV-SWAT Water Budget Results					
30	Total Precipitation			6,098	acre-ft
31	Total Applied water			30,226	acre-ft
32	Total Evapotranspiration (ET)			29,370	acre-ft
33	Total Runoff			945	acre-ft
34	Total Percolation			5,978	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			36.6	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			11	mg/L

AWA: Acre-Weighted Average

Township: M25S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	99			%
3	Reported Acreage	10,789			acres
4	Parcels	173			number
5	Reported Crops	14			number
6	Reported N Applied	1,307,176			lbs
7	Total N Applied	1,316,396		1,248,089	lbs
8	AWA N Applied	122		116	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			1,431,262	lbs
11	AWA N Uptake			158	lbs/ac
12	Total N Removed	775,498		758,304	lbs
13	AWA N Removed	72		70	lbs/ac
14	AWA N Balance	44		45	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,939	lbs
17	Total N Runoff			5,682	lbs
18	Total Denitrification			24,402	lbs
19	Total Ammonia Volatilization			32,972	lbs
20	Total Change in Soil Organic N			38,327	lbs
21	Total Perennial Tissue N			181,916	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			4.2	lbs/ac
27	AWA Perennial Tissue N			20	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,672	acre-ft
31	Total Applied water			29,946	acre-ft
32	Total Evapotranspiration (ET)			29,080	acre-ft
33	Total Runoff			698	acre-ft
34	Total Percolation			6,051	acre-ft
35	AWA Precipitation			7.5	inches
36	AWA Applied water			39.6	inches
37	AWA Evapotranspiration (ET)			38.5	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			6.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M25S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA, TBWQC			
2	Percent HVA	99			%
3	Reported Acreage	18,324			acres
4	Parcels	588			number
5	Reported Crops	18			number
6	Reported N Applied	1,721,141			lbs
7	Total N Applied	1,790,433		1,762,737	lbs
8	AWA N Applied	98		96	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,642,777	lbs
11	AWA N Uptake			95	lbs/ac
12	Total N Removed	755,417		746,036	lbs
13	AWA N Removed	41		41	lbs/ac
14	AWA N Balance	56		55	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,785	lbs
17	Total N Runoff			33,778	lbs
18	Total Denitrification			59,704	lbs
19	Total Ammonia Volatilization			46,043	lbs
20	Total Change in Soil Organic N			19,750	lbs
21	Total Perennial Tissue N			309,310	lbs
22	AWA N in Rain			1.4	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			1.1	lbs/ac
27	AWA Perennial Tissue N			17.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,346	acre-ft
31	Total Applied water			52,564	acre-ft
32	Total Evapotranspiration (ET)			54,000	acre-ft
33	Total Runoff			1,161	acre-ft
34	Total Percolation			6,686	acre-ft
35	AWA Precipitation			6.5	inches
36	AWA Applied water			36.3	inches
37	AWA Evapotranspiration (ET)			37.3	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			4.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			32	mg/L

AWA: Acre-Weighted Average

Township: M25S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA, TBWQC			
2	Percent HVA	14			%
3	Reported Acreage	6,578			acres
4	Parcels	106			number
5	Reported Crops	13			number
6	Reported N Applied	708,575			lbs
7	Total N Applied	708,629		712,229	lbs
8	AWA N Applied	108		108	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			627,490	lbs
11	AWA N Uptake			102	lbs/ac
12	Total N Removed	248,022		252,848	lbs
13	AWA N Removed	38		38	lbs/ac
14	AWA N Balance	70		70	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			8,761	lbs
17	Total N Runoff			21,069	lbs
18	Total Denitrification			23,396	lbs
19	Total Ammonia Volatilization			13,862	lbs
20	Total Change in Soil Organic N			30,688	lbs
21	Total Perennial Tissue N			123,593	lbs
22	AWA N in Rain			1.4	lbs/ac
23	AWA N Runoff			3.4	lbs/ac
24	AWA Denitrification			3.8	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			20.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			40	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,286	acre-ft
31	Total Applied water			19,751	acre-ft
32	Total Evapotranspiration (ET)			20,757	acre-ft
33	Total Runoff			389	acre-ft
34	Total Percolation			1,860	acre-ft
35	AWA Precipitation			6.4	inches
36	AWA Applied water			38.6	inches
37	AWA Evapotranspiration (ET)			40.6	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			3.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			52	mg/L

AWA: Acre-Weighted Average

Township: M26S18E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	46			%
3	Reported Acreage	5,181			acres
4	Parcels	47			number
5	Reported Crops	4			number
6	Reported N Applied	888,792			lbs
7	Total N Applied	888,792		844,769	lbs
8	AWA N Applied	172		163	lbs/ac
9	AWA N Applied Difference		8		lbs/ac
10	Total N Uptake			799,885	lbs
11	AWA N Uptake			195	lbs/ac
12	Total N Removed	501,211		445,666	lbs
13	AWA N Removed	97		86	lbs/ac
14	AWA N Balance	67		77	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-10		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			6,977	lbs
17	Total N Runoff			1,351	lbs
18	Total Denitrification			11,186	lbs
19	Total Ammonia Volatilization			27,024	lbs
20	Total Change in Soil Organic N			37,092	lbs
21	Total Perennial Tissue N			78,665	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			6.6	lbs/ac
26	AWA Change in Soil Organic N			9	lbs/ac
27	AWA Perennial Tissue N			19.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			51	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,603	acre-ft
31	Total Applied water			15,271	acre-ft
32	Total Evapotranspiration (ET)			14,410	acre-ft
33	Total Runoff			301	acre-ft
34	Total Percolation			3,372	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			44.6	inches
37	AWA Evapotranspiration (ET)			42.1	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			29	mg/L

AWA: Acre-Weighted Average

Township: M26S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA, WWQC			
2	Percent HVA	84			%
3	Reported Acreage	5,412			acres
4	Parcels	146			number
5	Reported Crops	5			number
6	Reported N Applied	621,401			lbs
7	Total N Applied	624,704		630,167	lbs
8	AWA N Applied	115		116	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			665,841	lbs
11	AWA N Uptake			151	lbs/ac
12	Total N Removed	381,844		350,901	lbs
13	AWA N Removed	71		65	lbs/ac
14	AWA N Balance	45		52	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,429	lbs
17	Total N Runoff			5,428	lbs
18	Total Denitrification			11,394	lbs
19	Total Ammonia Volatilization			19,038	lbs
20	Total Change in Soil Organic N			22,424	lbs
21	Total Perennial Tissue N			96,868	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			2.6	lbs/ac
25	AWA Ammonia Volatilization			4.3	lbs/ac
26	AWA Change in Soil Organic N			5.1	lbs/ac
27	AWA Perennial Tissue N			22	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			47	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,791	acre-ft
31	Total Applied water			14,709	acre-ft
32	Total Evapotranspiration (ET)			14,219	acre-ft
33	Total Runoff			455	acre-ft
34	Total Percolation			2,797	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			40.1	inches
37	AWA Evapotranspiration (ET)			38.7	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			6.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M26S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	94			%
3	Reported Acreage	2,619			acres
4	Parcels	23			number
5	Reported Crops	3			number
6	Reported N Applied	319,738			lbs
7	Total N Applied	319,738		315,040	lbs
8	AWA N Applied	122		120	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			321,560	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	179,479		176,420	lbs
13	AWA N Removed	69		67	lbs/ac
14	AWA N Balance	54		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,375	lbs
17	Total N Runoff			2,146	lbs
18	Total Denitrification			6,160	lbs
19	Total Ammonia Volatilization			10,083	lbs
20	Total Change in Soil Organic N			13,337	lbs
21	Total Perennial Tissue N			44,586	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			3.1	lbs/ac
25	AWA Ammonia Volatilization			5.1	lbs/ac
26	AWA Change in Soil Organic N			6.7	lbs/ac
27	AWA Perennial Tissue N			22.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			22	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			41	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,260	acre-ft
31	Total Applied water			6,734	acre-ft
32	Total Evapotranspiration (ET)			6,725	acre-ft
33	Total Runoff			208	acre-ft
34	Total Percolation			1,045	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			40.6	inches
37	AWA Evapotranspiration (ET)			40.6	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			20	mg/L

AWA: Acre-Weighted Average

Township: M26S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	34			%
3	Reported Acreage	11,972			acres
4	Parcels	95			number
5	Reported Crops	12			number
6	Reported N Applied	1,317,551			lbs
7	Total N Applied	1,338,641		1,306,069	lbs
8	AWA N Applied	112		109	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,947,584	lbs
11	AWA N Uptake			169	lbs/ac
12	Total N Removed	1,386,435		1,336,640	lbs
13	AWA N Removed	116		112	lbs/ac
14	AWA N Balance	-8		-3	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,450	lbs
17	Total N Runoff			4,399	lbs
18	Total Denitrification			33,692	lbs
19	Total Ammonia Volatilization			35,923	lbs
20	Total Change in Soil Organic N			58,555	lbs
21	Total Perennial Tissue N			182,501	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			2.9	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			5.1	lbs/ac
27	AWA Perennial Tissue N			15.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			19	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-758	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,304	acre-ft
31	Total Applied water			37,487	acre-ft
32	Total Evapotranspiration (ET)			36,632	acre-ft
33	Total Runoff			1,052	acre-ft
34	Total Percolation			7,062	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39	inches
37	AWA Evapotranspiration (ET)			38.1	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			7.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M26S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	33			%
3	Reported Acreage	16,158			acres
4	Parcels	106			number
5	Reported Crops	8			number
6	Reported N Applied	2,543,036			lbs
7	Total N Applied	2,604,344		2,584,580	lbs
8	AWA N Applied	161		160	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			3,114,103	lbs
11	AWA N Uptake			204	lbs/ac
12	Total N Removed	1,983,688		1,924,296	lbs
13	AWA N Removed	123		119	lbs/ac
14	AWA N Balance	36		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,903	lbs
17	Total N Runoff			9,231	lbs
18	Total Denitrification			52,522	lbs
19	Total Ammonia Volatilization			67,550	lbs
20	Total Change in Soil Organic N			97,131	lbs
21	Total Perennial Tissue N			292,445	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.6	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			19.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			34	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			83	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,663	acre-ft
31	Total Applied water			55,517	acre-ft
32	Total Evapotranspiration (ET)			52,851	acre-ft
33	Total Runoff			1,403	acre-ft
34	Total Percolation			10,905	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			43.7	inches
37	AWA Evapotranspiration (ET)			41.6	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			8.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M26S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	69			%
3	Reported Acreage	19,044			acres
4	Parcels	163			number
5	Reported Crops	12			number
6	Reported N Applied	2,732,394			lbs
7	Total N Applied	2,838,819		2,821,161	lbs
8	AWA N Applied	149		148	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			3,195,626	lbs
11	AWA N Uptake			178	lbs/ac
12	Total N Removed	1,954,100		1,836,971	lbs
13	AWA N Removed	103		96	lbs/ac
14	AWA N Balance	45		52	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,451	lbs
17	Total N Runoff			8,569	lbs
18	Total Denitrification			38,000	lbs
19	Total Ammonia Volatilization			78,812	lbs
20	Total Change in Soil Organic N			24,816	lbs
21	Total Perennial Tissue N			375,853	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			1.4	lbs/ac
27	AWA Perennial Tissue N			20.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			50	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,349	acre-ft
31	Total Applied water			64,963	acre-ft
32	Total Evapotranspiration (ET)			61,620	acre-ft
33	Total Runoff			1,325	acre-ft
34	Total Percolation			13,404	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			43.5	inches
37	AWA Evapotranspiration (ET)			41.2	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M26S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	CWDC, KRWCA			
2	Percent HVA	66			%
3	Reported Acreage	17,810			acres
4	Parcels	238			number
5	Reported Crops	12			number
6	Reported N Applied	1,909,889			lbs
7	Total N Applied	2,002,848		2,030,149	lbs
8	AWA N Applied	112		114	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,073,532	lbs
11	AWA N Uptake			124	lbs/ac
12	Total N Removed	1,110,064		1,068,589	lbs
13	AWA N Removed	62		60	lbs/ac
14	AWA N Balance	50		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,219	lbs
17	Total N Runoff			14,089	lbs
18	Total Denitrification			56,657	lbs
19	Total Ammonia Volatilization			48,679	lbs
20	Total Change in Soil Organic N			52,584	lbs
21	Total Perennial Tissue N			336,070	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			2.9	lbs/ac
26	AWA Change in Soil Organic N			3.2	lbs/ac
27	AWA Perennial Tissue N			20.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,225	acre-ft
31	Total Applied water			55,337	acre-ft
32	Total Evapotranspiration (ET)			56,277	acre-ft
33	Total Runoff			1,378	acre-ft
34	Total Percolation			7,839	acre-ft
35	AWA Precipitation			7.4	inches
36	AWA Applied water			39.8	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			1	inches
39	AWA Percolation			5.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M27S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	19			%
3	Reported Acreage	14,350			acres
4	Parcels	68			number
5	Reported Crops	5			number
6	Reported N Applied	1,330,064			lbs
7	Total N Applied	1,343,021		1,378,679	lbs
8	AWA N Applied	94		96	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,323,163	lbs
11	AWA N Uptake			118	lbs/ac
12	Total N Removed	737,703		725,056	lbs
13	AWA N Removed	51		51	lbs/ac
14	AWA N Balance	42		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			19,027	lbs
17	Total N Runoff			10,741	lbs
18	Total Denitrification			14,541	lbs
19	Total Ammonia Volatilization			46,416	lbs
20	Total Change in Soil Organic N			52,074	lbs
21	Total Perennial Tissue N			216,758	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			1.3	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			4.6	lbs/ac
27	AWA Perennial Tissue N			19.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			51	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,096	acre-ft
31	Total Applied water			36,880	acre-ft
32	Total Evapotranspiration (ET)			35,932	acre-ft
33	Total Runoff			1,264	acre-ft
34	Total Percolation			6,722	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39.5	inches
37	AWA Evapotranspiration (ET)			38.5	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			5.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M27S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA, WWQC			
2	Percent HVA	97			%
3	Reported Acreage	12,402			acres
4	Parcels	120			number
5	Reported Crops	9			number
6	Reported N Applied	1,265,031			lbs
7	Total N Applied	1,280,445		1,283,872	lbs
8	AWA N Applied	103		104	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,347,793	lbs
11	AWA N Uptake			153	lbs/ac
12	Total N Removed	739,874		665,614	lbs
13	AWA N Removed	60		54	lbs/ac
14	AWA N Balance	44		50	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-6		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,824	lbs
17	Total N Runoff			7,948	lbs
18	Total Denitrification			38,930	lbs
19	Total Ammonia Volatilization			27,869	lbs
20	Total Change in Soil Organic N			56,363	lbs
21	Total Perennial Tissue N			166,738	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			4.4	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			19	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,562	acre-ft
31	Total Applied water			28,976	acre-ft
32	Total Evapotranspiration (ET)			28,853	acre-ft
33	Total Runoff			874	acre-ft
34	Total Percolation			4,727	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39.6	inches
37	AWA Evapotranspiration (ET)			39.4	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			4.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: M27S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	77			%
3	Reported Acreage	16,687			acres
4	Parcels	186			number
5	Reported Crops	11			number
6	Reported N Applied	2,940,714			lbs
7	Total N Applied	2,983,034		2,764,094	lbs
8	AWA N Applied	179		166	lbs/ac
9	AWA N Applied Difference		13		lbs/ac
10	Total N Uptake			3,074,732	lbs
11	AWA N Uptake			206	lbs/ac
12	Total N Removed	1,869,209		1,739,338	lbs
13	AWA N Removed	112		104	lbs/ac
14	AWA N Balance	53		61	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-9		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,305	lbs
17	Total N Runoff			23,783	lbs
18	Total Denitrification			36,453	lbs
19	Total Ammonia Volatilization			101,419	lbs
20	Total Change in Soil Organic N			158,735	lbs
21	Total Perennial Tissue N			293,552	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			6.8	lbs/ac
26	AWA Change in Soil Organic N			10.7	lbs/ac
27	AWA Perennial Tissue N			19.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			36	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			58	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,431	acre-ft
31	Total Applied water			55,978	acre-ft
32	Total Evapotranspiration (ET)			51,055	acre-ft
33	Total Runoff			2,202	acre-ft
34	Total Percolation			12,805	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			45.1	inches
37	AWA Evapotranspiration (ET)			41.1	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M27S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	71			%
3	Reported Acreage	16,005			acres
4	Parcels	271			number
5	Reported Crops	17			number
6	Reported N Applied	2,700,860			lbs
7	Total N Applied	2,777,190		2,736,594	lbs
8	AWA N Applied	174		171	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			3,215,418	lbs
11	AWA N Uptake			208	lbs/ac
12	Total N Removed	1,992,132		1,864,974	lbs
13	AWA N Removed	124		117	lbs/ac
14	AWA N Balance	46		54	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-8		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,076	lbs
17	Total N Runoff			20,479	lbs
18	Total Denitrification			52,995	lbs
19	Total Ammonia Volatilization			64,596	lbs
20	Total Change in Soil Organic N			125,292	lbs
21	Total Perennial Tissue N			311,590	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			3.4	lbs/ac
25	AWA Ammonia Volatilization			4.2	lbs/ac
26	AWA Change in Soil Organic N			8.1	lbs/ac
27	AWA Perennial Tissue N			20.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			31	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,812	acre-ft
31	Total Applied water			57,615	acre-ft
32	Total Evapotranspiration (ET)			52,820	acre-ft
33	Total Runoff			1,258	acre-ft
34	Total Percolation			13,508	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			44.6	inches
37	AWA Evapotranspiration (ET)			40.9	inches
38	AWA Runoff			1	inches
39	AWA Percolation			10.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M27S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	100			%
3	Reported Acreage	22,407			acres
4	Parcels	123			number
5	Reported Crops	9			number
6	Reported N Applied	3,135,754			lbs
7	Total N Applied	3,411,423		3,389,582	lbs
8	AWA N Applied	152		151	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			3,915,797	lbs
11	AWA N Uptake			202	lbs/ac
12	Total N Removed	2,557,842		2,509,861	lbs
13	AWA N Removed	114		112	lbs/ac
14	AWA N Balance	36		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,916	lbs
17	Total N Runoff			7,993	lbs
18	Total Denitrification			40,492	lbs
19	Total Ammonia Volatilization			70,586	lbs
20	Total Change in Soil Organic N			104,446	lbs
21	Total Perennial Tissue N			393,613	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			3.6	lbs/ac
26	AWA Change in Soil Organic N			5.4	lbs/ac
27	AWA Perennial Tissue N			20.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			18	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			45	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,265	acre-ft
31	Total Applied water			71,609	acre-ft
32	Total Evapotranspiration (ET)			66,035	acre-ft
33	Total Runoff			820	acre-ft
34	Total Percolation			17,186	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			44.4	inches
37	AWA Evapotranspiration (ET)			40.9	inches
38	AWA Runoff			0.5	inches
39	AWA Percolation			9.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M27S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	CWDC, KRWCA			
2	Percent HVA	46			%
3	Reported Acreage	15,770			acres
4	Parcels	187			number
5	Reported Crops	22			number
6	Reported N Applied	1,996,679			lbs
7	Total N Applied	2,043,007		2,035,416	lbs
8	AWA N Applied	130		129	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,128,903	lbs
11	AWA N Uptake			147	lbs/ac
12	Total N Removed	1,019,685		990,451	lbs
13	AWA N Removed	65		63	lbs/ac
14	AWA N Balance	65		66	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,717	lbs
17	Total N Runoff			12,201	lbs
18	Total Denitrification			79,460	lbs
19	Total Ammonia Volatilization			44,309	lbs
20	Total Change in Soil Organic N			100,415	lbs
21	Total Perennial Tissue N			321,472	lbs
22	AWA N in Rain			1.6	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			5.5	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			6.9	lbs/ac
27	AWA Perennial Tissue N			22.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,866	acre-ft
31	Total Applied water			49,883	acre-ft
32	Total Evapotranspiration (ET)			48,998	acre-ft
33	Total Runoff			1,143	acre-ft
34	Total Percolation			8,671	acre-ft
35	AWA Precipitation			7.3	inches
36	AWA Applied water			41.2	inches
37	AWA Evapotranspiration (ET)			40.5	inches
38	AWA Runoff			0.9	inches
39	AWA Percolation			6.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M28S21E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	54			%
3	Reported Acreage	10,623			acres
4	Parcels	67			number
5	Reported Crops	4			number
6	Reported N Applied	1,779,759			lbs
7	Total N Applied	1,820,021		1,814,103	lbs
8	AWA N Applied	171		171	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,732,248	lbs
11	AWA N Uptake			189	lbs/ac
12	Total N Removed	1,181,352		1,176,592	lbs
13	AWA N Removed	111		111	lbs/ac
14	AWA N Balance	60		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			15,517	lbs
17	Total N Runoff			13,897	lbs
18	Total Denitrification			16,799	lbs
19	Total Ammonia Volatilization			58,118	lbs
20	Total Change in Soil Organic N			58,608	lbs
21	Total Perennial Tissue N			163,553	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			6.4	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			17.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			54	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,790	acre-ft
31	Total Applied water			33,617	acre-ft
32	Total Evapotranspiration (ET)			31,886	acre-ft
33	Total Runoff			985	acre-ft
34	Total Percolation			6,484	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			44.1	inches
37	AWA Evapotranspiration (ET)			41.9	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M28S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA, WWQC			
2	Percent HVA	60			%
3	Reported Acreage	15,379			acres
4	Parcels	107			number
5	Reported Crops	8			number
6	Reported N Applied	1,478,125			lbs
7	Total N Applied	1,522,898		1,520,701	lbs
8	AWA N Applied	99		99	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,739,153	lbs
11	AWA N Uptake			136	lbs/ac
12	Total N Removed	989,823		933,988	lbs
13	AWA N Removed	64		61	lbs/ac
14	AWA N Balance	35		38	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,587	lbs
17	Total N Runoff			6,447	lbs
18	Total Denitrification			22,593	lbs
19	Total Ammonia Volatilization			36,097	lbs
20	Total Change in Soil Organic N			51,271	lbs
21	Total Perennial Tissue N			241,108	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			4	lbs/ac
27	AWA Perennial Tissue N			18.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			16	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			43	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,076	acre-ft
31	Total Applied water			41,744	acre-ft
32	Total Evapotranspiration (ET)			41,951	acre-ft
33	Total Runoff			1,226	acre-ft
34	Total Percolation			6,530	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			39.5	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M28S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA			
2	Percent HVA	47			%
3	Reported Acreage	13,157			acres
4	Parcels	193			number
5	Reported Crops	19			number
6	Reported N Applied	1,713,690			lbs
7	Total N Applied	1,791,144		1,811,382	lbs
8	AWA N Applied	136		138	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			2,188,817	lbs
11	AWA N Uptake			185	lbs/ac
12	Total N Removed	1,457,606		1,435,340	lbs
13	AWA N Removed	111		109	lbs/ac
14	AWA N Balance	25		29	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,141	lbs
17	Total N Runoff			9,952	lbs
18	Total Denitrification			16,897	lbs
19	Total Ammonia Volatilization			63,214	lbs
20	Total Change in Soil Organic N			77,214	lbs
21	Total Perennial Tissue N			166,447	lbs
22	AWA N in Rain			1.5	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			1.4	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			6.5	lbs/ac
27	AWA Perennial Tissue N			14.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			16	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,499	acre-ft
31	Total Applied water			38,195	acre-ft
32	Total Evapotranspiration (ET)			36,597	acre-ft
33	Total Runoff			1,454	acre-ft
34	Total Percolation			7,648	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			38.7	inches
37	AWA Evapotranspiration (ET)			37.1	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M28S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	39			%
3	Reported Acreage	13,210			acres
4	Parcels	174			number
5	Reported Crops	17			number
6	Reported N Applied	1,951,680			lbs
7	Total N Applied	2,152,106		2,148,943	lbs
8	AWA N Applied	163		163	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,547,771	lbs
11	AWA N Uptake			197	lbs/ac
12	Total N Removed	1,724,253		1,687,224	lbs
13	AWA N Removed	131		128	lbs/ac
14	AWA N Balance	32		35	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,944	lbs
17	Total N Runoff			13,642	lbs
18	Total Denitrification			25,921	lbs
19	Total Ammonia Volatilization			68,723	lbs
20	Total Change in Soil Organic N			79,362	lbs
21	Total Perennial Tissue N			222,162	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.1	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			5.3	lbs/ac
26	AWA Change in Soil Organic N			6.1	lbs/ac
27	AWA Perennial Tissue N			17.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			25	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			72	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,209	acre-ft
31	Total Applied water			45,773	acre-ft
32	Total Evapotranspiration (ET)			42,240	acre-ft
33	Total Runoff			1,306	acre-ft
34	Total Percolation			10,396	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			42.4	inches
37	AWA Evapotranspiration (ET)			39.1	inches
38	AWA Runoff			1.2	inches
39	AWA Percolation			9.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M28S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	99			%
3	Reported Acreage	17,910			acres
4	Parcels	327			number
5	Reported Crops	18			number
6	Reported N Applied	2,775,229			lbs
7	Total N Applied	2,790,504		2,800,255	lbs
8	AWA N Applied	156		156	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			3,241,623	lbs
11	AWA N Uptake			189	lbs/ac
12	Total N Removed	1,753,171		1,732,854	lbs
13	AWA N Removed	98		97	lbs/ac
14	AWA N Balance	57		60	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			29,064	lbs
17	Total N Runoff			16,843	lbs
18	Total Denitrification			62,187	lbs
19	Total Ammonia Volatilization			66,624	lbs
20	Total Change in Soil Organic N			155,519	lbs
21	Total Perennial Tissue N			357,876	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			3.6	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			9.1	lbs/ac
27	AWA Perennial Tissue N			20.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			59	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,881	acre-ft
31	Total Applied water			59,079	acre-ft
32	Total Evapotranspiration (ET)			55,007	acre-ft
33	Total Runoff			1,592	acre-ft
34	Total Percolation			13,577	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			41.3	inches
37	AWA Evapotranspiration (ET)			38.4	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M28S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	CWDC, KRWCA			
2	Percent HVA	89			%
3	Reported Acreage	17,369			acres
4	Parcels	199			number
5	Reported Crops	12			number
6	Reported N Applied	1,733,535			lbs
7	Total N Applied	1,857,725		1,941,568	lbs
8	AWA N Applied	107		112	lbs/ac
9	AWA N Applied Difference		-5		lbs/ac
10	Total N Uptake			2,160,447	lbs
11	AWA N Uptake			136	lbs/ac
12	Total N Removed	1,106,289		1,119,119	lbs
13	AWA N Removed	64		64	lbs/ac
14	AWA N Balance	43		47	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			26,790	lbs
17	Total N Runoff			16,116	lbs
18	Total Denitrification			43,182	lbs
19	Total Ammonia Volatilization			43,489	lbs
20	Total Change in Soil Organic N			90,998	lbs
21	Total Perennial Tissue N			273,066	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			2.7	lbs/ac
26	AWA Change in Soil Organic N			5.7	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			23	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			49	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,027	acre-ft
31	Total Applied water			48,391	acre-ft
32	Total Evapotranspiration (ET)			46,897	acre-ft
33	Total Runoff			1,740	acre-ft
34	Total Percolation			9,953	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			36.7	inches
37	AWA Evapotranspiration (ET)			35.5	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			6.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M28S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	CWDC, KRWCA			
2	Percent HVA	11			%
3	Reported Acreage	3,333			acres
4	Parcels	32			number
5	Reported Crops	7			number
6	Reported N Applied	138,752			lbs
7	Total N Applied	148,351		135,787	lbs
8	AWA N Applied	45		41	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			153,114	lbs
11	AWA N Uptake			76	lbs/ac
12	Total N Removed	71,833		65,184	lbs
13	AWA N Removed	22		20	lbs/ac
14	AWA N Balance	19		21	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			3,408	lbs
17	Total N Runoff			2,078	lbs
18	Total Denitrification			4,141	lbs
19	Total Ammonia Volatilization			3,724	lbs
20	Total Change in Soil Organic N			5,232	lbs
21	Total Perennial Tissue N			33,880	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			1.9	lbs/ac
26	AWA Change in Soil Organic N			2.6	lbs/ac
27	AWA Perennial Tissue N			16.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			9	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			42	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,273	acre-ft
31	Total Applied water			6,050	acre-ft
32	Total Evapotranspiration (ET)			6,327	acre-ft
33	Total Runoff			257	acre-ft
34	Total Percolation			885	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			36.1	inches
37	AWA Evapotranspiration (ET)			37.8	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			3.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			12	mg/L

AWA: Acre-Weighted Average

Township: M29S22E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	WWQC			
2	Percent HVA	15			%
3	Reported Acreage	3,221			acres
4	Parcels	13			number
5	Reported Crops	3			number
6	Reported N Applied	514,795			lbs
7	Total N Applied	514,795		516,736	lbs
8	AWA N Applied	160		160	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			554,649	lbs
11	AWA N Uptake			220	lbs/ac
12	Total N Removed	453,165		399,051	lbs
13	AWA N Removed	141		124	lbs/ac
14	AWA N Balance	19		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-17		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			4,274	lbs
17	Total N Runoff			819	lbs
18	Total Denitrification			1,799	lbs
19	Total Ammonia Volatilization			16,221	lbs
20	Total Change in Soil Organic N			13,369	lbs
21	Total Perennial Tissue N			43,157	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.3	lbs/ac
24	AWA Denitrification			0.7	lbs/ac
25	AWA Ammonia Volatilization			6.4	lbs/ac
26	AWA Change in Soil Organic N			5.3	lbs/ac
27	AWA Perennial Tissue N			17.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			14	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			40	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,593	acre-ft
31	Total Applied water			9,737	acre-ft
32	Total Evapotranspiration (ET)			8,916	acre-ft
33	Total Runoff			163	acre-ft
34	Total Percolation			2,242	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			46.4	inches
37	AWA Evapotranspiration (ET)			42.5	inches
38	AWA Runoff			0.8	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			8	mg/L

AWA: Acre-Weighted Average

Township: M29S23E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA			
2	Percent HVA	12			%
3	Reported Acreage	6,068			acres
4	Parcels	78			number
5	Reported Crops	13			number
6	Reported N Applied	656,566			lbs
7	Total N Applied	660,671		643,017	lbs
8	AWA N Applied	109		106	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			775,819	lbs
11	AWA N Uptake			138	lbs/ac
12	Total N Removed	421,101		415,499	lbs
13	AWA N Removed	69		68	lbs/ac
14	AWA N Balance	36		37	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,252	lbs
17	Total N Runoff			4,321	lbs
18	Total Denitrification			13,713	lbs
19	Total Ammonia Volatilization			13,850	lbs
20	Total Change in Soil Organic N			28,403	lbs
21	Total Perennial Tissue N			83,849	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			5.1	lbs/ac
27	AWA Perennial Tissue N			15	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			104	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,551	acre-ft
31	Total Applied water			16,710	acre-ft
32	Total Evapotranspiration (ET)			16,955	acre-ft
33	Total Runoff			531	acre-ft
34	Total Percolation			2,895	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			35.8	inches
37	AWA Evapotranspiration (ET)			36.3	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			5.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			30	mg/L

AWA: Acre-Weighted Average

Township: M29S24E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA			
2	Percent HVA	28			%
3	Reported Acreage	14,162			acres
4	Parcels	169			number
5	Reported Crops	17			number
6	Reported N Applied	1,687,636			lbs
7	Total N Applied	1,709,839		1,742,245	lbs
8	AWA N Applied	121		123	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			3,071,472	lbs
11	AWA N Uptake			221	lbs/ac
12	Total N Removed	2,466,459		2,331,441	lbs
13	AWA N Removed	174		165	lbs/ac
14	AWA N Balance	-53		-42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-12		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,086	lbs
17	Total N Runoff			13,715	lbs
18	Total Denitrification			30,947	lbs
19	Total Ammonia Volatilization			43,771	lbs
20	Total Change in Soil Organic N			54,838	lbs
21	Total Perennial Tissue N			163,445	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			3.9	lbs/ac
27	AWA Perennial Tissue N			11.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			27	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			-64	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,808	acre-ft
31	Total Applied water			42,432	acre-ft
32	Total Evapotranspiration (ET)			40,574	acre-ft
33	Total Runoff			1,463	acre-ft
34	Total Percolation			9,004	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			36.6	inches
37	AWA Evapotranspiration (ET)			35	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			15	mg/L

AWA: Acre-Weighted Average

Township: M29S25E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	49			%
3	Reported Acreage	15,836			acres
4	Parcels	198			number
5	Reported Crops	17			number
6	Reported N Applied	2,136,799			lbs
7	Total N Applied	2,266,454		2,279,927	lbs
8	AWA N Applied	143		144	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			3,183,888	lbs
11	AWA N Uptake			217	lbs/ac
12	Total N Removed	2,302,178		2,253,193	lbs
13	AWA N Removed	145		142	lbs/ac
14	AWA N Balance	-2		2	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,300	lbs
17	Total N Runoff			18,373	lbs
18	Total Denitrification			27,796	lbs
19	Total Ammonia Volatilization			67,709	lbs
20	Total Change in Soil Organic N			87,917	lbs
21	Total Perennial Tissue N			201,114	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.9	lbs/ac
25	AWA Ammonia Volatilization			4.6	lbs/ac
26	AWA Change in Soil Organic N			6	lbs/ac
27	AWA Perennial Tissue N			13.7	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			20	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			1,202	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,284	acre-ft
31	Total Applied water			47,963	acre-ft
32	Total Evapotranspiration (ET)			43,986	acre-ft
33	Total Runoff			1,680	acre-ft
34	Total Percolation			11,446	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			39.3	inches
37	AWA Evapotranspiration (ET)			36	inches
38	AWA Runoff			1.4	inches
39	AWA Percolation			8.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			10	mg/L

AWA: Acre-Weighted Average

Township: M29S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	99			%
3	Reported Acreage	15,318			acres
4	Parcels	210			number
5	Reported Crops	24			number
6	Reported N Applied	2,009,247			lbs
7	Total N Applied	2,052,490		2,050,952	lbs
8	AWA N Applied	134		134	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			2,086,625	lbs
11	AWA N Uptake			172	lbs/ac
12	Total N Removed	1,305,768		1,295,867	lbs
13	AWA N Removed	85		85	lbs/ac
14	AWA N Balance	47		49	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			20,492	lbs
17	Total N Runoff			23,994	lbs
18	Total Denitrification			51,630	lbs
19	Total Ammonia Volatilization			53,877	lbs
20	Total Change in Soil Organic N			78,016	lbs
21	Total Perennial Tissue N			145,002	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			2	lbs/ac
24	AWA Denitrification			4.3	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			6.4	lbs/ac
27	AWA Perennial Tissue N			12	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			30	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			61	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,732	acre-ft
31	Total Applied water			34,219	acre-ft
32	Total Evapotranspiration (ET)			31,536	acre-ft
33	Total Runoff			1,290	acre-ft
34	Total Percolation			9,198	acre-ft
35	AWA Precipitation			7.7	inches
36	AWA Applied water			33.9	inches
37	AWA Evapotranspiration (ET)			31.2	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			7.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M29S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	74			%
3	Reported Acreage	762			acres
4	Parcels	24			number
5	Reported Crops	4			number
6	Reported N Applied	115,612			lbs
7	Total N Applied	115,612		116,984	lbs
8	AWA N Applied	152		153	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			130,820	lbs
11	AWA N Uptake			194	lbs/ac
12	Total N Removed	95,168		84,615	lbs
13	AWA N Removed	125		111	lbs/ac
14	AWA N Balance	27		42	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-16		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			1,119	lbs
17	Total N Runoff			1,178	lbs
18	Total Denitrification			1,367	lbs
19	Total Ammonia Volatilization			3,000	lbs
20	Total Change in Soil Organic N			3,381	lbs
21	Total Perennial Tissue N			12,215	lbs
22	AWA N in Rain			1.7	lbs/ac
23	AWA N Runoff			1.7	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			4.4	lbs/ac
26	AWA Change in Soil Organic N			5	lbs/ac
27	AWA Perennial Tissue N			18.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			16	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			38	%
CV-SWAT Water Budget Results					
30	Total Precipitation			428	acre-ft
31	Total Applied water			2,431	acre-ft
32	Total Evapotranspiration (ET)			2,285	acre-ft
33	Total Runoff			65	acre-ft
34	Total Percolation			504	acre-ft
35	AWA Precipitation			7.6	inches
36	AWA Applied water			43.2	inches
37	AWA Evapotranspiration (ET)			40.6	inches
38	AWA Runoff			1.1	inches
39	AWA Percolation			7.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: M29S29E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	34			%
3	Reported Acreage	1,905			acres
4	Parcels	76			number
5	Reported Crops	8			number
6	Reported N Applied	151,270			lbs
7	Total N Applied	151,696		139,721	lbs
8	AWA N Applied	80		73	lbs/ac
9	AWA N Applied Difference		6		lbs/ac
10	Total N Uptake			110,534	lbs
11	AWA N Uptake			79	lbs/ac
12	Total N Removed	32,496		31,305	lbs
13	AWA N Removed	17		16	lbs/ac
14	AWA N Balance	56		57	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,995	lbs
17	Total N Runoff			1,802	lbs
18	Total Denitrification			2,479	lbs
19	Total Ammonia Volatilization			4,486	lbs
20	Total Change in Soil Organic N			13,669	lbs
21	Total Perennial Tissue N			27,972	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.3	lbs/ac
24	AWA Denitrification			1.8	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			9.8	lbs/ac
27	AWA Perennial Tissue N			20	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			57	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,120	acre-ft
31	Total Applied water			4,757	acre-ft
32	Total Evapotranspiration (ET)			5,124	acre-ft
33	Total Runoff			215	acre-ft
34	Total Percolation			616	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			40.8	inches
37	AWA Evapotranspiration (ET)			44	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			3.9	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M30S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	25			%
3	Reported Acreage	8,961			acres
4	Parcels	63			number
5	Reported Crops	9			number
6	Reported N Applied	1,420,960			lbs
7	Total N Applied	1,484,632		1,484,494	lbs
8	AWA N Applied	166		166	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			1,465,252	lbs
11	AWA N Uptake			216	lbs/ac
12	Total N Removed	967,980		957,905	lbs
13	AWA N Removed	108		107	lbs/ac
14	AWA N Balance	58		59	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			14,245	lbs
17	Total N Runoff			29,085	lbs
18	Total Denitrification			36,016	lbs
19	Total Ammonia Volatilization			41,036	lbs
20	Total Change in Soil Organic N			49,717	lbs
21	Total Perennial Tissue N			70,575	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			4.3	lbs/ac
24	AWA Denitrification			5.3	lbs/ac
25	AWA Ammonia Volatilization			6	lbs/ac
26	AWA Change in Soil Organic N			7.3	lbs/ac
27	AWA Perennial Tissue N			10.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			63	%
CV-SWAT Water Budget Results					
30	Total Precipitation			5,374	acre-ft
31	Total Applied water			18,393	acre-ft
32	Total Evapotranspiration (ET)			16,857	acre-ft
33	Total Runoff			1,043	acre-ft
34	Total Percolation			5,845	acre-ft
35	AWA Precipitation			9.5	inches
36	AWA Applied water			32.5	inches
37	AWA Evapotranspiration (ET)			29.8	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			7.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

Township: M30S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	39			%
3	Reported Acreage	1,456			acres
4	Parcels	42			number
5	Reported Crops	9			number
6	Reported N Applied	128,113			lbs
7	Total N Applied	164,884		154,474	lbs
8	AWA N Applied	113		106	lbs/ac
9	AWA N Applied Difference		7		lbs/ac
10	Total N Uptake			162,917	lbs
11	AWA N Uptake			142	lbs/ac
12	Total N Removed	106,311		111,509	lbs
13	AWA N Removed	73		77	lbs/ac
14	AWA N Balance	26		30	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			2,459	lbs
17	Total N Runoff			3,472	lbs
18	Total Denitrification			4,014	lbs
19	Total Ammonia Volatilization			3,188	lbs
20	Total Change in Soil Organic N			3,203	lbs
21	Total Perennial Tissue N			7,331	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3	lbs/ac
24	AWA Denitrification			3.5	lbs/ac
25	AWA Ammonia Volatilization			2.8	lbs/ac
26	AWA Change in Soil Organic N			2.8	lbs/ac
27	AWA Perennial Tissue N			6.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			89	%
CV-SWAT Water Budget Results					
30	Total Precipitation			924	acre-ft
31	Total Applied water			2,988	acre-ft
32	Total Evapotranspiration (ET)			2,725	acre-ft
33	Total Runoff			224	acre-ft
34	Total Percolation			1,045	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			31.3	inches
37	AWA Evapotranspiration (ET)			28.5	inches
38	AWA Runoff			2.4	inches
39	AWA Percolation			8.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			13	mg/L

AWA: Acre-Weighted Average

Township: M30S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	100			%
3	Reported Acreage	2,598			acres
4	Parcels	71			number
5	Reported Crops	22			number
6	Reported N Applied	202,475			lbs
7	Total N Applied	210,294		214,279	lbs
8	AWA N Applied	81		82	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			245,624	lbs
11	AWA N Uptake			109	lbs/ac
12	Total N Removed	150,534		155,258	lbs
13	AWA N Removed	58		60	lbs/ac
14	AWA N Balance	23		23	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			4,863	lbs
17	Total N Runoff			4,393	lbs
18	Total Denitrification			5,118	lbs
19	Total Ammonia Volatilization			3,613	lbs
20	Total Change in Soil Organic N			3,556	lbs
21	Total Perennial Tissue N			20,605	lbs
22	AWA N in Rain			2.2	lbs/ac
23	AWA N Runoff			1.9	lbs/ac
24	AWA Denitrification			2.3	lbs/ac
25	AWA Ammonia Volatilization			1.6	lbs/ac
26	AWA Change in Soil Organic N			1.6	lbs/ac
27	AWA Perennial Tissue N			9.1	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			105	%
CV-SWAT Water Budget Results					
30	Total Precipitation			1,822	acre-ft
31	Total Applied water			5,906	acre-ft
32	Total Evapotranspiration (ET)			5,755	acre-ft
33	Total Runoff			410	acre-ft
34	Total Percolation			1,602	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			31.4	inches
37	AWA Evapotranspiration (ET)			30.6	inches
38	AWA Runoff			2.2	inches
39	AWA Percolation			7.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			14	mg/L

AWA: Acre-Weighted Average

Township: M30S29E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	100			%
3	Reported Acreage	16,728			acres
4	Parcels	318			number
5	Reported Crops	22			number
6	Reported N Applied	1,928,934			lbs
7	Total N Applied	1,956,625		1,903,188	lbs
8	AWA N Applied	117		114	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,545,011	lbs
11	AWA N Uptake			118	lbs/ac
12	Total N Removed	726,590		759,074	lbs
13	AWA N Removed	43		45	lbs/ac
14	AWA N Balance	73		68	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			27,529	lbs
17	Total N Runoff			32,620	lbs
18	Total Denitrification			39,189	lbs
19	Total Ammonia Volatilization			44,540	lbs
20	Total Change in Soil Organic N			108,897	lbs
21	Total Perennial Tissue N			157,166	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.5	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			3.4	lbs/ac
26	AWA Change in Soil Organic N			8.3	lbs/ac
27	AWA Perennial Tissue N			12	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			70	%
CV-SWAT Water Budget Results					
30	Total Precipitation			10,445	acre-ft
31	Total Applied water			33,246	acre-ft
32	Total Evapotranspiration (ET)			35,228	acre-ft
33	Total Runoff			2,012	acre-ft
34	Total Percolation			7,109	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			30.6	inches
37	AWA Evapotranspiration (ET)			32.4	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			41	mg/L

AWA: Acre-Weighted Average

Township: M30S30E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	43			%
3	Reported Acreage	8,774			acres
4	Parcels	130			number
5	Reported Crops	23			number
6	Reported N Applied	732,204			lbs
7	Total N Applied	748,806		745,014	lbs
8	AWA N Applied	85		85	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			667,956	lbs
11	AWA N Uptake			113	lbs/ac
12	Total N Removed	323,937		327,040	lbs
13	AWA N Removed	37		37	lbs/ac
14	AWA N Balance	48		48	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,685	lbs
17	Total N Runoff			15,273	lbs
18	Total Denitrification			10,192	lbs
19	Total Ammonia Volatilization			24,412	lbs
20	Total Change in Soil Organic N			48,836	lbs
21	Total Perennial Tissue N			81,895	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.6	lbs/ac
24	AWA Denitrification			1.7	lbs/ac
25	AWA Ammonia Volatilization			4.1	lbs/ac
26	AWA Change in Soil Organic N			8.2	lbs/ac
27	AWA Perennial Tissue N			13.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			28	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			60	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,743	acre-ft
31	Total Applied water			16,244	acre-ft
32	Total Evapotranspiration (ET)			17,535	acre-ft
33	Total Runoff			1,004	acre-ft
34	Total Percolation			2,637	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			32.9	inches
37	AWA Evapotranspiration (ET)			35.5	inches
38	AWA Runoff			2	inches
39	AWA Percolation			3.6	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			35	mg/L

AWA: Acre-Weighted Average

Township: M31S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	BVC, KRWCA			
2	Percent HVA	13			%
3	Reported Acreage	4,969			acres
4	Parcels	31			number
5	Reported Crops	9			number
6	Reported N Applied	580,218			lbs
7	Total N Applied	581,428		558,354	lbs
8	AWA N Applied	117		112	lbs/ac
9	AWA N Applied Difference		5		lbs/ac
10	Total N Uptake			805,620	lbs
11	AWA N Uptake			166	lbs/ac
12	Total N Removed	531,838		527,250	lbs
13	AWA N Removed	107		106	lbs/ac
14	AWA N Balance	10		6	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,468	lbs
17	Total N Runoff			5,734	lbs
18	Total Denitrification			15,835	lbs
19	Total Ammonia Volatilization			11,468	lbs
20	Total Change in Soil Organic N			18,628	lbs
21	Total Perennial Tissue N			75,271	lbs
22	AWA N in Rain			1.9	lbs/ac
23	AWA N Runoff			1.2	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			2.4	lbs/ac
26	AWA Change in Soil Organic N			3.8	lbs/ac
27	AWA Perennial Tissue N			15.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			42	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			666	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,920	acre-ft
31	Total Applied water			15,040	acre-ft
32	Total Evapotranspiration (ET)			14,709	acre-ft
33	Total Runoff			711	acre-ft
34	Total Percolation			3,479	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			37.1	inches
37	AWA Evapotranspiration (ET)			36.3	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			8.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			22	mg/L

AWA: Acre-Weighted Average

Township: M31S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	30			%
3	Reported Acreage	12,305			acres
4	Parcels	222			number
5	Reported Crops	26			number
6	Reported N Applied	1,504,562			lbs
7	Total N Applied	1,694,379		1,718,080	lbs
8	AWA N Applied	138		140	lbs/ac
9	AWA N Applied Difference		-2		lbs/ac
10	Total N Uptake			1,839,631	lbs
11	AWA N Uptake			162	lbs/ac
12	Total N Removed	1,224,571		1,231,695	lbs
13	AWA N Removed	100		100	lbs/ac
14	AWA N Balance	34		40	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			23,812	lbs
17	Total N Runoff			18,704	lbs
18	Total Denitrification			23,920	lbs
19	Total Ammonia Volatilization			44,514	lbs
20	Total Change in Soil Organic N			26,650	lbs
21	Total Perennial Tissue N			100,756	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			2.1	lbs/ac
25	AWA Ammonia Volatilization			3.9	lbs/ac
26	AWA Change in Soil Organic N			2.3	lbs/ac
27	AWA Perennial Tissue N			8.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			89	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,114	acre-ft
31	Total Applied water			30,039	acre-ft
32	Total Evapotranspiration (ET)			28,450	acre-ft
33	Total Runoff			1,621	acre-ft
34	Total Percolation			9,330	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			31.8	inches
37	AWA Evapotranspiration (ET)			30.1	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			9.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			17	mg/L

AWA: Acre-Weighted Average

Township: M31S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	56			%
3	Reported Acreage	12,924			acres
4	Parcels	159			number
5	Reported Crops	28			number
6	Reported N Applied	1,744,952			lbs
7	Total N Applied	1,784,424		1,762,819	lbs
8	AWA N Applied	138		136	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,792,412	lbs
11	AWA N Uptake			154	lbs/ac
12	Total N Removed	1,282,197		1,260,985	lbs
13	AWA N Removed	99		98	lbs/ac
14	AWA N Balance	38		39	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			24,133	lbs
17	Total N Runoff			26,144	lbs
18	Total Denitrification			31,843	lbs
19	Total Ammonia Volatilization			62,494	lbs
20	Total Change in Soil Organic N			29,981	lbs
21	Total Perennial Tissue N			62,315	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.2	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			5.4	lbs/ac
26	AWA Change in Soil Organic N			2.6	lbs/ac
27	AWA Perennial Tissue N			5.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			48	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			123	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,388	acre-ft
31	Total Applied water			25,188	acre-ft
32	Total Evapotranspiration (ET)			24,788	acre-ft
33	Total Runoff			1,853	acre-ft
34	Total Percolation			8,066	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			25.9	inches
37	AWA Evapotranspiration (ET)			25.5	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			7.5	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			28	mg/L

AWA: Acre-Weighted Average

Township: M31S29E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	97			%
3	Reported Acreage	20,637			acres
4	Parcels	288			number
5	Reported Crops	44			number
6	Reported N Applied	2,371,665			lbs
7	Total N Applied	2,461,966		2,385,050	lbs
8	AWA N Applied	119		116	lbs/ac
9	AWA N Applied Difference		4		lbs/ac
10	Total N Uptake			2,473,586	lbs
11	AWA N Uptake			143	lbs/ac
12	Total N Removed	1,538,181		1,494,866	lbs
13	AWA N Removed	75		72	lbs/ac
14	AWA N Balance	40		43	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			36,530	lbs
17	Total N Runoff			39,009	lbs
18	Total Denitrification			48,896	lbs
19	Total Ammonia Volatilization			55,406	lbs
20	Total Change in Soil Organic N			74,807	lbs
21	Total Perennial Tissue N			139,064	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.3	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			3.2	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			94	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,883	acre-ft
31	Total Applied water			38,907	acre-ft
32	Total Evapotranspiration (ET)			39,606	acre-ft
33	Total Runoff			2,399	acre-ft
34	Total Percolation			11,522	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			27	inches
37	AWA Evapotranspiration (ET)			27.4	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			6.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			27	mg/L

AWA: Acre-Weighted Average

Township: M31S30E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	55			%
3	Reported Acreage	10,129			acres
4	Parcels	98			number
5	Reported Crops	20			number
6	Reported N Applied	865,965			lbs
7	Total N Applied	905,514		908,265	lbs
8	AWA N Applied	89		90	lbs/ac
9	AWA N Applied Difference		0		lbs/ac
10	Total N Uptake			965,364	lbs
11	AWA N Uptake			109	lbs/ac
12	Total N Removed	468,601		451,527	lbs
13	AWA N Removed	46		45	lbs/ac
14	AWA N Balance	43		45	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			18,615	lbs
17	Total N Runoff			13,912	lbs
18	Total Denitrification			13,186	lbs
19	Total Ammonia Volatilization			15,976	lbs
20	Total Change in Soil Organic N			59,446	lbs
21	Total Perennial Tissue N			132,148	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.6	lbs/ac
24	AWA Denitrification			1.5	lbs/ac
25	AWA Ammonia Volatilization			1.8	lbs/ac
26	AWA Change in Soil Organic N			6.7	lbs/ac
27	AWA Perennial Tissue N			14.9	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			24	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			53	%
CV-SWAT Water Budget Results					
30	Total Precipitation			7,082	acre-ft
31	Total Applied water			25,393	acre-ft
32	Total Evapotranspiration (ET)			26,410	acre-ft
33	Total Runoff			1,355	acre-ft
34	Total Percolation			4,921	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			34.4	inches
37	AWA Evapotranspiration (ET)			35.8	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			5.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			18	mg/L

AWA: Acre-Weighted Average

Township: M32S26E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	17			%
3	Reported Acreage	19,666			acres
4	Parcels	118			number
5	Reported Crops	16			number
6	Reported N Applied	1,359,600			lbs
7	Total N Applied	1,375,055		1,320,505	lbs
8	AWA N Applied	70		67	lbs/ac
9	AWA N Applied Difference		3		lbs/ac
10	Total N Uptake			1,964,271	lbs
11	AWA N Uptake			117	lbs/ac
12	Total N Removed	1,219,384		1,205,607	lbs
13	AWA N Removed	62		61	lbs/ac
14	AWA N Balance	7		6	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			35,107	lbs
17	Total N Runoff			5,923	lbs
18	Total Denitrification			33,882	lbs
19	Total Ammonia Volatilization			27,681	lbs
20	Total Change in Soil Organic N			12,462	lbs
21	Total Perennial Tissue N			235,626	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			2	lbs/ac
25	AWA Ammonia Volatilization			1.6	lbs/ac
26	AWA Change in Soil Organic N			0.7	lbs/ac
27	AWA Perennial Tissue N			14	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			26	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			444	%
CV-SWAT Water Budget Results					
30	Total Precipitation			13,599	acre-ft
31	Total Applied water			49,367	acre-ft
32	Total Evapotranspiration (ET)			50,557	acre-ft
33	Total Runoff			2,230	acre-ft
34	Total Percolation			9,984	acre-ft
35	AWA Precipitation			9.7	inches
36	AWA Applied water			35.2	inches
37	AWA Evapotranspiration (ET)			36.1	inches
38	AWA Runoff			1.6	inches
39	AWA Percolation			6.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			19	mg/L

AWA: Acre-Weighted Average

Township: M32S27E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	76			%
3	Reported Acreage	19,575			acres
4	Parcels	90			number
5	Reported Crops	27			number
6	Reported N Applied	1,532,311			lbs
7	Total N Applied	1,548,969		1,524,008	lbs
8	AWA N Applied	79		78	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,371,149	lbs
11	AWA N Uptake			91	lbs/ac
12	Total N Removed	690,265		717,372	lbs
13	AWA N Removed	35		37	lbs/ac
14	AWA N Balance	43		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			32,127	lbs
17	Total N Runoff			7,891	lbs
18	Total Denitrification			36,660	lbs
19	Total Ammonia Volatilization			16,125	lbs
20	Total Change in Soil Organic N			-28,235	lbs
21	Total Perennial Tissue N			101,565	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.5	lbs/ac
24	AWA Denitrification			2.4	lbs/ac
25	AWA Ammonia Volatilization			1.1	lbs/ac
26	AWA Change in Soil Organic N			-1.9	lbs/ac
27	AWA Perennial Tissue N			6.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			37	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			89	%
CV-SWAT Water Budget Results					
30	Total Precipitation			12,043	acre-ft
31	Total Applied water			32,234	acre-ft
32	Total Evapotranspiration (ET)			35,512	acre-ft
33	Total Runoff			1,647	acre-ft
34	Total Percolation			7,091	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			25.7	inches
37	AWA Evapotranspiration (ET)			28.3	inches
38	AWA Runoff			1.3	inches
39	AWA Percolation			4.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			37	mg/L

AWA: Acre-Weighted Average

Township: M32S28E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	68			%
3	Reported Acreage	21,082			acres
4	Parcels	135			number
5	Reported Crops	29			number
6	Reported N Applied	2,311,025			lbs
7	Total N Applied	2,331,908		2,279,241	lbs
8	AWA N Applied	111		108	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			1,879,810	lbs
11	AWA N Uptake			132	lbs/ac
12	Total N Removed	1,068,562		1,093,079	lbs
13	AWA N Removed	51		52	lbs/ac
14	AWA N Balance	59		56	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			30,197	lbs
17	Total N Runoff			42,066	lbs
18	Total Denitrification			67,951	lbs
19	Total Ammonia Volatilization			33,135	lbs
20	Total Change in Soil Organic N			52,833	lbs
21	Total Perennial Tissue N			76,243	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3	lbs/ac
24	AWA Denitrification			4.8	lbs/ac
25	AWA Ammonia Volatilization			2.3	lbs/ac
26	AWA Change in Soil Organic N			3.7	lbs/ac
27	AWA Perennial Tissue N			5.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			54	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			97	%
CV-SWAT Water Budget Results					
30	Total Precipitation			11,431	acre-ft
31	Total Applied water			28,974	acre-ft
32	Total Evapotranspiration (ET)			30,033	acre-ft
33	Total Runoff			2,207	acre-ft
34	Total Percolation			8,312	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			24.4	inches
37	AWA Evapotranspiration (ET)			25.3	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			4.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			51	mg/L

AWA: Acre-Weighted Average

Township: M32S29E

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	60			%
3	Reported Acreage	23,025			acres
4	Parcels	168			number
5	Reported Crops	32			number
6	Reported N Applied	2,336,992			lbs
7	Total N Applied	2,416,364		2,365,081	lbs
8	AWA N Applied	105		103	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			2,451,935	lbs
11	AWA N Uptake			140	lbs/ac
12	Total N Removed	1,470,920		1,430,739	lbs
13	AWA N Removed	64		62	lbs/ac
14	AWA N Balance	37		41	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-3		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			37,157	lbs
17	Total N Runoff			52,075	lbs
18	Total Denitrification			57,450	lbs
19	Total Ammonia Volatilization			54,907	lbs
20	Total Change in Soil Organic N			93,545	lbs
21	Total Perennial Tissue N			136,384	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3	lbs/ac
24	AWA Denitrification			3.3	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			5.4	lbs/ac
27	AWA Perennial Tissue N			7.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			45	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			112	%
CV-SWAT Water Budget Results					
30	Total Precipitation			14,021	acre-ft
31	Total Applied water			38,629	acre-ft
32	Total Evapotranspiration (ET)			39,434	acre-ft
33	Total Runoff			2,914	acre-ft
34	Total Percolation			10,846	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			26.5	inches
37	AWA Evapotranspiration (ET)			27.1	inches
38	AWA Runoff			2	inches
39	AWA Percolation			5.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			36	mg/L

AWA: Acre-Weighted Average

Township: S11N18W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	16			%
3	Reported Acreage	6,162			acres
4	Parcels	39			number
5	Reported Crops	8			number
6	Reported N Applied	675,273			lbs
7	Total N Applied	710,334		705,153	lbs
8	AWA N Applied	115		114	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			565,502	lbs
11	AWA N Uptake			99	lbs/ac
12	Total N Removed	231,193		232,058	lbs
13	AWA N Removed	38		38	lbs/ac
14	AWA N Balance	78		77	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			12,216	lbs
17	Total N Runoff			19,610	lbs
18	Total Denitrification			22,675	lbs
19	Total Ammonia Volatilization			18,618	lbs
20	Total Change in Soil Organic N			12,270	lbs
21	Total Perennial Tissue N			103,187	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3.4	lbs/ac
24	AWA Denitrification			4	lbs/ac
25	AWA Ammonia Volatilization			3.3	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			18	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			51	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			4,577	acre-ft
31	Total Applied water			17,832	acre-ft
32	Total Evapotranspiration (ET)			18,695	acre-ft
33	Total Runoff			1,001	acre-ft
34	Total Percolation			2,695	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			37.4	inches
37	AWA Evapotranspiration (ET)			39.2	inches
38	AWA Runoff			2.1	inches
39	AWA Percolation			5.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: S11N19W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	73			%
3	Reported Acreage	25,918			acres
4	Parcels	171			number
5	Reported Crops	28			number
6	Reported N Applied	2,400,331			lbs
7	Total N Applied	2,536,124		2,490,140	lbs
8	AWA N Applied	98		96	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			2,375,175	lbs
11	AWA N Uptake			110	lbs/ac
12	Total N Removed	1,282,013		1,243,025	lbs
13	AWA N Removed	49		48	lbs/ac
14	AWA N Balance	48		48	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		0		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			45,913	lbs
17	Total N Runoff			32,712	lbs
18	Total Denitrification			53,187	lbs
19	Total Ammonia Volatilization			54,512	lbs
20	Total Change in Soil Organic N			67,803	lbs
21	Total Perennial Tissue N			237,523	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			1.5	lbs/ac
24	AWA Denitrification			2.5	lbs/ac
25	AWA Ammonia Volatilization			2.5	lbs/ac
26	AWA Change in Soil Organic N			3.2	lbs/ac
27	AWA Perennial Tissue N			11	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			33	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			68	%
CV-SWAT Water Budget Results					
30	Total Precipitation			17,223	acre-ft
31	Total Applied water			54,752	acre-ft
32	Total Evapotranspiration (ET)			56,628	acre-ft
33	Total Runoff			3,155	acre-ft
34	Total Percolation			12,204	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			30.5	inches
37	AWA Evapotranspiration (ET)			31.6	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			5.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: S11N20W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	54			%
3	Reported Acreage	11,238			acres
4	Parcels	135			number
5	Reported Crops	20			number
6	Reported N Applied	1,356,892			lbs
7	Total N Applied	1,407,718		1,395,396	lbs
8	AWA N Applied	125		124	lbs/ac
9	AWA N Applied Difference		1		lbs/ac
10	Total N Uptake			1,474,928	lbs
11	AWA N Uptake			146	lbs/ac
12	Total N Removed	876,004		819,578	lbs
13	AWA N Removed	78		73	lbs/ac
14	AWA N Balance	46		51	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-5		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			21,474	lbs
17	Total N Runoff			7,616	lbs
18	Total Denitrification			26,813	lbs
19	Total Ammonia Volatilization			18,273	lbs
20	Total Change in Soil Organic N			53,580	lbs
21	Total Perennial Tissue N			134,304	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			2.7	lbs/ac
25	AWA Ammonia Volatilization			1.8	lbs/ac
26	AWA Change in Soil Organic N			5.3	lbs/ac
27	AWA Perennial Tissue N			13.3	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			32	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			62	%
CV-SWAT Water Budget Results					
30	Total Precipitation			8,068	acre-ft
31	Total Applied water			28,621	acre-ft
32	Total Evapotranspiration (ET)			30,428	acre-ft
33	Total Runoff			1,402	acre-ft
34	Total Percolation			4,983	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			34.1	inches
37	AWA Evapotranspiration (ET)			36.2	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			5.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			26	mg/L

AWA: Acre-Weighted Average

Township: S11N21W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	57			%
3	Reported Acreage	12,035			acres
4	Parcels	88			number
5	Reported Crops	10			number
6	Reported N Applied	1,494,953			lbs
7	Total N Applied	1,495,221		1,507,244	lbs
8	AWA N Applied	124		125	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			1,238,859	lbs
11	AWA N Uptake			105	lbs/ac
12	Total N Removed	680,712		614,053	lbs
13	AWA N Removed	57		51	lbs/ac
14	AWA N Balance	67		74	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-7		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			25,260	lbs
17	Total N Runoff			10,011	lbs
18	Total Denitrification			25,466	lbs
19	Total Ammonia Volatilization			25,193	lbs
20	Total Change in Soil Organic N			80,061	lbs
21	Total Perennial Tissue N			238,489	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			2.2	lbs/ac
25	AWA Ammonia Volatilization			2.1	lbs/ac
26	AWA Change in Soil Organic N			6.8	lbs/ac
27	AWA Perennial Tissue N			20.2	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			41	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			56	%
CV-SWAT Water Budget Results					
30	Total Precipitation			9,456	acre-ft
31	Total Applied water			40,859	acre-ft
32	Total Evapotranspiration (ET)			44,676	acre-ft
33	Total Runoff			1,504	acre-ft
34	Total Percolation			4,231	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			41.5	inches
37	AWA Evapotranspiration (ET)			45.4	inches
38	AWA Runoff			1.5	inches
39	AWA Percolation			4.2	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			43	mg/L

AWA: Acre-Weighted Average

Township: S12N18W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	24			%
3	Reported Acreage	4,567			acres
4	Parcels	11			number
5	Reported Crops	13			number
6	Reported N Applied	652,231			lbs
7	Total N Applied	652,231		595,878	lbs
8	AWA N Applied	143		130	lbs/ac
9	AWA N Applied Difference		12		lbs/ac
10	Total N Uptake			481,668	lbs
11	AWA N Uptake			133	lbs/ac
12	Total N Removed	211,274		216,325	lbs
13	AWA N Removed	46		47	lbs/ac
14	AWA N Balance	84		83	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,768	lbs
17	Total N Runoff			10,190	lbs
18	Total Denitrification			14,019	lbs
19	Total Ammonia Volatilization			11,402	lbs
20	Total Change in Soil Organic N			27,869	lbs
21	Total Perennial Tissue N			4,925	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			2.8	lbs/ac
24	AWA Denitrification			3.9	lbs/ac
25	AWA Ammonia Volatilization			3.1	lbs/ac
26	AWA Change in Soil Organic N			7.7	lbs/ac
27	AWA Perennial Tissue N			1.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			74	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			89	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,904	acre-ft
31	Total Applied water			4,916	acre-ft
32	Total Evapotranspiration (ET)			5,462	acre-ft
33	Total Runoff			567	acre-ft
34	Total Percolation			1,931	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			16.3	inches
37	AWA Evapotranspiration (ET)			18.1	inches
38	AWA Runoff			1.9	inches
39	AWA Percolation			5.1	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			64	mg/L

AWA: Acre-Weighted Average

Township: S12N19W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	100			%
3	Reported Acreage	6,279			acres
4	Parcels	61			number
5	Reported Crops	17			number
6	Reported N Applied	637,882			lbs
7	Total N Applied	646,463		567,841	lbs
8	AWA N Applied	103		90	lbs/ac
9	AWA N Applied Difference		13		lbs/ac
10	Total N Uptake			484,668	lbs
11	AWA N Uptake			106	lbs/ac
12	Total N Removed	234,196		234,301	lbs
13	AWA N Removed	37		37	lbs/ac
14	AWA N Balance	55		53	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		1		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,822	lbs
17	Total N Runoff			14,079	lbs
18	Total Denitrification			12,979	lbs
19	Total Ammonia Volatilization			23,689	lbs
20	Total Change in Soil Organic N			22,227	lbs
21	Total Perennial Tissue N			39,019	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			3.1	lbs/ac
24	AWA Denitrification			2.8	lbs/ac
25	AWA Ammonia Volatilization			5.2	lbs/ac
26	AWA Change in Soil Organic N			4.8	lbs/ac
27	AWA Perennial Tissue N			8.5	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			43	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			80	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,674	acre-ft
31	Total Applied water			9,929	acre-ft
32	Total Evapotranspiration (ET)			10,531	acre-ft
33	Total Runoff			761	acre-ft
34	Total Percolation			2,514	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			26	inches
37	AWA Evapotranspiration (ET)			27.5	inches
38	AWA Runoff			2	inches
39	AWA Percolation			4.8	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			39	mg/L

AWA: Acre-Weighted Average

Township: S12N20W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	100			%
3	Reported Acreage	4,008			acres
4	Parcels	49			number
5	Reported Crops	18			number
6	Reported N Applied	510,860			lbs
7	Total N Applied	529,422		522,464	lbs
8	AWA N Applied	132		130	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			554,679	lbs
11	AWA N Uptake			148	lbs/ac
12	Total N Removed	298,791		287,435	lbs
13	AWA N Removed	75		72	lbs/ac
14	AWA N Balance	57		59	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-2		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,941	lbs
17	Total N Runoff			3,510	lbs
18	Total Denitrification			12,085	lbs
19	Total Ammonia Volatilization			5,462	lbs
20	Total Change in Soil Organic N			16,108	lbs
21	Total Perennial Tissue N			53,962	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.9	lbs/ac
24	AWA Denitrification			3.2	lbs/ac
25	AWA Ammonia Volatilization			1.5	lbs/ac
26	AWA Change in Soil Organic N			4.3	lbs/ac
27	AWA Perennial Tissue N			14.4	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			39	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			66	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,996	acre-ft
31	Total Applied water			10,587	acre-ft
32	Total Evapotranspiration (ET)			10,826	acre-ft
33	Total Runoff			524	acre-ft
34	Total Percolation			2,243	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			33.9	inches
37	AWA Evapotranspiration (ET)			34.7	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			6.7	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			25	mg/L

AWA: Acre-Weighted Average

Township: S12N21W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	94			%
3	Reported Acreage	4,609			acres
4	Parcels	41			number
5	Reported Crops	5			number
6	Reported N Applied	438,557			lbs
7	Total N Applied	500,504		492,776	lbs
8	AWA N Applied	109		107	lbs/ac
9	AWA N Applied Difference		2		lbs/ac
10	Total N Uptake			567,557	lbs
11	AWA N Uptake			124	lbs/ac
12	Total N Removed	359,621		335,739	lbs
13	AWA N Removed	78		73	lbs/ac
14	AWA N Balance	31		34	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			9,716	lbs
17	Total N Runoff			1,764	lbs
18	Total Denitrification			5,537	lbs
19	Total Ammonia Volatilization			7,428	lbs
20	Total Change in Soil Organic N			3,992	lbs
21	Total Perennial Tissue N			76,547	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.4	lbs/ac
24	AWA Denitrification			1.2	lbs/ac
25	AWA Ammonia Volatilization			1.6	lbs/ac
26	AWA Change in Soil Organic N			0.9	lbs/ac
27	AWA Perennial Tissue N			16.8	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			15	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			44	%
CV-SWAT Water Budget Results					
30	Total Precipitation			3,657	acre-ft
31	Total Applied water			14,882	acre-ft
32	Total Evapotranspiration (ET)			15,026	acre-ft
33	Total Runoff			671	acre-ft
34	Total Percolation			2,832	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			39.1	inches
37	AWA Evapotranspiration (ET)			39.5	inches
38	AWA Runoff			1.8	inches
39	AWA Percolation			7.4	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			9	mg/L

AWA: Acre-Weighted Average

Township: S12N22W

Row (R)	Category	INMP/NMP		CV-SWAT	Units
INMP/NMP Data and N Balance Results					
1	Coalitions	KRWCA			
2	Percent HVA	18			%
3	Reported Acreage	4,201			acres
4	Parcels	44			number
5	Reported Crops	12			number
6	Reported N Applied	497,045			lbs
7	Total N Applied	518,096		523,728	lbs
8	AWA N Applied	123		125	lbs/ac
9	AWA N Applied Difference		-1		lbs/ac
10	Total N Uptake			531,182	lbs
11	AWA N Uptake			155	lbs/ac
12	Total N Removed	341,568		331,784	lbs
13	AWA N Removed	81		79	lbs/ac
14	AWA N Balance	42		46	lbs/ac
15	AWA N Balance Difference (INMP vs. CV-SWAT)		-4		lbs/ac
CV-SWAT Nitrogen Budget Results					
16	Total N in Rain			7,257	lbs
17	Total N Runoff			2,759	lbs
18	Total Denitrification			10,387	lbs
19	Total Ammonia Volatilization			6,856	lbs
20	Total Change in Soil Organic N			7,348	lbs
21	Total Perennial Tissue N			51,135	lbs
22	AWA N in Rain			2.1	lbs/ac
23	AWA N Runoff			0.8	lbs/ac
24	AWA Denitrification			3	lbs/ac
25	AWA Ammonia Volatilization			2	lbs/ac
26	AWA Change in Soil Organic N			2.1	lbs/ac
27	AWA Perennial Tissue N			15	lbs/ac
28	Nitrate-N (Load) at Bottom of Root-zone (AWA)			35	lbs/ac
29	Percent of N Balance (row 14) at Bottom of Root-zone			77	%
CV-SWAT Water Budget Results					
30	Total Precipitation			2,735	acre-ft
31	Total Applied water			10,741	acre-ft
32	Total Evapotranspiration (ET)			10,674	acre-ft
33	Total Runoff			477	acre-ft
34	Total Percolation			2,550	acre-ft
35	AWA Precipitation			9.6	inches
36	AWA Applied water			37.7	inches
37	AWA Evapotranspiration (ET)			37.5	inches
38	AWA Runoff			1.7	inches
39	AWA Percolation			7.3	inches
40	Nitrate-N (Concentration) at the Bottom of Root-zone			21	mg/L

AWA: Acre-Weighted Average

APPENDIX 3 – MODEL INPUTS AND SETUP

This appendix describes the watershed delineation and climate designation approaches used in CV-SWAT. Soils data processing is also described. As described in the GWP Workplan, the spatial domains are the Sacramento Valley, San Joaquin River Watershed, and the Tulare Lake Basin.

WATERSHED DELINEATION AND CLIMATE DESIGNATION

CV-SWAT was used in the delineation of the watersheds and setting up the hydrologic model. For each domain, a drainage area threshold of 5,000 hectare was used on a 30m DEM. The threshold area defines the minimum drainage area required to form the origin of a stream. The selected threshold of 5,000 hectares generated sub-watershed or sub-basins which are comparable to HUC 8 (Hydrological Unit Code) of USGS watershed boundary dataset (WBD). In order to match the domain boundary to the watershed boundary and to match the sub-basins to HUC 8 unit, a predefined stream and watershed boundary approach was used. In this approach, the watershed outlet points are moved or deleted in an iterative process until the desired delineation is achieved. The watershed delineation comparable to HUC 8 unit provided the granularity required to capture the hydrological heterogeneity of the landscape. In SWAT, the smallest simulation unit is called the hydrological response unit (HRU) which are unique for each sub-basin, therefore the number of sub-basins would influence the total number of HRU's created. A single land use and slope class was used in defining the hydrologic response units (HRUs) which meant that soils and sub-basins drove the number of HRU generated within any domain. The delineation of Tulare Lake Basin domain generated 40 sub-basins comprising of 2,800 HRUs with the weather variability captured by 12 stations (Figure 3-1). The delineation of San Joaquin River Watershed domain generated 36 sub-basins comprising of 3,679 HRUs, with the weather variability captured by 17 stations (Figure 3-2). The delineation of Sacramento Valley domain generated 49 sub-basins comprising of 3,649 HRUs, with the weather variability captured by 17 stations (Figure 3-3). All the three domains were setup to run for a 38-year period (1983-2020) with a 7-year warm-up period (1983-1989).

SOILS DATA

Soils information is a key input for CV-SWAT and influences a number of root-zone processes including water and nutrient storage, movement, transformation, and losses (Texas Water Resources Institute 2011). CV-SWAT was built using a refined version of the PEDON dataset provided by the USDA NRCS (MPEP Team 2019). This dataset is comprised mainly of observed pedon (soil profile) information from a publicly available database developed by the Kellogg Soil Survey Laboratory on behalf of the National Cooperative Soil Survey, and gap filled with NRCS SSURGO and STATSGO data (MPEP Team 2019) as needed. In preparation for developing the Root-zone Library for the Groundwater Protection Program, additional refinements were made to the dataset to enhance the accuracy of model estimates. These refinements are outlined below.

Improvements to the PEDON dataset included evaluating and refining soil layer and solum depth information for mapping units on the Central Valley floor parameterized with uncharacteristically shallow depths (e.g., < 30 inches). While there are soils within Region 5 that are relatively shallow due to underlying bedrock or the formation of root limiting layers (e.g., duripans), the vast majority of farmed land in the California Central Valley is deeper (either naturally, or through land-modification practices such as ripping). Soil depth is important in CV-SWAT because is controls the volume of media in which root-zone processes are simulated. If soils are parameterized as uncharacteristically shallow, then leaching estimates may be artificially inflated. This is because crop roots cannot extend beyond the maximum rooting depth. Therefore, soils parameterized this way may truncate the actual crop root-zone and limit the opportunity for N uptake.

To address this issue, suspect MUKEYs were identified, and their respective PEDON data were compared to other sources for soil information including the NCSS database and NRCS SSURGO data. The underlying issues with PEDON soil depth information were found to be related to duplicated soil pit information and incomplete pedon descriptions. In the first case, a number of soil pits had been sampled, analyzed, and recorded in the database multiple times. However, reports vary in terms of "completeness" with respect to describing the entire soil profile. For example, there are multiple entries for Hesperia soils characterized from a specific soil pit (Pedon ID 94CA019001). While the initial report in the database contains laboratory data for the entire profile, the data in PEDON were from an ancillary report which only describes the top two horizons and not the entire profile. This data artifact thus created an artificially shallow soil in the database because the total soil depth was truncated to the top two horizons. In these cases, information from complete pedon descriptions associated with the same soil pit or soil series were used to parameterize MUKEYs in CV-SWAT. In some cases, only "incomplete" reports were available for specific pedons within the NCSS database. In these cases, information was sourced from the NRCS SSURGO database for the respective mapping units.

Another adjustment to the soil database was implemented to control the N lost through ammonia volatilization. Ammonia volatilization in CV-SWAT is in part a function of the soil depth of the top layer in which the fertilizer is applied. CV-SWAT assumes that fertilizer placed below the soil surface is placed in the middle of the first layer. There was a subset of soil mapping units that had data characterizing the first layer as less than 60 mm which was observed to dramatically increase volatilization estimates. To avoid over-inflated ammonia volatilization, soil properties (sand, silt, clay, soil carbon) from the top two layers were layer weighted to create a single soil layer that spanned from the soil surface to the depth of the second layer. From there, pedo-transfer functions (Saxton and Rawls 2006) were used re-calculate saturated hydraulic conductivity and available water capacity.

The final soil data modification was made to soils with duripans. Duripans are a silica-cemented layer that form in some soils naturally through pedogenic processes. However, it is not common to leave duripans intact for lands that are intensively farmed. Instead, these soils are ripped to break up the duripan and allow for improved soil drainage. Therefore, for mapping units with duripan information, soil properties (sand, silt, clay, soil carbon) from the layers above and below the duripans were layer-weighted to create a single soil layer. From there, pedo-transfer functions (Saxton and Rawls 2006) were used to re-calculate saturated hydraulic conductivity and available water capacity. Figure 3-4 shows the key SSURGO soil variables across the domains.

FIGURE 3-1. TULARE LAKE BASIN AND SUB-BASIN DELINEATION

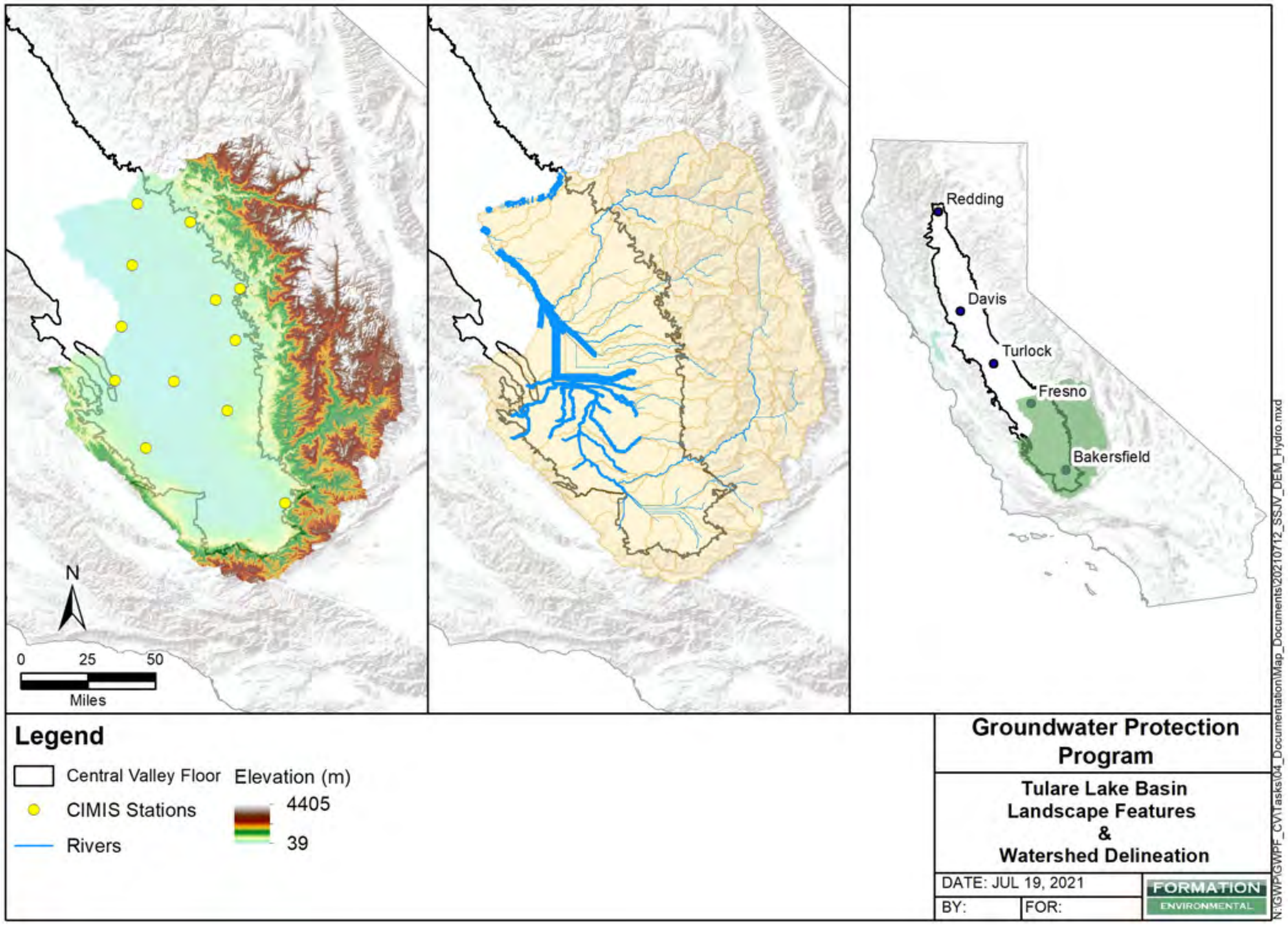


FIGURE 3-2. SAN JOAQUIN VALLEY WATERSHED AND SUB-BASIN DELINEATION

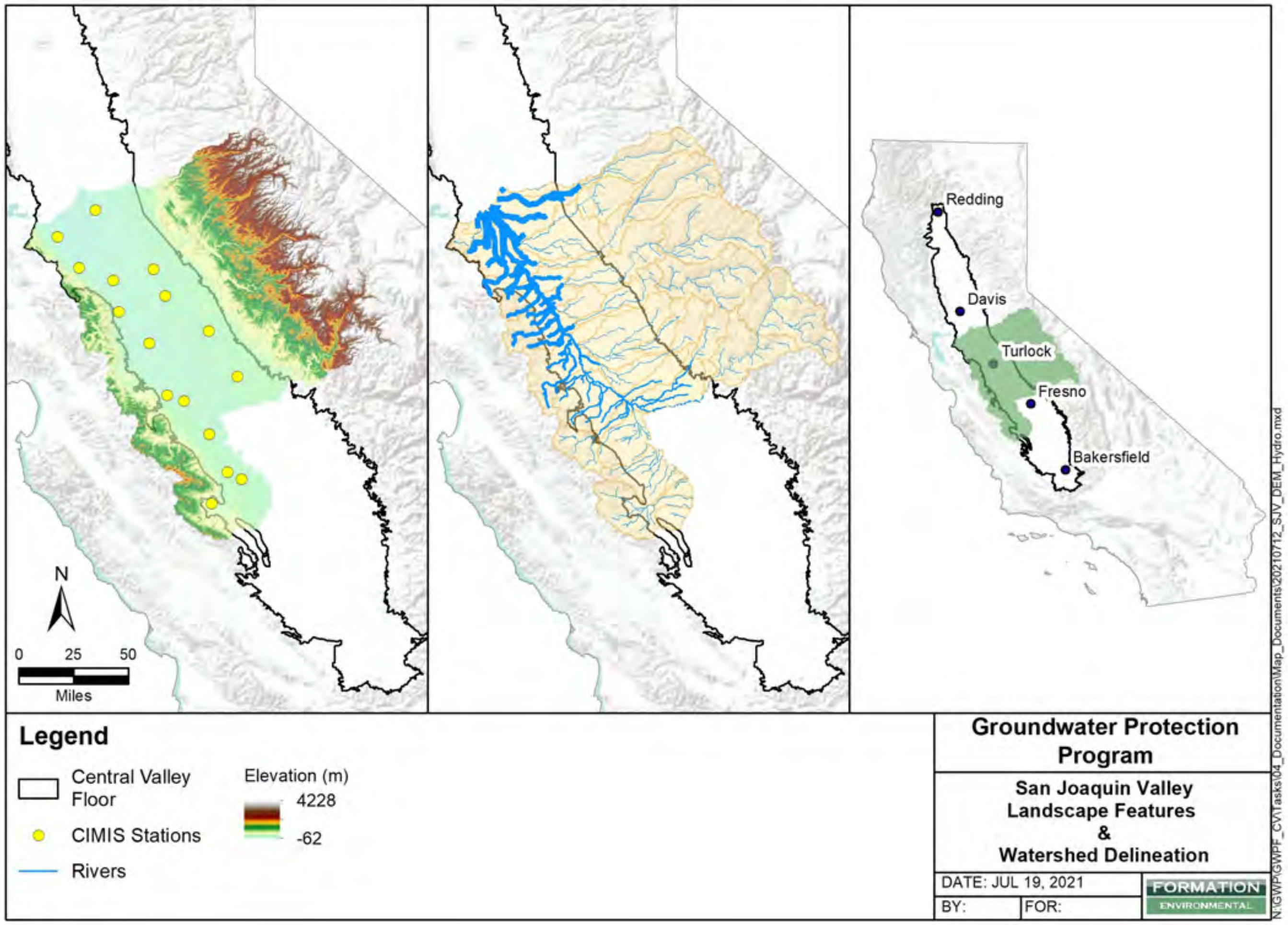


FIGURE 3-3. SACRAMENTO VALLEY WATERSHED AND SUB-BASIN DELINEATION

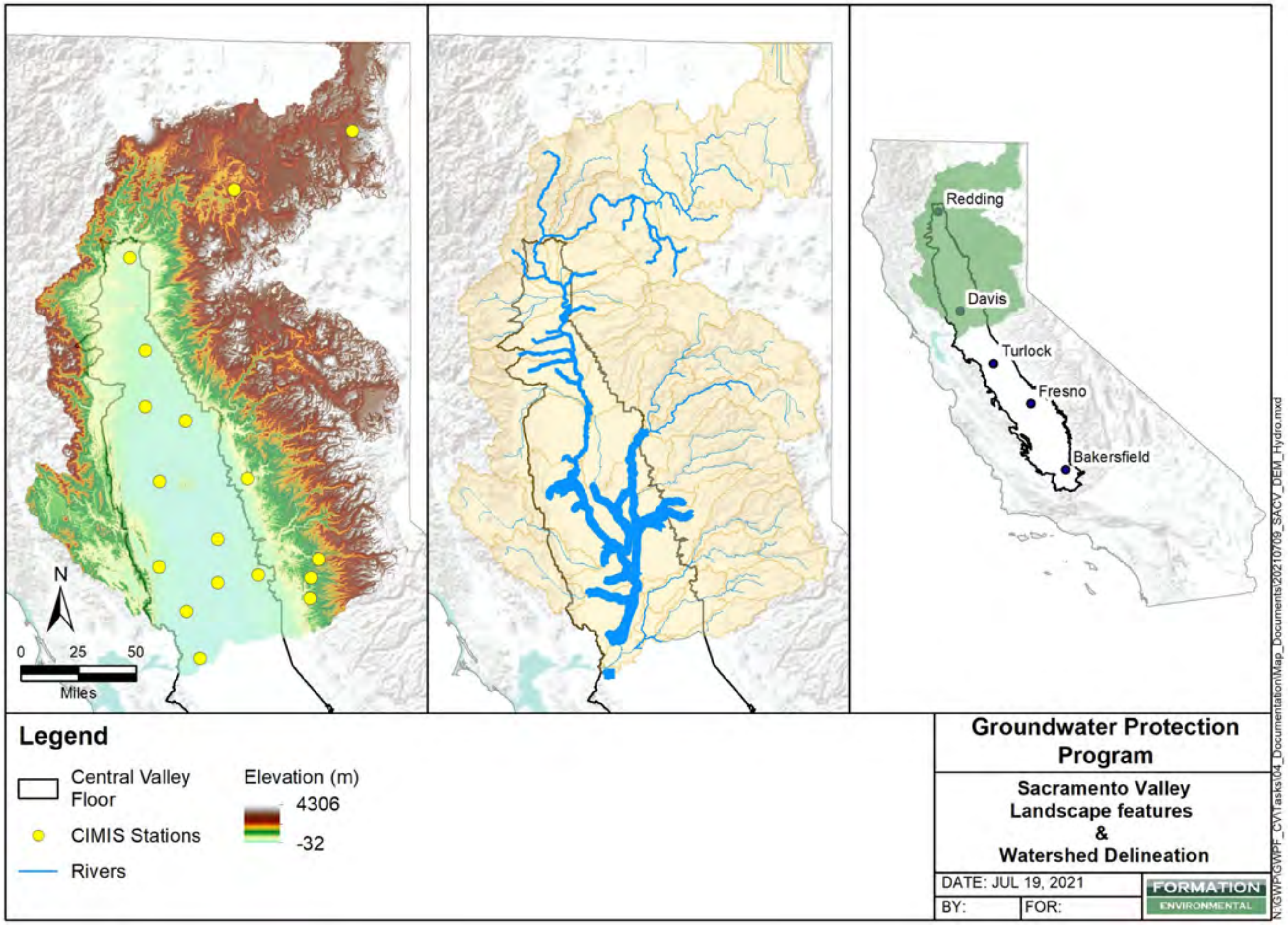
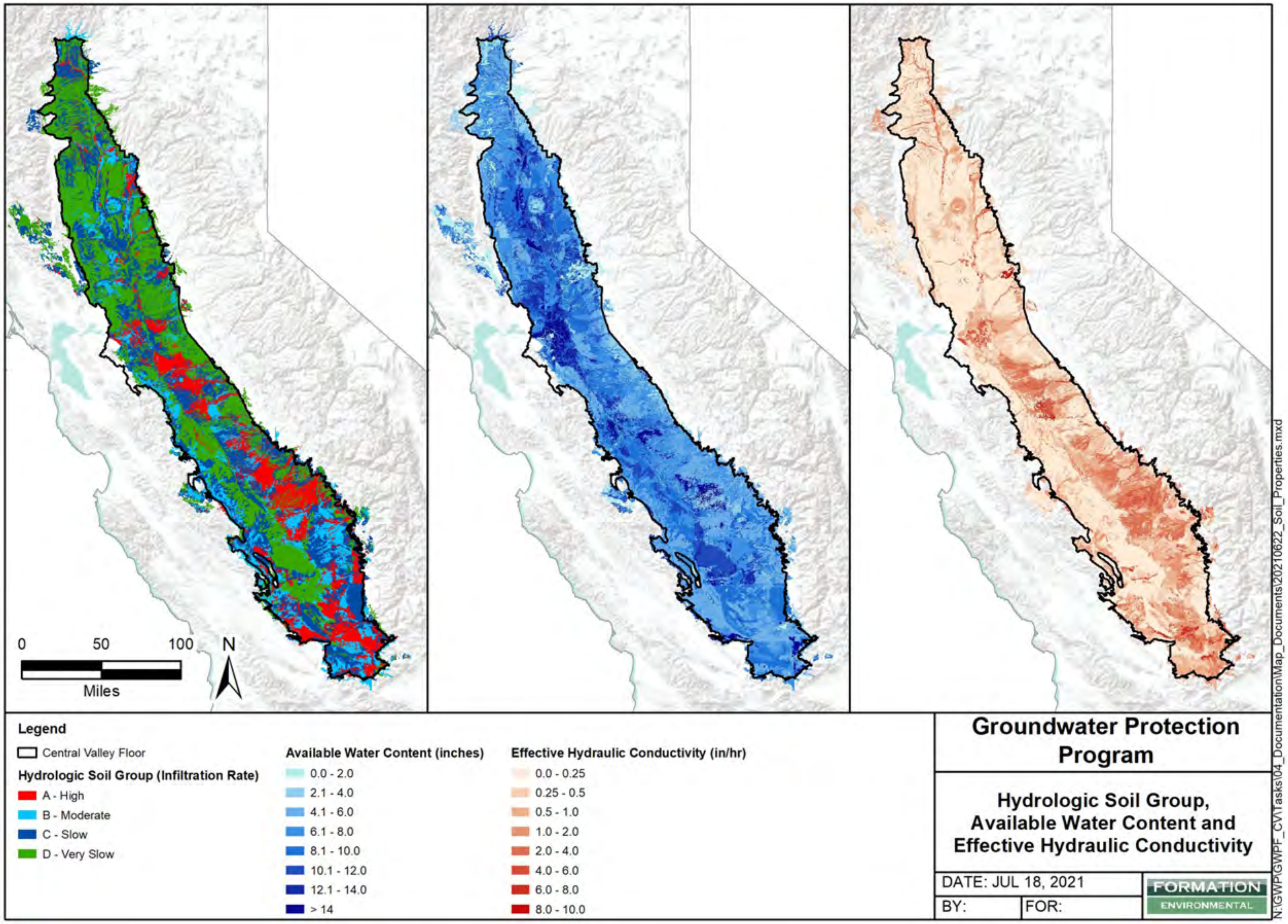


FIGURE 3-4. KEY SSURGO SOIL VARIABLES ACROSS THE CV-SWAT DOMAINS



APPENDIX 4 – CROP MODEL DEVELOPMENT

This appendix provides data and summaries for each crop model developed for the Root-zone Library. This includes specific crop parameters, management suites by crop, and results of each calibrated crop model. Specifically, this includes the following:

- Table 4-1. Modeled Irrigation Type, Number of Irrigation Events, and Irrigation Volume for Each of the Three Domains
- Table 4-2. Fertilizer Type and Annual Application Rates for Each of the Three Domains
- Table 4-3. Calibrated Crop Values for Baseline Model for the Tulare Lake Basin Domain
- Table 4-4. Calibrated Crop Values for Baseline Model for the San Joaquin Valley Domain
- Table 4-5. Calibrated Crop Values for Baseline Model for the Sacramento Valley Domain
- Table 4-6. Crop Growth Parameter Definitions
- Table 4-7. Crop Growth Parameter Values for Crops in the Tulare Lake Basin Domain
- Table 4-8. Crop Growth Parameter Values for Crops in the San Joaquin Valley Domain
- Table 4-9. Crop Growth Parameter Values for Crops in the Sacramento Valley Domain

Additionally, SWAT reference citations and other sources are listed below.

SOURCES OF INFORMATION ACROSS CROPS

Crop nutrient uptake and partitioning summaries:
https://www.cdfa.ca.gov/is/ffldrs/frep/FertilizationGuidelines/N_Uptake.html

UC Crop Production Budgets with Description of Management Practices: https://coststudies.ucdavis.edu/en/

CROP-SPECIFIC REFERENCES

Alfalfa

Hanson, B. R., K. L. Bali, and B. L. Sanden. 2008. Irrigating alfalfa in arid regions. UC Pub. 8293.

Mueller, S. C. and L. R. Teuber. 2007. Alfalfa growth and development. UC Pub. 8289.

Putnam, D. H., P. Robinson, and E. DePeters. 2008. Forage quality and testing. UC Pub. 8302.

Almond

Doll, D. and K. Shackel. 2015. Drought management for California almonds. Univ. Calif. Pub 8515.

Muhammad, S., B. L. Sanden, B. D. Lampinen, S. Saa, M. I. Siddiqui, D. R. Smart, A. Olivos, K. A. Shackel, T. DeJong, and P. Brown. 2015. Seasonal changes in nutrient content and concentrations in a mature deciduous tree species: Studies in almond (*Prunus dulcis* (Mill.) D. A. Webb). European J. Agron. 65: 52-68.

Muhammad, S., B. L. Sanden, S. Saa, B. D. Lampinen, D. R. Smart, K. A. Shackel, T. DeJong, and P. Brown. 2018. Optimization of nitrogen and potassium nutrition to improve yield and yield parameters of irrigated almond (*Prunus dulcis* (Mill.) D. A. Webb). Scientia Hort. 228: 204-212.

Silva, S. S., S. Muhammed, B. Sanden, E. Laca, and P. Brown. 2012. Almond early-season sampling and in-season nitrogen application maximizes productivity, minimizes loss. Protocol for early-season sampling and in-season nitrogen budgeting. Almond Board of California.

Apple

Brunetto, G., G. W. Bastos De Melo, M. Toselli, M. Quartieri, and M. Tagliavini. 2015. The role of mineral nutrition on yields and fruit quality on grapevine, pear and apple. Rev. Bras. Frutic., Jaboticabal - SP, 37(4): 1089-1104, December.

Scandellari, F., M. Ventura, D. Malaguti, C. Ceccon, G. Menarbin, and M. Tagliavini. 2010. Net primary productivity and partitioning of absorbed nutrients in field-grown apple trees. Acta Hortic. 868: 115-122.

Zanotelli, D., L. Montagnani, G. Manca, and M. Tagliavini. 2013. Net primary productivity, allocation pattern and carbon use efficiency in an apple orchard assessed by integrating eddy covariance, biometric and continuous soil chamber measurements. Biogeosciences 10: 3089-3108.

Barley

Jackson, L. et al. 2006. Small Grains Production Manual. UC Pub. 8208.

Bean

Araujo, A. P. and M. G. Teixiera. 2003. Nitrogen and phosphorus harvest indices of common bean cultivars: implications for yield quantity and quality. Plant and Soil 257: 425-433.

Long, R., M. Leinfelder-Miles, K. Mathesius, K. Bali, S. Light, M. Galla, S. Mueller, A. Fulton, N. Clark, and R. D. Meyer. 2019. Garbanzo bean (chickpea) production in California. UC Pub. 8634.

Long, R., S. Temple, J. Schmierer, M. Canevari, and R. D. Meyer. 2010. Common dry bean production in California. UC Pub. 8402.

Bush Berries

Bryla, D. R., B. C. Strik, M. P. Banados, and T. L. Righetti. 2012. Response of highbush blueberry to nitrogen fertilizer during field establishment II: Plant nutrient requirements in relation to nitrogen fertilizer supply. HortScience 47: 917-926.

Cantaloupe/Honeydew

Soto-Ortiz, R. 2008. Crop phenology, dry matter production and nutrient uptake and partitioning in cantaloupe (C*ucumis melo l.*) and chile (C*apsicum annuum l.*). PhD Dissertation, University of Arizona.

Carrot

Hartz, T. K., P. R. Johnstone, and J. J. Nunez. 2005. production environment and nitrogen fertility affect carrot cracking. HortScience 40: 611-615.

Makries, J. L. and D. D. Warncke. 2013. Timing nitrogen applications for quality tops and healthy root production in carrot. Commun. Soil Sci. Plant Anal. 44: 2860-2874.

Santos, P., J. J. Nunez, and R. M. Davis. 2000. Influence of gibberellic acid on carrot growth and severity of Alternaria leaf blight. Plant Disease 84: 555-558.

Westerveld, S. M., A. W. McKeown, and M. R. MacDonald. 2006. Seasonal nitrogen partitioning and nitrogen uptake of carrots as affected by nitrogen application in a mineral and an organic soil. HortScience 41: 1332-1338.

Cherry

Glozer, K., J. Grant, M. Kong, and G. Lang. 2011. Optimizing nitrogen availability in cherry growth to obtain high yield and fruit quality. California Department of Food and Agriculture Fertilizer Research and Education Program final project report.

San-Martino, L., G. O. Sozzi, S. San-Martino, and R. S. Lavado. 2010. Isotopically-labelled nitrogen uptake and partitioning in sweet cherry as influenced by timing of fertilizer application. Scientia Hortic. 126: 42-49.

Citrus

Alva, A. K. and S. Paramasivam. 1998. Nitrogen management for high yield and quality of citrus in sandy soils. Soil Sci. Soc. Amer. J. 62: 1335-1342.

Alva, A. K., S. Paramasivam, T. A. Obreza, and A. W. Schumann. 2006. Nitrogen best management practice for citrus trees I. Fruit yield, quality, and nutritional status. Scientia Hortic. 107: 233-244.

Arpaia, M. L. and L. J. Lund. 2003. Nitrogen management in citrus under low volume irrigation. California Department of Food and Agriculture Fertilizer Research and Education Program final project report.

Morgan, K. T., J. M. S. Scholberg, T. A. Obreza, and T. A. Wheaton. 2006. Size, biomass, and nitrogen relationships with sweet orange tree growth. J. Amer. Soc. Hort. Sci., 131: 149-156.

Roccuzzo, G., D. Zanotelli, M. Allegra, A. Giuffrida, B. F. Torrisi, A. Leonardi, A. Quinones, F. Intrigliolo, and M. Tagliavini. 2012. Assessing nutrient uptake by field-grown orange trees. European J. Agron. 41: 73-80.

Schwankl, L. J., T.L . Pritchard, B. R. Hanson, and R. B. Elkins. 2007. Understanding your orchard's water requirements. UC Pub. 8212.

Cole Crops

Smith, R., M. Cahn, T. Hartz, P. Love, and B. Farrara. 2016. Nitrogen dynamics of cole crop production: implications for fertility management and environmental protection. HortScience 51: 1586-1591.

Corn

Geisseler, D., P. A. Lazicki, G. S. Pettygrove, B. Ludwig, P. A. M. Bachand, and W. R. Horwath. 2012. Nitrogen dynamics in irrigated forage systems fertilized with liquid dairy manure. Agron. J. 104: 897-907.

Heckman, J. R. 2007. Sweet corn nutrient uptake and removal. HortTechnology 17:82-86.

Cotton

Fritschi, F. B., B. A. Roberts, R. L. Travis, D. W. Rains, and R. B. Hutmacher. 2003. Response of irrigated acala and pima cotton to nitrogen fertilization: Growth, dry matter partitioning and yield. Agron. J. 95: 133-146.

Fritschi, F. B., B. A. Roberts, R. L. Travis, D. W. Rains, and R. B. Hutmacher. 2004. Seasonal nitrogen concentration, uptake, and partitioning pattern of irrigated acala and pima cotton as influenced by nitrogen fertility level. Crop Sci. 44: 516-527.

Hutmacher, R. B., R. L. Travis, D. W. Rains, R. N. Vargas, B. A. Roberts, B. L. Weir, S. D. Wright, D. S. Munk, B. H. Marsh, M. P. Keeley, F. B. Fritschi, D. J. Munier, R. L. Nichols, and R. Delgado. 2004. Response of recent acala cotton varieties to variable nitrogen rates in the San Joaquin Valley of California. Agron. J. 96: 48-62.

Fig

Goldhamer, D. and M. Salinas. 1999. Black Mission fig production improved by heavier irrigation. California Agriculture 53(6): 30-34.

Grape

Araujo, F. J. and L. E. Williams. 1988. Dry matter and nitrogen partitioning and root growth of young field-grown Thompson Seedless grapevines. Vitis, 27: 21-32.

Christiansen, L. P. 2000. Raisin production manual. UC Pub. 3393.

Peacock, W. L., L. P. Christensen, and F. E. Broadbent. 1989. Uptake, storage, and utilization of soil-applied nitrogen by Thompson Seedless as affected by time of application. Amer. J. Enol. Vitic. 40: 16-20.

Williams, L. E. 1987. Growth of 'Thompson Seedless' grapevines: II. Nitrogen distribution. J. Amer. Soc. Hortic. Sci., 112: 330-333.

Williams, L. E. 2017. Dry matter accumulation and nitrogen and potassium partitioning in the roots and trunk of field-grown Thompson Seedless grapevines. Amer. J. Enol. Vitic. 68: 422-430.

Williams, L. E. and Biscay, P. J. 1991. Partitioning of dry weight, nitrogen, and potassium in Cabernet Sauvignon grapevines from anthesis until harvest. Amer. J. Enol. Vitic. 42: 113-117.

Kiwifruit

Morton, A. R. 2013. Kiwifruit (*Actinidia* spp.) vine and fruit responses to nitrogen fertilizer applied to the soil or leaves. Dissertation, Massey University, New Zealand.

Smith, G. S., J. G. Buwalda, and C. J. Clark. 1988. Nutrient dynamics of a kiwifruit ecosystem. Scientia Hortic. 37: 87-109.

Lettuce

Bottoms, T.G., R.F. Smith, M.D. Cahn, and T.K. Hartz. 2012. Nitrogen requirements and N status determination of lettuce. HortScience 47: 1768-1774.

Oat

Jackson, L. et al. 2006. Small grains production manual. UC Pub. 8208.

Olive

Fernandez Escobar, R., M. A. Sanchez Zamora, J. M. Gracia Novelo, and C. Molina Soria. 2015. Nutrient removal from olive trees by fruit yield and pruning. HortScience 50: 474-478.

Lightle, D. and J. Connell. 2018. Drought tip: Drought strategies for table and oil olive production. UC Pub. 8538.

Villalobos, F. J., L. Testi, J. Hidalgo, M. Pastor, and F. Orgaza. 2006. Modelling potential growth and yield of olive (*Olea europaea* L.) canopies. European J. Agronomy 24: 296-303.

Onion

Smith, R., A. Biscaro, M. Cahn, O. Daugovish, E. Natwick, J. Nunez, E. Takele, and T. Turini. 2011. Fresh-market bulb onion production in California. UC Pub. 7242.

Sullivan, D. M., J. M. Hart, and N. W. Christensen. 1999. Nitrogen uptake and utilization by Pacific Northwest crops. Pacific Northwest Extension Pub. 513.

Peach/Nectarine

El-Jendoubi, H., J. Abadía, and A. Abadía. 2013. Assessment of nutrient removal in bearing peach trees (*Prunus persica* L. Batsch) based on whole tree analysis. Plant and Soil, 369: 421-437.

Rufat, J. and T. M. DeJong. 2001. Estimating seasonal nitrogen dynamics in peach trees in response to nitrogen availability. Tree Physiology 21: 1133-1140.

Pepper

Hartz, T., M. Cantwell, M. LeStrange, R. Smith, J. Aguiar, and O. Daugovish. 2008. Bell pepper production in California. UC Pub. 7217.

Pistachio

Baram, S., V. Couvreur, T. Harter, M. Read, P. H. Brown, J. W. Hopmans, and D. R. Smart. 2016. Assessment of orchard losses to groundwater with a vadose zone monitoring network. Agricultural Water Management 172: 83-95.

Brown, P. H., S. A. Weinbaum, and G. A. Picchioni. 1995. Alternate bearing influences annual nutrient consumption and the total nutrient content of mature pistachio trees. Trees 9: 158-164.

Rosecrance, R. C., S. A. Weinbaum, and P. H. Brown. 1996. Assessment of nitrogen, phosphorus, and potassium uptake capacity and root growth in mature alternate-bearing pistachio (*Pistacia vera*). Tree Physiology 16: 949-956.

Rosecrance, R. C., S. A. Weinbaum, and P. H. Brown. 1998. Patterns of nitrogen uptake and storage in mature, alternate bearing pistachio trees. Acta Hortic. 470: 387-393.

Siddiqui, M. I. 2014. Development of leaf sampling and interpretation methods for pistachio and development of a nutrient budget approach to fertilizer management in pistachio. Dissertation, University of California – Davis.

Plum/Prune

Schwankl, L.J., T.L. Pritchard, B.R. Hanson, and R.B. Elkins. 2007. Understanding your orchard's water requirements. UC Pub. 8212.

Pomegranate

Ayars, J. E. and C. J. Phene. 2015. Improving pomegranate fertigation and nitrogen use efficiency with drip irrigation systems. California Department of Food and Agriculture Fertilizer Research and Education Program final project report. Available at https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/completedprojects/12-0387-SA_Ayars.pdf.

Potato

Sullivan, D. M., J. M. Hart, and N. W. Christensen. 1999. Nitrogen uptake and utilization by Pacific Northwest crops. Pacific Northwest Extension Pub. 513.

Pumpkin

Aegerter, B., R. Smith, E. Natwick, M. Gaskell and E. Rilla. 2013. Pumpkin production in California. UC Pub. 7222.

Rice

CRC (California Rice Commission). 2013. Rice-specific groundwater assessment report. July. Appendix D: GAR Appendix D: Fate of Nitrogen in California Rice Soils: A More Detailed Discussion (April 13, 2012, memo from John Dickey to Tim Johnson and Roberta Firoved).

Dickey, J. 2021. Options for Calculating Rice Fields' Groundwater Protection Values. Technical Memorandum prepared for T. Dunham, T. Johnson, and D. Cory. Reviewed by B. Linquist and K. Miller. June 2.

Eagle, A. J., J. A. Bird, W. R. Horwath, B. A. Linquist, S. M. Brouder, J. E. Hill, and C. van Kessel. 2000. Rice yield and nitrogen utilization efficiency under alternative straw management practices. Agron. J. 92: 1096-1103.

LaHue, G.T. and B.A. Linquist. 2021. The contribution of percolation to water balances in water-seeded rice systems. Agricultural Water Management 243:106445.

Liang, X. Q., T. Harter, L. Porta, C. van Kessel, and B. A. Linquist. 2014. Nitrate leaching in Californian rice fields: A field- and regional-scale assessment. J. Environ. Qual. 43: 881-894.

Van Kessel, C. and B. Linquist. 2007. Fertility management in rice. California Department of Food and Agriculture Fertilizer Research and Education Program final project report. Available at https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/completedprojects/04-0704vanKessel2008.pdf.

Safflower

Kaffka, S. R. and T. E. Kearney. 1998. Safflower production in California. UC Pub. 21565.

Sunflower

Long, R., T. Gulya, S. Light, K. Bali, K. Mathesius, and R. D. Meyer. 2019. Sunflower hybrid seed production in California. UC Pub. 8638.

Sweet Corn

Heckman, J. R. 2007. Sweet corn nutrient uptake and removal. HortTechnology 17:82-86.

Sweet Potato

Stoddard, S. and B. Weimer. 2003. Effect of different rates of N and K on drip irrigated Beauregard sweet potato. California Department of Food and Agriculture Fertilizer Research and Education Program final project report. Available at https://www.cdfa.ca.gov/is/ffldrs/frep/pdfs/completedprojects/00-0507Weimer2004.pdf.

Tomato

Hartz, T.K. and T.G. Bottoms. 2009. Nitrogen requirement of drip-irrigated processing tomatoes. HortScience 44: 1988-1993.

Lazcano, C., J. Wade, W.R. Horwath, and M. Burger. 2015. Soil sampling protocol reliably estimates preplant NO_3^- in SDI tomatoes. California Agriculture 69:222-229.

Walnut

Fulton, A. and R. Buchner. 2015. Drought strategies for California walnut production. UC Pub. 8533.

Fulton, A. E., C. C. Little, R. L. Snyder, B. D. Lampinen, and R. P. Buchner. 2017. Evaluation of crop coefficients and evapotranspiration in English walnut. Paper #1701457, Proceedings of the American Society of Agricultural and Biological Engineers Annual Meeting, Spokane, WA.

Weinbaum, S. and C. van Kessel. 1998. Quantitative estimates of uptake and internal cycling of ^{14}N-labeled fertilizer in mature walnut trees. Tree Physiology, 18: 795-801.

Wheat

Dai, J., B. Bean, B. Brown, W. Beuening, J. Edwards, M. Flowers, R. Karow, C. Lee, G. Morgan, M. Ottman, J. Ransom, and J. Wiersma. 2016. Harvest index and straw yield of five classes of wheat. Biomass and Bioenergy 85: 223-227.

Jackson, L. et al. 2006. Small grains production manual. UC Pub. 8208.

Jackson, L. F. 2001. Nitrogen fertilization and grain protein content in California wheat. California Department of Food and Agriculture Fertilizer Research and Education Program final project report.

TABLE 4-1. MODELED IRRIGATION TYPE, NUMBER OF IRRIGATION EVENTS, AND IRRIGATION VOLUME FOR EACH OF THE THREE DOMAINS

Crop	Irrigation system	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)
Alfalfa	Flood	11	54.1	11	54.1	8	39.4
Almonds	Micro Sprinkler	48	47.8	44	43.3	39	38.4
Apple	Micro Sprinkler	43	36.4	35	34.5	-	-
Apricot	Micro Sprinkler	-	-	42	41.3	-	-
Barley Grain	Sprinkler	4	12.8	-	-	3	6.9
Barley Silage	Furrow	4	10.0	4	10.0	-	-
Beans Dry	Furrow	6	17.7	-	-	-	-
Bell Pepper	Subsurface Drip	30	23.0	30	23.0	30	23.0
Broccoli	Sprinkler	7	13.8	7	13.8	-	-
Bush Berries	Micro Sprinkler	33	32.5	-	-	-	-
Cabbage	Sprinkler	7	13.8	-	-	-	-
Cantaloupe	Subsurface Drip	29	18.1	29	18.1	-	-
Cherries	Micro Sprinkler	36	36.4	31	30.5	31	30.5
Corn	Furrow	8	25.6	8	25.6	8	25.6
Cotton	Subsurface Drip	-	-	-	-	29	29.5
	Furrow	8	29.7	8	29.7		

Crop	Irrigation system	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)
Carrot	Sprinkler	9	16.3	9	16.3	-	-
Corn Silage	Furrow	7	25.6	7	25.6	7	25.6
Cucumber	Subsurface Drip	-	-	-	-	29	18.1
Figs	Micro Sprinkler	-	-	25	24.6	-	-
Garlic	Subsurface Drip	18	19.7	18	19.7	-	-
Garbanzo Beans	Furrow	8	16.7	8	16.7	-	-
Raisin Grape	Subsurface Drip	44	34.6	44	34.6	-	-
Table Grape	Subsurface Drip	44	34.6	44	34.6	-	-
Wine Grapes	Subsurface Drip	44	34.6	44	34.6	20	19.7
Honeydew Melon	Subsurface Drip	29	18.1	29	18.1	-	-
Kiwis	Surface Drip	38	37.4	-	-	38	37.4
Lemon	Micro Sprinkler	52	42.1	52	42.1	-	-
Lettuce	Subsurface Drip	7	13.4	7	13.4	-	-
Lima	Furrow	-	-	6	19.7	6	18.7
Mandarins	Micro Sprinkler	52	42.1	52	42.1	-	-
Nectarines	Micro Sprinkler	42	42.3	39	38.4	-	-

Crop	Irrigation system	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)
Oats Silage	Furrow	4	10.0	4	10.0	-	-
Oats Grain	Sprinkler	4	12.8	4	12.8	-	-
Olives	Subsurface Drip	41	41.3	33	32.5	33	32.5
Onion	Subsurface Drip	22	21.2	22	21.2	-	-
Orange	Micro Sprinkler	52	42.1	52	42.1	-	-
Pasture Grazing	Sprinkler	5	19.7	5	19.7	5	19.7
Pasture Hay	Sprinkler	8	31.5	8	31.5	8	31.5
Peaches	Micro Sprinkler	42	42.3	39	38.4	37	36.4
Pear	Micro Sprinkler	-	-	35	34.5	35	34.5
Pistachios	Subsurface Drip	43	43.3	41	40.3	39	38.4
Plums	Micro Sprinkler	42	41.3	42	41.3	42	41.3
Pomegranates	Micro Sprinkler	33	32.5	33	32.5	-	-
Potato	Sprinkler	10	13.8	-	-	-	-
Prunes	Micro Sprinkler	42	41.3	42	41.3	42	41.3
Pumpkins		-	-	20	19.5	-	-
Safflower	Furrow	4	14.0	-	-	1	5.9
Sweet Corn	Furrow	5	17.7	5	17.7	-	-

Crop	Irrigation system	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)	Number of irrigations	Irrigation volume (in.)
Sorghum Grain	Furrow	6	23.6	-	-	6	21.6
Sorghum Hay	Furrow	6	23.6	6	22.6	6	21.6
Sunflower	Furrow	-	-	-	-	6	21.6
Sweet Potato	Sprinkler	40	27.0	40	27.0	-	-
Fresh Tomato	Subsurface Drip	28	17.9	28	17.9	-	-
Processing Tomato	Subsurface Drip	38	23.8	38	23.8	31	19.3
Triticale Silage	Furrow	4	10.0	-	-	-	-
Vine Seed	Furrow	-	-	-	-	11	19.7
Walnut	Sprinkler*	46	45.3	22	43.3	21	41.3
Watermelons	Subsurface Drip	42	25.8	42	25.8	-	-
Wheat Silage	Furrow	4	10.0	4	10.0	4	10.0
Wheat Grain	Sprinkler	4	12.8	3	7.8	3	6.9

**** Walnut is Micro Sprinkler in Tulare Lake Basin***

TABLE 4-2. FERTILIZER TYPE AND ANNUAL APPLICATION RATES FOR EACH OF THE THREE DOMAINS

Crop	Fertilizer Type	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)
Alfalfa	MAP	1	22	1	22	1	22
Almonds	URAN	6	210	6	210	6	210
Apple	URAN	4	80	4	80	-	-
Apricot	URAN	-	-	3	80	-	-
Barley Grain	Urea/URAN/Ammonium Sulfate	3	107	-	-	3	107
Barley Silage	Urea/Ammonium Sulfate	2	107	2	107	-	-
Beans Dry	Ammonium Sulfate	1	45	-	-	-	-
Bell Pepper	Urea/Ammonium Sulfate	7	205	7	205	7	205
Broccoli	Urea/Ammonium Sulfate	3	223	3	223	-	-
Bush Berries	URAN	4	98	-	-	-	-
Cabbage	URAN/Ammonium Sulfate	3	223	-	-	-	-
Cantaloupe	URAN/Ammonium Sulfate	4	112	4	112	-	-
Cherries	URAN	2	62	2	54	2	54
Corn	URAN/Ammonium Sulfate	4	214	4	214	4	214
Cotton Drip Irrigated	URAN/Ammonium Sulfate	-	-	-		6	165
Cotton Furrow Irrigated	URAN/Ammonium Sulfate	3	170	3	170		0
Carrot	URAN/Ammonium Sulfate	6	161	6	161	-	
Corn Silage	URAN/Ammonium Sulfate	4	214	4	214	4	214
Cucumber	URAN/Ammonium Sulfate	-	-	-	-	4	112
Figs	URAN	-	-	3	80	-	-
Garlic	URAN/Ammonium Sulfate	7	201	7	201	-	-

Crop	Fertilizer Type	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)
Garbanzo Beans	URAN/Ammonium Sulfate	3	89	3	89	-	-
Raisin Grape	URAN	2	62	2	62	-	-
Table Grape	URAN	2	62	2	62	-	-
Wine Grapes	URAN	2	62	2	62	2	45
Honeydew Melon	URAN/Ammonium Sulfate	4	112	4	112	-	-
Kiwis	URAN	4	98	-	-	4	98
Lemon	URAN	3	120	3	120	-	-
Lettuce	URAN/Ammonium Sulfate	3	161	3	161	-	-
Lima Bean		-	-	2	54	2	54
Mandarins	URAN	3	120	3	120	-	-
Nectarines	URAN	3	80	3	80	-	-
Oats Silage	URAN/Ammonium Sulfate	2	152	2	152	-	-
Oats Grain	Urea/URAN/Ammonium Sulfate	3	107	3	107	-	-
Olives	URAN	5	76	5	58	5	58
Onion	URAN/Ammonium Sulfate	6	196	6	196	-	-
Orange	URAN	3	120	3	120	-	-
Pasture Grazing	Ammonium Sulfate	1	58	1	58	1	58
Pasture Hay	URAN	1	76	1	76	1	76
Peaches	URAN	3	89	3	89	3	89
Pear	URAN	-	-	4	80	4	80
Pistachios	URAN	4	161	4	161	4	161
Plums	URAN	3	80	3	80	3	80

Crop	Fertilizer Type	Tulare Lake Basin		San Joaquin Valley		Sacramento Valley	
		Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)	Number of applications	N Rate (lbs/ac)
Pomegranates	URAN	4	103	4	103	-	-
Potato	URAN/Ammonium Sulfate	3	214	-	-	-	-
Prunes	URAN	3	107	3	107	3	107
Pumpkins		-	-	4	116	-	
Safflower	URAN/Ammonium Sulfate	2	125	-	-	1	98
Sweet Corn	URAN/Ammonium Sulfate	3	196	3	196	-	
Sorghum Grain	URAN/Ammonium Sulfate	3	125	-		3	125
Sorghum Hay	URAN/Ammonium Sulfate	3	125	3	125	3	125
Sunflower		-	-	-	-	2	107
Sweet Potato	URAN/Ammonium Sulfate	5	152	5	152	-	-
Fresh Tomato	URAN/Ammonium Sulfate	6	205	6	205	-	-
Processing Tomato	URAN/Ammonium Sulfate	7	205	7	205	7	205
Triticale Silage	Urea/Ammonium Sulfate	2	178	-	-	-	
Vine Seed	URAN/Ammonium Sulfate	-	-	-	-	2	107
Walnut	URAN	4	152	4	152	4	152
Watermelons	URAN/Ammonium Sulfate	6	134	6	134	-	-
Wheat Silage	URAN/Ammonium Sulfate	2	178	2	178	2	125
Wheat Grain	Urea/URAN/Ammonium Sulfate	3	170	3	152	3	152

TABLE 4-3. CALIBRATED CROP VALUES FOR BASELINE MODEL FOR TULARE LAKE BASIN DOMAIN

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Alfalfa	17,001	8.6	42.2	19.2	450.0	448.4	0.009	0.5	-	-4.6
Almonds	2,450	8.7	43.8	11.5	225.3	169.9	1.2	4.7	13.6	1.6
Apple	3,1309	7.6	41.4	3.0	62.1	17.0	4.7	2.1	14.9	-1.2
Barley Grain	4,852	6.7	16.2	4.6	112.3	81.4	0.3	8.8	-	-1
Barley Silage	25,483	5.3	13.1	4.9	100.5	88.6	0.4	6.7	-	-5
Beans Dry	3,370	5.3	21.4	4.5	207.3	121.3	1.1	1.7	-	11
Bell Pepper	44,413	6.2	25.9	5.0	241.4	73.5	9.2	3.3	-	23.6
Broccoli	14,685	4.7	16.8	4.9	254.2	67.5	10.8	5.4	-	21.7
Bush Berries	12,774	4.4	37.4	3.3	82.9	28.2	2.9	2.8	16.1	1.4
Cabbage	40,745	4.7	16.8	4.8	251.5	91.2	9.1	5.4	-	18.4
Cantaloupe	38,475	5.8	22.7	3.3	153.9	101.4	0.7	1.8	-	-0.6
Cherries	11,658	6.9	39.1	5.1	104.2	25.1	0.2	1.5	22.2	2.5
Corn	11,067	12.1	24.9	8.4	257.9	130.8	1.8	3.5	-	21.7
Cotton	1,853	7.1	33.3	4.5	168.2	108.4	2.8	2.4	-	1.2
Carrot	58,612	5.1	17.1	7.0	162.7	86.3	4.0	2.2	-	5.5
Corn Silage	55,521	11.6	25.7	7.7	212.6	188.1	0.6	4.2	-	-4.4
Garlic	17,839	6.5	20.6	6.9	176.2	134.8	3.4	3.0	-	-0.9
Garbanzo Beans	3,167	5.4	17.3	7.3	182.1	105.7	0.8	1.1	-	10.4
Raisin Grape	5,255	5.9	36.7	5.6	67.9	26.8	2.0	1.5	16.1	-2.1
Table Grape	24,011	5.9	36.7	5.6	68.6	27.2	1.9	1.5	16.2	-2.1

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Wine Grapes	22,236	5.8	36.7	5.6	67.5	40.0	1.4	1.5	10.7	-3.3
Honeydew Melon	39,666	6.0	22.8	3.3	198.7	58.5	3.8	1.9	-	20.2
Kiwis	28,251	6.3	37.8	7.3	111.2	60.6	1.1	2.3	15.7	-0.7
Lemon	33,554	7.3	44.4	5.6	85.3	43.2	2.2	2.9	16.4	-2.1
Lettuce	39,291	2.8	15.3	5.9	124.6	72.9	5.4	2.9	-	-0.1
Mandarins	33,554	7.3	44.4	5.6	85.3	42.7	2.3	2.9	16.6	-2.1
Nectarines	30,018	7.4	43.7	6.4	103.6	54.5	0.5	1.8	14.2	-0.6
Oats Silage	26,793	5.6	13.1	4.8	135.1	113.9	1.0	9.6	-	-3.9
Oats Grain	4,486	6.2	16.2	4.6	104.3	84.3	0.3	8.7	-	-2.6
Olives	11,277	6.6	42.6	6.6	85.2	35.6	2.1	1.6	14.0	-0.8
Onion	43,696	6.4	22.9	6.1	164.3	86.2	7.3	2.9	-	2.7
Orange	33,554	7.3	44.4	5.6	85.2	49.7	2.1	2.9	13.4	-2.6
Pasture Grazing	0	5.7	27.1	1.0	122.1	0.0	0.1	15.9	4.8	59.3
Pasture Hay	7,298	4.6	30.2	9.4	78.7	68.6	0.0	4.3	9.1	-5.1
Peaches	30,911	7.7	43.7	6.4	113.2	44.2	1.2	2.0	20.2	3.3
Pistachios	3,824	7.2	42.2	8.7	166.8	107.2	2.2	3.8	16.7	0.3
Plums	23,050	7.2	43.6	5.5	90.7	25.8	2.6	2.0	19.2	1.8
Pomegranates	27,349	9.6	34.5	5.7	103.2	52.5	3.1	2.7	18.9	-1.5
Potato	48,043	7.9	17.3	4.5	215.8	149.8	3.9	2.9	-	4.5
Prunes	6,768	7.0	43.6	5.5	94.0	39.1	4.0	2.6	16.2	0.8

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrifica-tion (lbs/ac)	Volatiliza-tion (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Safflower	3,127	6.7	18.0	4.2	137.4	80.3	0.8	2.3	-	6.2
Sweet Corn	25,227	7.4	18.5	7.1	178.7	90.7	3.8	3.5	-	12.7
Sorghum Grain	7,967	9.1	23.7	7.6	144.4	125.0	0.4	3.8	-	-4.9
Sorghum Hay	13,652	8.3	23.4	8.0	150.2	122.9	0.4	5.0	-	-5.4
Sweet Potato	40,373	8.8	30.8	4.1	228.8	95.9	5.3	3.6	-	10.6
Fresh Tomato	61,764	6.4	20.9	5.1	235.0	80.8	6.3	2.8	-	23.3
Processing Tomato	114,072	7.8	26.4	5.6	227.6	169.5	1.3	2.7	-	4.8
Triticale Silage	27,031	5.6	13.1	4.8	155.9	118.5	1.7	11.3	4.7	-1.9
Walnut	5,089	7.6	42.6	10.2	115.1	80.8	3.2	3.7	12.0	-2.6
Watermelons	72,690	7.3	27.9	5.7	146.1	50.8	6.0	2.3	-	3.9
Wheat Silage	26,972	5.6	13.1	4.8	151.8	130.1	1.3	11.3	-	-3.7
Wheat Grain	6,283	8.7	16.2	4.6	155.0	132.8	0.4	13.8	-	-2.2

TABLE 4-4. CALIBRATED CROP VALUES FOR BASELINE MODEL FOR THE SAN JOAQUIN VALLEY DOMAIN

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Alfalfa	17,377	8.9	39.7	19.3	453.6	458.2	0.0	0.7	-	-9.8
Almonds	2,452	9.2	42.4	8.0	224.4	170.1	1.1	6.4	13.4	-1.2
Apple	33,151	8.3	38.7	3.6	66.7	18.0	3.2	2.6	16.6	-2.5
Apricots	19,392	7.1	41.4	7.1	99.4	53.9	0.6	2.4	15.6	-3.0
Barley Silage	24,024	5.0	12.8	5.5	95.6	83.5	0.5	6.6	-	-7.3
Bell Pepper	46,914	6.6	26.2	4.3	254.8	77.6	8.1	5.5	-	24.7
Broccoli	13,097	4.8	16.7	5.3	254.3	60.4	9.1	9.3	-	21.4
Cantaloupe	37,284	5.9	22.8	3.2	149.4	98.3	0.8	3.1	-	-3.2
Cherries	11,906	7.1	36.5	2.1	95.2	25.7	0.1	1.8	19.7	4.1
Corn	11,638	13.3	25.6	7.6	249.3	137.5	1.3	5.5	-	18.7
Cotton	1,803	7.0	32.7	5.1	163.3	105.7	2.4	4.0	-	-1.8
Carrot	60,317	5.3	16.7	7.5	167.4	88.9	3.4	4.0	-	3.5
Corn Silage	55,997	12.6	26.0	7.3	211.9	188.0	0.5	6.4	-	-7.2
Figs	5,946	6.8	30.6	1.9	100.6	33.3	2.3	2.4	19.6	2.3
Garlic	16,259	6.2	20.0	7.6	160.3	122.5	3.3	4.8	-	-3.6
Garbanzo Beans	2,933	5.3	17.2	7.5	177.6	98.0	0.9	1.8	-	10.9
Raisin Grape	5,276	6.3	36.0	5.5	71.8	26.9	1.6	1.9	17.7	-3.6
Table Grape	24,904	6.3	36.0	6.2	71.6	28.2	1.4	1.9	17.1	-3.6
Wine Grape	22,370	6.3	36.0	6.2	70.0	40.2	1.1	1.9	11.7	-4.8
Honeydew Melon	38,773	6.2	22.8	3.2	193.8	57.2	3.0	3.1	-	19.1

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Lemon	34,702	8.1	41.5	7.7	92.2	44.7	1.8	3.7	19.0	-3.8
Lettuce	40,631	3.0	15.4	6.2	130.6	75.4	4.6	5.0	-	-2.1
Lima Beans	3,542	6.3	21.9	6.0	189.2	127.6	0.6	2.3	-	-1.3
Mandarins	34,702	8.1	41.5	7.7	92.2	44.2	1.8	3.7	19.3	-3.7
Nectarines	30,567	7.7	41.8	4.3	104.3	55.6	0.4	2.4	14.2	-2.0
Oats Silage	26,674	5.6	13.1	5.3	125.4	107.9	0.9	9.7	-	-7.3
Oats Grain	4,273	6.0	16.0	5.1	101.6	80.3	0.3	8.0	-	-4.7
Olives	12,505	6.7	40.2	0.9	82.2	39.5	0.2	1.9	12.3	-1.8
Onion	48,034	7.0	22.9	6.3	170.4	94.7	5.7	5.0	-	4.7
Orange	35,403	8.3	41.5	7.7	93.8	52.5	1.6	3.7	18.0	-4.4
Pasture Grazing	0	5.6	27.0	1.1	124.4	0.0	0.1	15.9	-	55.3
Pasture Hay	7,166	4.5	30.6	8.4	76.6	66.4	0.0	8.1	-	-7.0
Peaches	31,597	8.1	41.9	4.2	116.2	45.2	1.1	2.7	20.9	1.9
Pear	37,611	8.4	39.2	3.2	69.2	24.3	3.0	2.6	15.3	-2.8
Pistachios	3,858	7.8	41.3	6.5	177.8	108.1	1.6	5.8	20.0	-0.3
Plums	23,608	7.3	41.8	6.8	91.1	26.4	1.9	2.4	19.2	-0.6
Pomegranates	26,307	9.2	32.9	7.1	99.3	50.5	2.0	3.7	18.4	-3.3
Prunes	6,944	7.1	41.8	6.7	94.5	40.1	3.0	3.2	16.1	-1.7
Pumpkins	45,513	5.5	22.5	5.2	148.4	105.8	0.7	4.9	-	-4.6
Sweet Corn	26,210	7.9	18.6	7.1	189.1	94.2	2.9	5.4	-	14.5
Sorghum Hay	13,662	8.6	22.9	7.6	144.5	120.4	0.4	7.3	-	-7.6
Sweet Potato	39,517	9.1	32.0	6.4	212.0	93.8	2.7	6.3	-	14.6

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Fresh Tomato	58,490	6.3	20.9	4.9	218.7	76.5	5.8	4.6	-	21.1
Processing Tomato	112,343	7.7	26.8	5.4	211.7	167.0	1.3	4.7	-	-3.0
Walnut	5,237	8.0	38.3	11.7	121.7	83.1	2.1	5.2	14.0	-4.0
Watermelons	75,726	7.6	28.2	5.6	151.4	52.9	4.9	3.6	-	1.8
Wheat Silage	24,977	5.2	12.8	5.6	146.0	121.2	1.2	11.0	-	-5.7
Wheat Grain	5,928	8.4	15.0	2.1	159.5	125.1	0.5	11.5	-	-2.2

TABLE 4-5. CALIBRATED CROP VALUES FOR BASELINE MODEL FOR THE SACRAMENTO VALLEY DOMAIN

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrification (lbs/ac)	Volatilization (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Alfalfa	18,351	9.8	39.9	15.1	465.4	483.8	0.0	0.4	-	-8.2
Almonds	2,494	9.4	40.8	12.4	228.9	173.2	0.8	4.8	13.8	-2.2
Barley Grain	4,618	6.3	17.0	6.2	104.9	77.5	0.5	6.7	-	-5.3
Bell Pepper	46,437	6.5	26.9	11.3	228.0	77.0	2.9	5.3	-	18.7
Cherries	11,410	6.7	36.3	9.5	87.8	24.6	0.2	1.3	18.4	-1.9
Corn	11,320	12.9	26.2	14.7	233.3	133.8	1.0	4.1	-	12.7
Cotton	1,889	7.5	34.6	11.3	161.3	110.6	1.5	3.0	-	-4.4
Corn Silage	58,855	12.8	27.3	13.6	213.5	191.1	0.4	4.6	-	-9.2
Cucumber	27,385	5.4	24.2	9.2	152.6	29.5	2.3	3.0	-	13.0
Wine Grape	20,673	6.1	30.6	5.3	59.7	37.2	0.1	1.4	9.8	-5.9
Kiwis	27,547	7.4	36.6	15.7	117.1	59.0	0.4	2.3	18.2	-3.0
Lima Beans	3,664	6.7	23.2	11.2	197.8	132.1	0.6	1.6	-	-2.5
Olives	12,616	7.0	43.6	5.3	86.0	39.8	0.3	1.4	13.3	-3.5
Pasture Grazing	-	5.9	30.2	5.5	124.1	-	0.2	14.0	-	-
Pasture Hay	7,582	4.8	31.8	15.5	81.0	70.1	0.0	4.3	10.3	-8.4
Peaches	33,246	8.2	41.5	10.3	131.0	47.5	0.4	2.1	24.4	0.0
Pear	39,713	8.5	39.3	10.4	70.6	25.6	1.6	2.0	15.3	-4.4
Pistachios	4,027	8.1	40.4	13.2	180.7	112.9	1.1	4.5	19.5	-1.7
Plums	22,436	6.9	41.2	15.0	86.8	25.1	1.3	1.9	18.3	-2.4
Prunes	6,958	7.2	41.2	15.1	94.7	40.2	2.0	2.5	16.1	-3.1

Crop	Yield (lbs/ac)	Biomass (ton/ac)	ET (inches)	Percolation (inches)	N Uptake (lbs/ac)	N Removed (lbs/ac)	Denitrifica-tion (lbs/ac)	Volatiliza-tion (lbs/ac)	Perennial Tissue Storage (lbs/ac)	Soil N Storage (lbs/ac)
Safflower	2,952	5.7	17.5	5.5	109.2	75.3	0.4	3.7	-	-4.7
Sorghum Grain	7,668	9.1	25.4	10.0	127.3	113.5	0.3	3.4	-	-10.0
Sorghum Hay	13,428	8.2	23.9	12.9	130.8	115.0	0.3	3.5	-	-10.1
Sunflower	2,165	6.4	24.7	12.7	118.1	67.7	0.4	2.8	-	-4.2
Processing Tomato	114,792	7.6	26.4	8.7	205.6	170.7	1.1	3.7	-	-5.8
Vine Seed	836	5.9	24.5	10.6	126.6	74.7	0.9	2.3	-	-4.5
Walnut	5,292	8.0	37.4	18.8	119.4	84.0	1.4	3.4	12.7	-5.5
Wheat Silage	23,667	4.9	13.3	5.8	108.0	96.6	0.4	8.1	-	-8.7
Wheat Grain	5,694	7.8	17.0	6.2	133.0	117.6	0.6	9.5	-	-6.7

TABLE 4-6. CROP GROWTH PARAMETER DEFINITIONS

Parameter Name	Minimum Value	Maximum Value	Definition of Each Parameter
CPNM	XXXX	XXXX	Four character code to represent the land cover/plant name.
Crop Name	-	-	Crop description name.
BIO_E	0	90	Biomass/Energy Ratio.
HVSTI	0.01	4	Harvest index.
BLAI	0.5	10	Max leaf area index.
FRGRW1	0	1	Fraction of the plant growing season corresponding to the 1st point on the optimal leaf area development curve.
LAIMX1	0	1	Fraction of the max. leaf area index corresponding to the 1st point on the optimal leaf area development curve.
FRGRW2	0	1	Fraction of the plant growing season corresponding to the 2nd point on the optimal leaf area development curve.
LAIMX2	0	1	Fraction of the max. leaf area index corresponding to the 2nd point on the optimal leaf area development curve.
DLAI	0.15	1	Fraction of growing season when leaf area starts declining.
CHTMX	0.1	20	Max canopy height.
RDMX	0	3	Max root depth.
T_OPT	11	38	Optimal temp for plant growth.
T_BASE	0	18	Min temp for plant growth.
CNYLD	0.0015	0.075	Fraction of nitrogen in seed.
CPYLD	0.0001	0.015	Fraction of phosphorus in seed.
BN1	0.004	0.07	Fraction of N in plant at emergence.
BN2	0.002	0.05	Fraction of N in plant at 0.5 maturity.
BN3	0.001	0.27	Fraction of N in plant at maturity.
BP1	0.0005	0.01	Fraction of P at emergence.
BP2	0.0002	0.007	Fraction of P at 0.5 maturity.
BP3	0.0003	0.0035	Fraction of P at maturity.
WSYF	-0.2	1.1	Lower limit of harvest index.
USLE_C	0.001	0.5	Min value of USLE C factor applicable to the land cover/plant.
GSI	0	5	Max stomatal conductance (in drought condition).
VPDFR	1.5	6	Vapor pressure deficit corresponding to the fraction maximum stomatal conductance defined by FRGMAX.
FRGMAX	0	1	Fraction of maximum stomatal conductance that is achievable at a high vapor pressure deficit.
WAVP	0	50	Rate of decline in radiation use efficiency per unit increase in vapor pressure deficit.
CO2HI	300	1000	Elevated CO_2 atmospheric concentration.
BIOEHI	5	100	Biomass-energy ratio corresponding to the 2nd point on the radiation use efficiency curve.
RSDCO_PL	0.01	0.099	Plant residue decomposition coefficient.
OV_N	0.01	30	Manning's "n" value for overland flow.

Parameter Name	Minimum Value	Maximum Value	Definition of Each Parameter
CN2A	25	98	SCS runoff curve number for moisture condition II.
CN2B	25	98	SCS runoff curve number for moisture condition II.
CN2C	25	98	SCS runoff curve number for moisture condition II.
CN2D	25	98	SCS runoff curve number for moisture condition II.
FERTFIELD	0	1	If checked this crop is going to be fertilized.
ALAI_MIN	0	3	Min leaf area index during dormant period.
BIO_LEAF	0	1	Fraction of tree biomass converted to residue during dormancy.
MAT_YRS	0	100	Number of years required for tree species to reach full development.
BMX_TREES	0	5000	Maximum biomass for a forest.
EXT_COEF	0	2	Light extinction coefficient.
BM_DIEOFF	0	1	Biomass die-off fraction.

TABLE 4-7. CROP GROWTH PARAMETER VALUES FOR CROPS IN THE TULARE LAKE BASIN DOMAIN

ICNUM	CPNM	IDC	Crop Name	BIO_E	HVSTI	BLAI	FRGRW1	LAIMX1	FRGRW2	LAIMX2	DLAI	CHTMX	RDMX	T_OPT	T_BASE	CNYLD	CPYLD	BN1	BN2	BN3	BP1	BP2	BP3	WSYF	USLE_C
140	ALF1	3	Alfalfa	12	0.9	3.5	0.15	0.01	0.3	0.95	0.99	0.9	3	23	5	0.035	0.0035	0.0417	0.027	0.025	0.0035	0.0028	0.002	0.9	0.01
128	ALM1	7	Almonds	13	0.67	4	0.05	0.1	0.2	0.95	0.85	6	2	27	9	0.019	0.0003	0.016	0.0155	0.014	0.0007	0.0004	0.0003	0.2	0.001
303	APP1	7	Apple	10.5	0.45	3.5	0.05	0.1	0.25	0.95	0.9	3.5	2	20	7	0.0034	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
261	BAR1	5	Barley Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0191	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03
264	BAS1	5	Barley Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.0137	0.0022	0.05	0.021	0.014	0.0053	0.002	0.0012	0.94	0.03
206	BEB1	1	Beans Dry	26	0.38	2	0.15	0.05	0.5	0.95	0.95	0.8	1.7	25	10	0.041	0.0091	0.05	0.038	0.02	0.0074	0.0037	0.0035	0.01	0.2
227	BEP1	4	Bell Pepper	23	0.35	4	0.15	0.05	0.5	0.95	0.9	0.5	1.2	27	10	0.0221	0.003	0.05	0.024	0.02	0.0053	0.002	0.0012	0.25	0.03
194	BRO1	5	Broccoli	26	0.18	4.2	0.25	0.23	0.4	0.86	1	0.5	0.6	18	4	0.0512	0.0071	0.062	0.035	0.03	0.005	0.004	0.003	0.95	0.2
300	BUB1	7	Bush Berries	9	0.3	3.5	0.05	0.01	0.2	0.95	0.9	1	1.5	25	10	0.014	0.0032	0.02	0.01	0.009	0.006	0.0022	0.0018	0.25	0.2
245	CAB1	5	Cabbage	26	0.45	4.2	0.25	0.23	0.4	0.86	1	0.5	0.6	18	4	0.028	0.0071	0.062	0.035	0.03	0.005	0.004	0.003	0.95	0.2
221	CAN1	4	Cantaloupe	25	0.52	2.5	0.15	0.05	0.6	0.95	0.95	0.4	1.2	25	8	0.022	0.0017	0.04	0.022	0.018	0.0053	0.002	0.0012	0.5	0.03
167	CHE1	7	Cherries	12	0.2	3.5	0.05	0.1	0.2	0.95	0.9	6	3.5	25	8	0.012	0.0003	0.01	0.009	0.008	0.0007	0.0004	0.0003	0.01	0.001
152	CIT1	7	Citrus	8	0.4	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0106	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
236	COR1	4	Corn	35	0.5	4.5	0.15	0.05	0.5	0.95	0.8	2.5	2	25	8	0.014	0.0016	0.04	0.016	0.012	0.0048	0.0018	0.0014	0.3	0.2
143	COT1	4	Cotton	15.5	0.44	4	0.05	0.05	0.4	0.95	0.99	1.3	2.5	30	12	0.0233	0.0003	0.031	0.013	0.012	0.0005	0.0004	0.0003	0.5	0.2
155	CRR1	5	Carrot	29	1.75	3.5	0.05	0.01	0.5	0.95	0.99	0.4	1	24	4	0.0134	0.0036	0.04	0.025	0.016	0.006	0.003	0.002	0.9	0.2
170	CSI1	4	Corn Silage	32	0.9	6	0.15	0.05	0.5	0.95	0.9	3	2	25	8	0.0126	0.0016	0.047	0.014	0.0125	0.0048	0.0018	0.0014	0.9	0.2
224	CUC1	4	Cucumber	20	0.2	2.5	0.15	0.05	0.6	0.95	0.6	0.5	1.2	25	8	0.018	0.0043	0.04	0.022	0.018	0.0053	0.0025	0.0012	0.25	0.03
182	GAR1	5	Garlic	26	0.7	3	0.15	0.01	0.5	0.95	0.7	0.5	0.6	19	7	0.0194	0.0032	0.035	0.025	0.02	0.0021	0.002	0.0019	0.2	0.2
200	GBB1	1	Garbanzo Beans	26	0.35	2	0.15	0.05	0.5	0.95	0.9	0.8	1.7	25	7	0.038	0.0091	0.05	0.03	0.017	0.0074	0.0037	0.0035	0.01	0.2
285	GRF1	7	Grapefruit	8	0.4	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0106	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
292	GRR1	7	Raisin Grape	11.5	0.5	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.006	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
146	GRT1	7	Table Grape	11.5	0.48	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.0063	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
289	GRW1	7	Wine Grape	11.5	0.5	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.009	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
309	HME1	4	Honeydew Melon	25	0.52	2.5	0.15	0.05	0.6	0.95	0.95	0.4	1.2	25	8	0.0123	0.0017	0.04	0.022	0.018	0.0053	0.002	0.0012	0.5	0.03
251	KIW1	7	Kiwis	12	0.48	2.5	0.05	0.01	0.2	0.95	0.9	2	2	25	10	0.013	0.0025	0.012	0.01	0.009	0.0014	0.0008	0.0006	0.05	0.1
287	LEM1	7	Lemon	8	0.42	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0092	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
164	LET1	5	Lettuce	22	0.55	3.5	0.1	0.05	0.8	0.95	1	0.2	0.6	18	7	0.031	0.0049	0.036	0.028	0.024	0.0084	0.0032	0.0019	0.01	0.01
149	MAN1	7	Mandarins	8	0.42	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0091	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
267	NEC1	7	Nectarines	11	0.35	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.014	0.0003	0.01	0.008	0.009	0.0007	0.0004	0.0003	0.01	0.001
242	OAS1	5	Oats Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.0153	0.0057	0.05	0.023	0.015	0.0084	0.0032	0.0019	0.94	0.03
239	OAT1	5	Oats Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0214	0.0057	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03
173	OLI1	7	Olives	10	0.45	2.5	0.1	0.4	0.2	0.95	0.99	6	3.5	30	10	0.0079	0.0003	0.009	0.008	0.006	0.0007	0.0004	0.0003	0.01	0.001
179	ONI1	5	Onion	24	0.62	3	0.15	0.01	0.5	0.95	0.6	0.5	0.6	19	7	0.0141	0.0032	0.028	0.0165	0.013	0.0021	0.002	0.0019	0.2	0.2
134	ORN1	7	Orange	8	0.42	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0106	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
297	PAG1	6	Pasture Grazing	30	0.9	4	0.05	0.15	0.5	0.95	0.99	0.5	1.2	25	8	0.022	0.0025	0.02	0.015	0.01	0.0084	0.0032	0.0019	0.9	0.003
294	PAS1	6	Pasture Hay	30	0.9	4	0.05	0.15	0.5	0.95	0.99	0.5	1.2	25	8	0.022	0.0025	0.03	0.02	0.016	0.0084	0.0032	0.0019	0.9	0.003
161	PEA1	7	Peaches	11	0.35	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.011	0.0003	0.01	0.008	0.009	0.0007	0.0004	0.0003	0.01	0.001
248	PER1	7	Pear	11.5	0.2	3.5	0.05	0.01	0.25	0.95	0.9	3.5	2	20	7	0.0038	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
131	PIS1	7	Pistachios	11	0.37	3.5	0.05	0.05	0.2	0.95	0.9	6	3.5	27	10	0.0266	0.0003	0.013	0.012	0.011	0.0007	0.0004	0.0003	0.2	0.001
185	PLU1	7	Plums	11	0.34	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.007	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001

ICNUM	CPNM	IDC	Crop Name	BIO_E	HVSTI	BLAI	FRGRW1	LAIMX1	FRGRW2	LAIMX2	DLAI	CHTMX	RDMX	T_OPT	T_BASE	CNYLD	CPYLD	BN1	BN2	BN3	BP1	BP2	BP3	WSYF	USLE_C
176	POM1	7	Pomegranates	9	0.47	4	0.1	0.4	0.2	0.95	0.99	3.5	2	25	7	0.008	0.0004	0.012	0.006	0.005	0.0007	0.0004	0.0003	0.05	0.001
158	POT1	5	Potato	31	1.7	4	0.05	0.01	0.5	0.95	0.9	0.6	0.6	22	7	0.0156	0.0023	0.05	0.027	0.022	0.006	0.0025	0.0019	0.95	0.2
188	PRU1	7	Prunes	11	0.42	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.0088	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001
233	SAF1	4	Safflower	25	0.28	3	0.15	0.01	0.6	0.95	0.8	2.5	2	25	6	0.028	0.0074	0.05	0.023	0.014	0.0063	0.0029	0.0023	0.18	0.2
276	SCR1	4	Sweet Corn	35	0.45	4	0.15	0.05	0.7	0.95	0.95	2.5	2	25	8	0.018	0.0016	0.047	0.017	0.0125	0.0048	0.0018	0.0014	0.3	0.2
270	SGG1	4	Sorghum Grain	32	0.5	4.5	0.15	0.05	0.5	0.95	0.8	2.5	2	25	8	0.019	0.0032	0.04	0.016	0.012	0.0048	0.0018	0.0014	0.3	0.2
273	SGH1	4	Sorghum Hay	32	0.9	6	0.15	0.05	0.5	0.95	0.9	3	2	25	8	0.0105	0.0032	0.04	0.016	0.012	0.0048	0.0018	0.0014	0.9	0.2
245	SPO1	5	Sweet Potato	25	1.3	3	0.15	0.1	0.6	0.95	0.8	0.6	1.5	25	10	0.0099	0.0023	0.045	0.025	0.014	0.006	0.0025	0.0019	0.8	0.2
197	TOF1	4	Fresh Tomato	27	0.4	4	0.2	0.05	0.6	0.95	0.99	0.5	1	25	10	0.0218	0.0048	0.0565	0.025	0.021	0.0005	0.0035	0.0003	0.3	0.03
218	TOM1	4	Processing Tomato	27	0.6	4	0.15	0.05	0.5	0.95	0.95	0.5	1	25	10	0.024	0.0048	0.0565	0.027	0.024	0.0005	0.0035	0.0003	0.3	0.03
282	TTG1	5	Triticale Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.023	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03
279	TTS1	5	Triticale Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.015	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.94	0.03
137	WAL1	7	Walnut	10	0.42	3	0.05	0.01	0.2	0.95	0.9	6	2	25	7	0.01636	0.0004	0.008	0.008	0.007	0.0007	0.0004	0.0003	0.2	0.001
255	WME1	4	Watermelons	25	0.64	2.5	0.1	0.05	0.6	0.95	0.9	0.4	1.2	25	8	0.007	0.0017	0.04	0.02	0.01	0.0053	0.002	0.0012	0.5	0.03
212	WSI1	5	Wheat Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.016	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.94	0.03
215	WWH1	5	Wheat Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.02422	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03

Additional parameters “continued”

ICNUM	CPNM	IDC	Crop Name	GSI	VPDFR	FRGMAX	WAVP	CO2HI	BIOEHI	RSDCO_PL	OV_N	CN2A	CN2B	CN2C	CN2D	FERTFIELD	ALAI_MIN	BIO_LEAF	MAT_YRS	BMX_TREES	EXT_COEF	BM_DIEOFF
140	ALF1	3	Alfalfa	0.01	4	0.75	10	660	35	0.05	0.06	31	59	72	79	0	1.25	0	0	0	0.65	0.1
128	ALM1	7	Almonds	0.004	4	0.75	5	660	18	0.05	0.14	45	66	77	83	1	0.01	0.75	8	100	0.61	0.1
303	APP1	7	Apple	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
261	BAR1	5	Barley Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
264	BAS1	5	Barley Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
206	BEB1	1	Beans Dry	0.007	4	0.75	6	660	34	0.05	0.14	67	78	85	89	0	0	0	0	0	0.45	0.1
227	BEP1	4	Bell Pepper	0.005	4	0.75	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
194	BRO1	5	Broccoli	0.006	4	0.75	5	660	30	0.05	0.16	67	77	83	87	1	0	0	0	0	0.65	0.1
300	BUB1	7	Bush Berries	0.005	4	0.75	7	660	36	0.05	0.14	67	77	83	87	1	0	0.7	0	0	0.65	0.1
245	CAB1	5	Cabbage	0.006	4	0.75	5	660	30	0.05	0.16	67	77	83	87	1	0	0	0	0	0.65	0.1
221	CAN1	4	Cantaloupe	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
167	CHE1	7	Cherries	0.004	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
152	CIT1	7	Citrus	0.003	4	3	5	660	20	0.05	0.15	45	66	77	83	1	2.5	0.5	5	30	0.65	0.1
236	COR1	4	Corn	0.007	4	0.75	6	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
143	COT1	4	Cotton	0.01	4	0.75	3	660	19	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
155	CRR1	5	Carrot	0.006	4	1	7	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
170	CSI1	4	Corn Silage	0.007	4	0.75	6	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
224	CUC1	4	Cucumber	0.003	4	0.75	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
182	GAR1	5	Garlic	0.006	4	0.75	8	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
200	GBB1	1	Garbanzo Beans	0.007	4	0.75	6	660	34	0.05	0.14	67	78	85	89	0	0	0	0	0	0.45	0.1

ICNUM	CPNM	IDC	Crop Name	GSI	VPDFR	FRGMAX	WAVP	CO2HI	BIOEHI	RSDCO_PL	OV_N	CN2A	CN2B	CN2C	CN2D	FERTFIELD	ALAI_MIN	BIO_LEAF	MAT_YRS	BMX_TREES	EXT_COEF	BM_DIEOFF
285	GRF1	7	Grapefruit	0.003	4	3	5	660	20	0.05	0.15	45	66	77	83	1	2.5	0.5	5	30	0.65	0.1
292	GRR1	7	Raisin Grape	0.005	1.1	0.75	5	660	40	0.05	0.14	45	66	77	83	1	0.01	0.6	4	25	0.65	0.1
146	GRT1	7	Table Grape	0.005	1.1	0.75	5	660	40	0.05	0.14	45	66	77	83	1	0.01	0.6	4	25	0.65	0.1
289	GRW1	7	Wine Grape	0.005	1.1	0.75	5	660	40	0.05	0.14	45	66	77	83	1	0.01	0.6	4	25	0.65	0.1
309	HME1	4	Honeydew Melon	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
251	KIW1	7	Kiwis	0.005	1.1	0.75	6	660	40	0.05	0.14	45	66	77	83	1	0.01	0.68	4	50	0.65	0.1
287	LEM1	7	Lemon	0.003	4	3	5	660	20	0.05	0.15	45	66	77	83	1	2.5	0.55	5	30	0.65	0.1
164	LET1	5	Lettuce	0.003	4	0.75	7	660	25	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
149	MAN1	7	Mandarins	0.003	4	3	5	660	20	0.05	0.15	45	66	77	83	1	2.5	0.55	5	30	0.65	0.1
267	NEC1	7	Nectarines	0.004	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
242	OAS1	5	Oats Silage	0.006	4	0.75	6	660	45	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
239	OAT1	5	Oats Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.45	0.1
173	OLI1	7	Olives	0.003	4	0.75	5	660	18	0.05	0.14	45	66	77	83	1	2.5	0.7	10	50	0.61	0.1
179	ONI1	5	Onion	0.006	4	0.75	8	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
134	ORN1	7	Orange	0.003	4	3	5	660	20	0.05	0.15	45	66	77	83	1	2.5	0.55	5	30	0.65	0.1
297	PAG1	6	Pasture Grazing	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.1
294	PAS1	6	Pasture Hay	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.1
161	PEA1	7	Peaches	0.004	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
248	PER1	7	Pear	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
131	PIS1	7	Pistachios	0.004	4	0.75	5	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	8	100	0.61	0.1
185	PLU1	7	Plums	0.004	4	0.75	7	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
176	POM1	7	Pomegranates	0.002	4	0.75	3	660	20	0.05	0.15	45	66	77	83	1	0.75	0.6	0	0	0.65	0.1
158	POT1	5	Potato	0.005	4	0.75	7	660	30	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
188	PRU1	7	Prunes	0.004	4	0.75	7	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
233	SAF1	4	Safflower	0.008	4	0.75	6	660	59	0.05	0.14	67	77	83	87	1	0	0	0	0	0.9	0.1
276	SCR1	4	Sweet Corn	0.007	4	0.75	7	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
270	SGG1	4	Sorghum Grain	0.005	4	0.75	6	660	36	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
273	SGH1	4	Sorghum Hay	0.005	4	0.75	6	660	36	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
245	SPO1	5	Sweet Potato	0.007	4	0.75	6	660	30	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
197	TOF1	4	Fresh Tomato Processing	0.008	4	1	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
218	TOM1	4	Tomato	0.008	4	1	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
282	TTG1	5	Triticale Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
279	TTS1	5	Triticale Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
137	WAL1	7	Walnut	0.007	4	0.75	4	660	20	0.05	0.14	45	66	77	83	1	0.01	0.55	10	100	0.65	0.1
255	WME1	4	Watermelons	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
212	WSI1	5	Wheat Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
215	WWH1	5	Wheat Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1

TABLE 4-8. CROP GROWTH PARAMETER VALUES FOR CROPS IN THE SAN JOAQUIN VALLEY DOMAIN

ICNUM	CPNM	IDC	Crop Name	BIO_E	HVSTI	BLAI	FRGRW1	LAIMX1	FRGRW2	LAIMX2	DLAI	CHTMX	RDMX	T_OPT	T_BASE	CNYLD	CPYLD	BN1	BN2	BN3	BP1	BP2	BP3	WSYF	USLE_C
141	ALF2	3	Alfalfa	11	0.9	3.5	0.15	0.01	0.3	0.95	0.99	0.9	3	23	5	0.035	0.0035	0.0417	0.027	0.025	0.0035	0.0028	0.0020	0.9	0.01
129	ALM2	7	Almonds	13	0.66	4	0.05	0.1	0.2	0.95	0.85	6	2	27	9	0.019	0.0003	0.016	0.0155	0.014	0.0007	0.0004	0.0003	0.2	0.001
304	APP2	7	Apple	10.5	0.45	3.5	0.05	0.01	0.25	0.95	0.9	3.5	2	20	7	0.0034	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
192	APR2	7	Apricots	10	0.25	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.0199	0.0003	0.01	0.009	0.007	0.0007	0.0004	0.0003	0.01	0.001
265	BAS2	5	Barley Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.99	0.9	2	18	0	0.0137	0.0022	0.05	0.021	0.014	0.0053	0.0020	0.0012	0.94	0.03
207	BEB2	1	Beans Dry	28	0.4	2	0.15	0.05	0.6	0.95	0.95	0.8	1.7	25	10	0.18	0.0091	0.05	0.04	0.025	0.0074	0.0037	0.0035	0.01	0.2
228	BEP2	4	Bell Pepper	23	0.35	4	0.15	0.05	0.5	0.95	0.9	0.5	1.2	27	10	0.0221	0.003	0.05	0.024	0.02	0.0053	0.0020	0.0012	0.25	0.03
195	BRO2	5	Broccoli	26	0.16	4.2	0.25	0.23	0.4	0.86	1	0.5	0.6	18	4	0.0512	0.0071	0.062	0.035	0.03	0.0050	0.0040	0.0030	0.95	0.2
222	CAN2	4	Cantaloupe	25	0.52	2.5	0.15	0.05	0.6	0.95	0.95	0.4	1.2	25	8	0.022	0.0017	0.04	0.022	0.018	0.0053	0.0020	0.0012	0.5	0.03
168	CHE2	7	Cherries	11.5	0.2	3.5	0.05	0.1	0.2	0.95	0.9	6	3.5	25	8	0.012	0.0003	0.01	0.009	0.008	0.0007	0.0004	0.0003	0.01	0.001
237	COR2	4	Corn	35	0.48	4.5	0.15	0.05	0.5	0.95	0.8	2.5	2	25	8	0.014	0.0016	0.04	0.016	0.012	0.0048	0.0018	0.0014	0.3	0.2
144	COT2	4	Cotton	15.5	0.47	4	0.05	0.05	0.4	0.95	0.99	1.3	2.5	30	12	0.0233	0.0003	0.031	0.013	0.012	0.0005	0.0004	0.0003	0.5	0.2
156	CRR2	5	Carrot	31	1.75	3.5	0.05	0.01	0.5	0.95	0.99	0.4	1	24	4	0.0134	0.0036	0.04	0.025	0.016	0.0060	0.0030	0.0020	0.9	0.2
171	CSI2	4	Corn Silage	32	0.9	6	0.15	0.05	0.5	0.95	0.9	3	2	25	8	0.0126	0.0016	0.047	0.014	0.0125	0.0048	0.0018	0.0014	0.9	0.2
225	CUC2	4	Cucumber	20	0.2	2.5	0.15	0.05	0.6	0.95	0.6	0.5	1.2	25	8	0.018	0.0043	0.04	0.022	0.018	0.0053	0.0025	0.0012	0.25	0.03
310	FIG2	7	Figs	11.5	0.42	3.5	0.05	0.01	0.2	0.95	0.9	6	3.5	25	8	0.008	0.0025	0.01	0.009	0.007	0.0014	0.0008	0.0006	0.01	0.001
183	GAR2	5	Garlic	26	0.7	3	0.15	0.01	0.5	0.95	0.7	0.5	0.6	19	7	0.0194	0.0032	0.035	0.025	0.02	0.0021	0.0020	0.0019	0.2	0.2
201	GBB2	1	Garbanzo Beans	26	0.35	2	0.15	0.05	0.5	0.95	0.9	0.8	1.7	25	7	0.038	0.0091	0.05	0.03	0.017	0.0074	0.0037	0.0035	0.01	0.2
210	GRL2	7	Wine Grapes	12	0.45	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.007	0.0025	0.01	0.0067	0.0057	0.0014	0.0008	0.0006	0.01	0.1
293	GRR2	7	Raisin Grape	11.5	0.48	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.006	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
147	GRT2	7	Table Grape	11.5	0.48	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.0063	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
288	LEM2	7	Lemon	8	0.4	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0092	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
165	LET2	5	Lettuce	22	0.55	3.5	0.1	0.05	0.8	0.95	1	0.2	0.6	18	7	0.031	0.0049	0.036	0.028	0.024	0.0084	0.0032	0.0019	0.01	0.01
204	LIM2	1	Lima Beans	22	0.35	2	0.1	0.05	0.5	0.95	0.95	0.6	2	26	10	0.041	0.0046	0.05	0.03	0.015	0.0035	0.0030	0.0015	0.22	0.2
150	MAN2	7	Mandarins	8	0.4	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0091	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
268	NEC2	7	Nectarines	10.5	0.35	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.014	0.0003	0.01	0.008	0.009	0.0007	0.0004	0.0003	0.01	0.001
243	OAS2	5	Oats Silage	26	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.0153	0.0057	0.05	0.023	0.015	0.0084	0.0032	0.0019	0.94	0.03
240	OAT2	5	Oats Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0214	0.0057	0.05	0.023	0.016	0.0084	0.0032	0.0019	0.175	0.03
174	OLI2	7	Olives	10.5	0.5	2.5	0.1	0.4	0.2	0.95	0.99	6	3.5	30	10	0.0079	0.0003	0.009	0.008	0.006	0.0007	0.0004	0.0003	0.01	0.001
180	ONI2	5	Onion	24	0.62	3	0.15	0.01	0.5	0.95	0.6	0.5	0.6	19	7	0.0141	0.0032	0.028	0.0165	0.013	0.0021	0.0020	0.0019	0.2	0.2
135	ORN2	7	Orange	8	0.4	2.5	0.1	0.32	0.5	0.72	0.99	3.5	2	25	7	0.0106	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
298	PAG2	6	Pasture Grazing	30	0.9	4	0.05	0.15	0.5	0.95	0.9	0.5	1.2	25	8	0.022	0.0025	0.02	0.015	0.01	0.0084	0.0032	0.0019	0.9	0.003
295	PAS2	6	Pasture Hay	30	0.9	4	0.05	0.15	0.5	0.95	0.99	0.5	1.2	25	8	0.022	0.0025	0.03	0.02	0.016	0.0084	0.0032	0.0019	0.9	0.003
162	PEA2	7	Peaches	10.5	0.35	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.011	0.0003	0.01	0.008	0.009	0.0007	0.0004	0.0003	0.01	0.001
249	PER2	7	Pear	10.5	0.54	3.5	0.05	0.01	0.2	0.95	0.9	3.5	2	20	7	0.0038	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
132	PIS2	7	Pistachios	11	0.37	3.5	0.05	0.05	0.2	0.95	0.9	6	3.5	27	10	0.0266	0.0003	0.013	0.012	0.011	0.0007	0.0004	0.0003	0.2	0.001
186	PLU2	7	Plums	10.5	0.34	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.007	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001
177	POM2	7	Pomegranates	9	0.47	4	0.1	0.4	0.2	0.95	0.99	3.5	2	25	7	0.008	0.0004	0.012	0.006	0.005	0.0007	0.0004	0.0003	0.05	0.001
189	PRU2	7	Prunes	10.5	0.42	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.0088	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001
259	PUM2	4	Pumpkin	23	0.5	2.5	0.1	0.05	0.6	0.95	0.9	0.4	1.2	25	8	0.025	0.0017	0.04	0.023	0.019	0.0053	0.0020	0.0012	0.5	0.03

ICNUM	CPNM	IDC	Crop Name	BIO_E	HVSTI	BLAI	FRGRW1	LAIMX1	FRGRW2	LAIMX2	DLAI	CHTMX	RDMX	T_OPT	T_BASE	CNYLD	CPYLD	BN1	BN2	BN3	BP1	BP2	BP3	WSYF	USLE_C
277	SCR2	4	Sweet Corn	35	0.45	4	0.15	0.05	0.7	0.95	0.95	2.5	2	25	8	0.018	0.0016	0.047	0.017	0.0125	0.0048	0.0018	0.0014	0.3	0.2
274	SGH2	4	Sorghum Hay	32	0.9	4	0.15	0.05	0.5	0.95	0.9	1.5	2	25	8	0.0105	0.0032	0.04	0.016	0.012	0.0060	0.0022	0.0018	0.9	0.2
246	SPO2	5	Sweet Potato	25	1.3	3	0.15	0.1	0.6	0.95	0.8	0.6	1.5	25	10	0.0099	0.0023	0.045	0.025	0.014	0.0060	0.0025	0.0019	0.8	0.2
198	TOF2	4	Fresh Tomato	27	0.4	4	0.2	0.05	0.6	0.95	0.99	0.5	1	25	10	0.0218	0.0048	0.0565	0.025	0.021	0.0005	0.0035	0.0003	0.3	0.03
219	TOM2	4	Processing Tomato	27	0.55	4	0.15	0.05	0.5	0.95	0.99	0.5	1	22	10	0.024	0.0048	0.0565	0.027	0.024	0.0005	0.0035	0.0003	0.3	0.03
138	WAL2	7	Walnut	9.7	0.42	3	0.05	0.01	0.2	0.95	0.9	6	2	25	7	0.0164	0.0004	0.008	0.008	0.007	0.0007	0.0004	0.0003	0.2	0.001
256	WME2	4	Watermelons	25	0.64	2.5	0.1	0.05	0.6	0.95	0.95	0.4	1.2	25	8	0.007	0.0017	0.04	0.02	0.01	0.0053	0.0020	0.0012	0.5	0.03
213	WSI2	5	Wheat Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.0175	0.0022	0.05	0.025	0.018	0.0053	0.0020	0.0012	0.94	0.03
216	WWH2	5	Wheat Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0242	0.0022	0.05	0.023	0.016	0.0053	0.0020	0.0012	0.2	0.03

Additional parameters “continued.”

ICNUM	CPNM	IDC	Crop Name	GSI	VPDFR	FRGMAX	WAVP	CO2HI	BIOEHI	RSDCO_PL	OV_N	CN2A	CN2B	CN2C	CN2D	FERTFIELD	ALAI_MIN	BIO_LEAF	MAT_YRS	BMX_TREES	EXT_COEF	BM_DIEOFF
141	ALF2	3	Alfalfa	0.01	4	0.75	10	660	35	0.05	0.06	31	59	72	79	0	1.25	0	0	0	0.65	0.1
129	ALM2	7	Almonds	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.75	8	100	0.61	0.1
304	APP2	7	Apple	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
192	APR2	7	Apricots	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.65	10	50	0.61	0.1
265	BAS2	5	Barley Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
207	BEB2	1	Beans Dry	0.0071	4	0.75	8	660	34	0.05	0.14	67	78	85	89	0	0	0	0	0	0.45	0.1
228	BEP2	4	Bell Pepper	0.005	4	0.75	7	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
195	BRO2	5	Broccoli	0.006	4	0.75	5	660	30	0.05	0.16	67	77	83	87	1	0	0	0	0	0.65	0.1
222	CAN2	4	Cantaloupe	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
168	CHE2	7	Cherries	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
237	COR2	4	Corn	0.007	4	0.75	7	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
144	COT2	4	Cotton	0.0095	4	0.75	3	660	19	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
156	CRR2	5	Carrot	0.006	4	1	5	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
171	CSI2	4	Corn Silage	0.007	4	0.75	6	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
225	CUC2	4	Cucumber	0.003	4	0.75	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
310	FIG2	7	Figs	0.005	4	0.75	6	660	40	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.65	0.1
183	GAR2	5	Garlic	0.006	4	0.75	8	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
201	GBB2	1	Garbanzo Beans	0.0071	4	0.75	6	660	34	0.05	0.14	67	78	85	89	0	0	0	0	0	0.45	0.1
210	GRL2	7	Wine Grapes	0.005	1.1	0.75	8	660	40	0.05	0.14	45	66	77	83	1	0.01	0.3	4	25	0.65	0.1
293	GRR2	7	Raisin Grape	0.005	1.1	0.75	6	660	40	0.05	0.14	45	66	77	83	1	0.01	0.6	4	25	0.65	0.1
147	GRT2	7	Table Grape	0.005	1.1	0.75	6	660	40	0.05	0.14	45	66	77	83	1	0.01	0.6	4	25	0.65	0.1
288	LEM2	7	Lemon	0.003	4	3	6	660	20	0.05	0.15	45	66	77	83	1	2.5	0.55	5	30	0.65	0.1
165	LET2	5	Lettuce	0.003	4	0.75	8	660	25	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
204	LIM2	1	Lima Beans	0.005	4	0.75	6	660	34	0.05	0.14	67	77	83	87	0	0	0	0	0	0.65	0.1
150	MAN2	7	Mandarins	0.003	4	3	6	660	20	0.05	0.15	45	66	77	83	1	2.5	0.55	5	30	0.65	0.1
268	NEC2	7	Nectarines	0.0036	4	0.75	7	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
243	OAS2	5	Oats Silage	0.006	4	0.75	6	660	45	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
240	OAT2	5	Oats Grain	0.006	5	1	6	660	45	0.05	0.14	62	73	81	84	1	0	0	0	0	0.45	0.1

ICNUM	CPNM	IDC	Crop Name	GSI	VPDFR	FRGMAX	WAVP	CO2HI	BIOEHI	RSDCO_PL	OV_N	CN2A	CN2B	CN2C	CN2D	FERTFIELD	ALAI_MIN	BIO_LEAF	MAT_YRS	BMX_TREES	EXT_COEF	BM_DIEOFF
174	OLI2	7	Olives	0.0036	4	0.75	5	660	18	0.05	0.14	45	66	77	83	1	1.5	0.7	10	50	0.61	0.1
180	ONI2	5	Onion	0.006	4	0.75	8	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
135	ORN2	7	Orange	0.003	4	3	7	660	20	0.05	0.15	45	66	77	83	1	2.5	0.5	5	30	0.65	0.1
298	PAG2	6	Pasture Grazing	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.1
295	PAS2	6	Pasture Hay	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.1
162	PEA2	7	Peaches	0.0036	4	0.75	7	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
249	PER2	7	Pear	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
132	PIS2	7	Pistachios	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	8	100	0.61	0.1
186	PLU2	7	Plums	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
177	POM2	7	Pomegranates	0.0017	4	0.75	4	660	20	0.05	0.15	45	66	77	83	1	0.75	0.6	0	0	0.65	0.1
189	PRU2	7	Prunes	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
259	PUM2	4	Pumpkin	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
277	SCR2	4	Sweet Corn	0.007	4	0.75	7	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
274	SGH2	4	Sorghum Hay	0.005	4	0.75	6	660	36	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
246	SPO2	5	Sweet Potato	0.0071	4	0.75	7	660	30	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
198	TOF2	4	Fresh Tomato	0.0075	4	1	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
219	TOM2	4	Processing Tomato	0.0075	4	1	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
138	WAL2	7	Walnut	0.007	4	0.75	5	660	20	0.05	0.14	45	66	77	83	1	0.01	0.6	10	100	0.65	0.1
256	WME2	4	Watermelons	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
213	WSI2	5	Wheat Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
216	WWH2	5	Wheat Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1

TABLE 4-9. CROP GROWTH PARAMETER VALUES FOR CROPS IN THE SACRAMENTO VALLEY DOMAIN

ICNUM	CPNM	IDC	Crop Name	BIO_E	HVSTI	BLAI	FRGRW1	LAIMX1	FRGRW2	LAIMX2	DLAI	CHTMX	RDMX	T_OPT	T_BASE	CNYLD	CPYLD	BN1	BN2	BN3	BP1	BP2	BP3	WSYF	USLE_C
142	ALF3	3	Alfalfa	10	0.9	3.5	0.15	0.01	0.3	0.95	0.99	0.9	3	23	5	0.035	0.0035	0.0417	0.027	0.025	0.0035	0.0028	0.002	0.9	0.01
130	ALM3	7	Almonds	13	0.64	4	0.05	0.1	0.2	0.95	0.85	6	2	27	9	0.019	0.0003	0.016	0.0155	0.014	0.0007	0.0004	0.0003	0.2	0.001
305	APP3	7	Apple	11.5	0.2	3.5	0.05	0.01	0.25	0.95	0.9	3.5	2	20	7	0.0034	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
263	BAR3	5	Barley Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0191	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03
229	BEP3	4	Bell Pepper	23	0.35	4	0.15	0.05	0.5	0.95	0.9	0.5	1.2	27	10	0.0221	0.003	0.05	0.024	0.02	0.0053	0.002	0.0012	0.25	0.03
169	CHE3	7	Cherries	11.5	0.2	3.5	0.05	0.01	0.2	0.95	0.9	6	3.5	25	8	0.012	0.0003	0.01	0.009	0.008	0.0007	0.0004	0.0003	0.01	0.001
238	COR3	4	Corn	35	0.48	4.5	0.15	0.05	0.5	0.95	0.8	2.5	2	25	8	0.014	0.0016	0.04	0.016	0.012	0.0048	0.0018	0.0014	0.3	0.2
145	COT3	4	Cotton	15	0.43	4	0.05	0.05	0.4	0.95	0.99	1.3	2.5	30	12	0.0233	0.0003	0.031	0.013	0.0115	0.0005	0.0004	0.0003	0.5	0.2
157	CRR3	5	Carrot	30.5	1.75	3.5	0.05	0.01	0.5	0.95	0.99	0.4	1	24	4	0.017	0.0036	0.04	0.025	0.017	0.006	0.003	0.002	0.9	0.2
172	CSI3	4	Corn Silage	32	0.9	6	0.15	0.05	0.5	0.95	0.9	3	2	25	8	0.0126	0.0016	0.047	0.014	0.0125	0.0048	0.0018	0.0014	0.9	0.2
226	CUC3	4	Cucumber	22	0.15	2.5	0.15	0.05	0.6	0.95	0.95	0.4	1.2	25	8	0.024	0.0043	0.04	0.022	0.018	0.0053	0.0025	0.0012	0.5	0.03
291	GRW3	7	Wine Grape	11	0.45	2	0.05	0.01	0.2	0.95	0.99	2	2	30	10	0.009	0.0025	0.01	0.0065	0.0055	0.0014	0.0008	0.0006	0.01	0.1
253	KIW3	7	Kiwis	12	0.4	2.5	0.05	0.01	0.2	0.95	0.9	2	2	25	10	0.013	0.0025	0.012	0.01	0.009	0.0014	0.0008	0.0006	0.05	0.1
205	LIM3	1	Lima Beans	22	0.32	2	0.1	0.05	0.5	0.95	0.95	0.6	2	26	10	0.041	0.0046	0.05	0.03	0.015	0.0035	0.003	0.0015	0.22	0.2
244	OAS3	5	Oats Silage	35	0.42	4	0.15	0.02	0.5	0.95	0.8	1.5	2	15	0	0.0316	0.0057	0.06	0.0231	0.0134	0.0084	0.0032	0.0019	0.175	0.03
175	OLI3	7	Olives	10	0.47	2.5	0.1	0.4	0.2	0.95	0.99	6	3.5	30	10	0.0079	0.0003	0.009	0.008	0.006	0.0007	0.0004	0.0003	0.01	0.0036
181	ONI3	5	Onion	26	0.7	3	0.15	0.01	0.5	0.95	0.6	0.5	0.6	19	7	0.015	0.0032	0.028	0.0165	0.013	0.0021	0.002	0.0019	0.2	0.2
136	ORN3	7	Orange	8.5	0.4	3	0.1	0.15	0.5	0.75	0.99	3.5	2	25	7	0.011	0.0004	0.0085	0.0052	0.0051	0.0007	0.0004	0.0003	0.2	0.001
299	PAG3	6	Pasture Grazing	30	0.9	4	0.05	0.15	0.5	0.95	0.99	0.5	1.2	25	8	0.022	0.0025	0.02	0.015	0.01	0.0084	0.0032	0.0019	0.9	0.003
296	PAS3	6	Pasture Hay	30	0.9	4	0.05	0.15	0.5	0.95	0.99	0.5	1.2	25	8	0.022	0.0025	0.03	0.02	0.016	0.0084	0.0032	0.0019	0.9	0.003
163	PEA3	7	Peaches	10	0.35	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.011	0.0003	0.01	0.009	0.009	0.0007	0.0004	0.0003	0.01	0.001
250	PER3	7	Pear	10.5	0.54	3.5	0.05	0.01	0.2	0.95	0.9	3.5	2	20	7	0.0038	0.0003	0.005	0.0045	0.004	0.0007	0.0004	0.0003	0.05	0.001
133	PIS3	7	Pistachios	11	0.35	3.5	0.05	0.05	0.2	0.95	0.9	6	3.5	27	10	0.0266	0.0003	0.013	0.012	0.011	0.0007	0.0004	0.0003	0.2	0.001
187	PLU3	7	Plums	10	0.34	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.007	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001
190	PRU3	7	Prunes	10.5	0.42	3.5	0.05	0.01	0.2	0.95	0.99	6	3.5	26	7	0.0088	0.0003	0.0075	0.0065	0.006	0.0007	0.0004	0.0003	0.01	0.001
235	SAF3	4	Safflower	25	0.34	3	0.15	0.05	0.6	0.95	0.8	2.5	2	25	6	0.028	0.0074	0.05	0.023	0.014	0.0063	0.0029	0.0023	0.18	0.2
272	SGG3	4	Sorghum Grain	32	0.48	4.5	0.15	0.05	0.5	0.95	0.8	2.5	2	25	8	0.019	0.0032	0.04	0.016	0.012	0.006	0.0022	0.0018	0.3	0.2
275	SGH3	4	Sorghum Hay	32	0.9	4	0.15	0.05	0.5	0.95	0.9	1.5	2	25	8	0.0105	0.0032	0.04	0.016	0.012	0.006	0.0022	0.0018	0.9	0.2
232	SUN3	4	Sunflower	28	0.2	3	0.015	0.01	0.5	0.95	0.9	2.5	2	25	6	0.034	0.0074	0.05	0.023	0.015	0.0063	0.0029	0.0023	0.18	0.2
199	TOF3	4	Fresh Tomato	30	0.55	4	0.15	0.05	0.5	0.95	0.99	0.5	1	22	10	0.024	0.0048	0.0565	0.027	0.024	0.0005	0.0035	0.0003	0.3	0.03
220	TOM3	4	Processing Tomato	27	0.62	4	0.15	0.05	0.5	0.95	0.95	0.5	1	25	10	0.024	0.0048	0.0565	0.029	0.007	0.0005	0.0035	0.0003	0.3	0.03
254	VIN3	4	Vine Seed	22	0.24	2.5	0.1	0.05	0.7	0.95	0.95	0.4	1.2	25	8	0.034	0.0017	0.04	0.022	0.018	0.0053	0.002	0.0012	0.5	0.03
139	WAL3	7	Walnut	9.7	0.42	3	0.05	0.01	0.2	0.95	0.9	6	2	25	7	0.0164	0.0004	0.008	0.008	0.007	0.0007	0.0004	0.0003	0.2	0.001
214	WSI3	5	Wheat Silage	25	0.94	4	0.15	0.05	0.8	0.95	0.9	0.9	2	18	0	0.0175	0.0022	0.05	0.025	0.018	0.0053	0.002	0.0012	0.94	0.03
217	WWH3	5	Wheat Grain	32	0.42	5	0.15	0.05	0.45	0.95	0.95	0.9	1.5	18	0	0.0242	0.0022	0.05	0.023	0.016	0.0053	0.002	0.0012	0.2	0.03

Additional parameters “continued.”

ICNUM	CPNM	IDC	Crop Name	GSI	VPDFR	FRGMAX	WAVP	CO2HI	BIOEHI	RSDCO_PL	OV_N	CN2A	CN2B	CN2C	CN2D	FERTFIELD	ALAI_MIN	BIO_LEAF	MAT_YRS	BMX_TREES	EXT_COEF	BM_DIEOFF
142	ALF3	3	Alfalfa	0.01	4	0.75	10	660	35	0.05	0.06	31	59	72	79	0	1.25	0	0	0	0.65	0.1
130	ALM3	7	Almonds	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.75	8	100	0.61	0.1
305	APP3	7	Apple	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
263	BAR3	5	Barley Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
229	BEP3	4	Bell Pepper	0.005	4	0.75	7	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
169	CHE3	7	Cherries	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
238	COR3	4	Corn	0.007	4	0.75	7	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
145	COT3	4	Cotton	0.0095	4	0.75	3	660	19	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
157	CRR3	5	Carrot	0.006	4	1	10	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
172	CSI3	4	Corn Silage	0.007	4	0.75	6	660	45	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
226	CUC3	4	Cucumber	0.003	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
291	GRW3	7	Wine Grape	0.005	1.1	0.75	6	660	40	0.05	0.14	45	66	77	83	1	0.01	0.55	4	25	0.65	0.1
253	KIW3	7	Kiwis	0.005	1.1	0.75	7	660	40	0.05	0.14	45	66	77	83	1	0.01	0.68	4	50	0.65	0.1
205	LIM3	1	Lima Beans	0.005	4	0.75	6	660	34	0.05	0.14	67	77	83	87	0	0	0	0	0	0.65	0.1
244	OAS3	5	Oats Silage	0.005	4	0.75	10	660	45	0.05	0.14	62	73	81	84	1	0	0	0	0	0.45	0.1
175	OLI3	7	Olives	0.0036	4	0.75	5	660	18	0.05	0.14	45	66	77	83	1	1.5	0.7	10	50	0.61	0.1
181	ONI3	5	Onion	0.006	4	0.75	10	660	35	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
136	ORN3	7	Orange	0.005	4	3	3	660	20	0.05	0.15	45	66	77	83	1	3	0.3	5	30	0.65	0.1
299	PAG3	6	Pasture Grazing	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.05
296	PAS3	6	Pasture Hay	0.005	4	0.75	6	660	36	0.05	0.15	49	69	79	84	1	1	0	0	0	0.65	0.05
163	PEA3	7	Peaches	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.25	10	50	0.61	0.1
250	PER3	7	Pear	0.007	4	0.75	6	660	20	0.05	0.14	45	66	77	83	1	0.01	0.65	10	500	0.65	0.1
133	PIS3	7	Pistachios	0.0036	4	0.75	6	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	8	100	0.61	0.1
187	PLU3	7	Plums	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
190	PRU3	7	Prunes	0.0036	4	0.75	8	660	18	0.05	0.14	45	66	77	83	1	0.01	0.7	10	50	0.61	0.1
235	SAF3	4	Safflower	0.008	4	0.75	6	660	59	0.05	0.14	67	77	83	87	1	0	0	0	0	0.9	0.1
272	SGG3	4	Sorghum Grain	0.005	4	0.75	7	660	36	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
275	SGH3	4	Sorghum Hay	0.005	4	0.75	6	660	36	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
232	SUN3	4	Sunflower	0.008	4	0.75	32.3	660	59	0.05	0.14	67	77	83	87	1	0	0	0	0	0.9	0.1
199	TOF3	4	Fresh Tomato	0.0075	4	1	8	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
220	TOM3	4	Processing Tomato	0.0075	4	1	6	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
254	VIN3	4	Vine Seed	0.005	4	1	3	660	39	0.05	0.14	67	77	83	87	1	0	0	0	0	0.65	0.1
139	WAL3	7	Walnut	0.007	4	0.75	5	660	20	0.05	0.14	45	66	77	83	1	0.01	0.6	10	100	0.65	0.1
214	WSI3	5	Wheat Silage	0.006	4	0.75	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1
217	WWH3	5	Wheat Grain	0.006	5	1	6	660	39	0.05	0.14	62	73	81	84	1	0	0	0	0	0.65	0.1

APPENDIX 5 – SUMMARY OF ROOT-ZONE LIBRARY

This appendix summarizes the Root-zone Library. This includes the number of model runs by crop as well as ranges for applied water, applied N and yield. Summaries are provided for each crop by domain.

TABLE 5-1. RANGE OF MANAGEMENT SIMULATED IN THE AUTOMATION FOR THE TULARE LAKE BASIN DOMAIN

Crop	Crop Code	# of Runs	Range of Water Applied (Inches)		Range of N Applied (lbs/ac)		Range of Yield (lbs/ac)	
			MIN	MAX	MIN	MAX	MIN	MAX
Alfalfa	ALF1	209	43	53	4	112	2030	30450
Almonds	ALM1	566	47	48	31	430	0	4270
Apple	APP1	759	29	36	12	189	0	60833
Barley Grain	BAR1	513	12	13	43	171	1624	8526
Barley Silage	BAS1	568	9	10	27	171	7740	41678
Beans Dry	BEB1	590	17	18	0	143	711	5481
Bell Pepper	BEP1	566	22	23	82	328	11550	86088
Broccoli	BRO1	566	13	14	89	357	3969	21828
Bush Berries	BUB1	788	24	32	15	231	0	25999
Cabbage	CAB1	550	13	14	89	357	12279	61397
Cantaloupe	CAN1	480	17	18	45	179	9675	61024
Cherries	CHE1	710	27	36	9	193	0	25301
Corn	COR1	533	24	26	86	343	2854	18498
Cotton	COT1	489	28	30	66	264	462	2876
Carrot	CRR1	566	16	16	64	258	20295	82804
Corn Silage	CSI1	569	23	26	54	343	13694	95859
Garlic	GAR1	560	19	20	81	322	4809	31144
Garbanzo Beans	GBB1	590	16	17	0	196	812	4974
Raisin Grape	GRR1	758	25	35	9	193	0	9774
Table Grape	GRT1	758	25	35	9	193	0	45145
Wine Grapes	GRW1	758	25	35	9	193	0	41525
Honeydew Melon	HME1	479	17	18	45	178	9675	61769
Kiwis	KIW1	591	27	37	15	157	0	53579
Lemon	LEM1	634	37	42	18	193	0	62514
Lettuce	LET1	550	13	13	64	257	10418	59532
Mandarins	MAN1	759	37	42	18	284	0	62514
Nectarines	NEC1	491	30	42	12	129	0	49118
Oats Silage	OAS1	569	9	10	38	243	2741	15225
Oats Grain	OAT1	513	12	13	43	171	1523	8019
Olives	OLI1	758	29	41	11	183	0	25010
Onion	ONI1	621	20	21	46	314	10844	90582
Orange	ORN1	770	34	42	18	284	0	61876
Pasture Grazing	PAG1	23		20	12	280		
Pasture Hay	PAS1	305	25	31	15	364	1015	23142
Peaches	PEA1	719	30	42	13	196	0	58387
Pistachios	PIS1	646	31	43	24	305	0	7191
Plums	PLU1	731	31	41	12	189	0	45206
Pomegranates	POM1	623	23	32	15	164	0	48001

Crop	Crop Code	# of Runs	Range of Water Applied (Inches)		Range of N Applied (lbs/ac)		Range of Yield (lbs/ac)	
			MIN	MAX	MIN	MAX	MIN	MAX
Potato	POT1	566	13	14	86	343	16967	73226
Prunes	PRU1	731	31	41	16	236	0	13532
Safflower	SAF1	566	13	14	50	200	874	5146
Sweet Corn	SCR1	565	17	18	78	314	6251	42864
Sorghum Grain	SGG1	533	22	24	57	228	2064	13932
Sorghum Hay	SGH1	569	21	23	36	228	3248	22330
Sweet Potato	SPO1	566	26	27	61	243	11535	61024
Fresh Tomato	TOF1	559	17	18	82	328	14883	95251
Processing Tomato	TOM1	480	23	24	82	328	30246	185799
Triticale Silage	TTS1	569	9	10	45	285	8038	45250
Walnut	WAL1	704	33	45	23	310	0	9681
Watermelons	WME1	550	25	26	54	214	17860	112518
Wheat Silage	WSI1	568	9	10	45	285	2741	15428
Wheat Grain	WWH1	512	12	13	68	271	2538	29638

TABLE 5-2. RANGE OF MANAGEMENT SIMULATED IN THE AUTOMATION FOR SAN JOAQUIN VALLEY DOMAIN

Crop	Crop Code	# of Runs	Range of Water Applied (Inches)		Range of N Applied (lbs/ac)		Range of Yield (lbs/ac)	
			MIN	MAX	MIN	MAX	MIN	MAX
Alfalfa	ALF2	209	43	53	4	111	132	25233
Almonds	ALM2	567	31	43	31	430	0	4221
Apple	APP2	759	28	34	12	189	0	61949
Apricots	APR2	577	31	41	12	129	0	35085
Barley Silage	BAS2	569	9	10	27	171	7145	38999
Bell Pepper	BEP2	566	22	23	82	328	11669	78586
Broccoli	BRO2	566	13	14	89	357	3969	20836
Cantaloupe	CAN2	480	17	18	45	179	10419	58792
Cherries	CHE2	711	23	31	8	166	0	25797
Corn	COR2	533	24	25	86	343	3277	19449
Cotton	COT2	489	28	30	66	264	497	2698
Carrot	CRR2	566	15	16	64	258	21919	85239
Corn Silage	CSI2	569	23	25	54	343	15778	91989
Figs	FIG2	577	18	25	12	129	0	10463
Garlic	GAR2	566	19	20	81	322	4580	28396
Garbanzo Beans	GBB2	590	16	17	0	196	711	4466
Raisin Grape	GRR2	758	25	35	9	193	0	8934
Table Grape	GRT2	759	25	35	9	193	0	44649
Wine Grapes	GRW2	1380	25	35	9	193	0	40185
Honeydew Melon	HME2	480	17	18	45	179	10419	59536
Lemon	LEM2	770	34	42	18	284	0	61238
Lettuce	LET2	551	13	13	64	257	11906	61020
Lima Beans	LIM2	590	19	19	0	171	914	5380
Mandarins	MAN2	770	34	42	18	284	0	61238
Nectarines	NEC2	491	27	38	12	129	0	52204
Oats Silage	OAS2	569	9	10	38	243	2639	14515
Oats Grain	OAT2	504	12	13	43	171	1421	7511
Olives	OLI2	885	26	32	9	240	0	22553
Onion	ONI2	624	20	21	79	314	12758	96323
Orange	ORN2	770	34	42	18	284	0	61238
Pasture Grazing	PAG2	23	0	19	12	279	0	0
Pasture Hay	PAS2	305	25	31	15	364	1421	23548
Peaches	PEA2	719	27	38	13	196		
Pear	PER2	759	28	34	12	189	0	68289
Pistachios	PIS2	646	29	40	24	305	0	7022
Plums	PLU2	732	31	41	12	189	0	44090
Pomegranates	POM2	623	23	32	15	164	0	44652
Prunes	PRU2	732	31	41	16	236	0	13253
Pumpkins	PUM2	480	19	19	46	185	12483	71055
Sweet Corn	SCR2	565	17	17	78	314	7144	42864
Sorghum Hay	SGH2	569	21	23	36	228	3756	22330
Sweet Potato	SPO2	566	26	27	61	242	13024	60280
Fresh Tomato	TOF2	559	17	18	82	328	16371	89298
Processing Tomato	TOM2	480	23	24	82	328	33127	182918
Walnut	WAL2	704	32	43	23	311	0	9681

Crop	Crop Code	# of Runs	Range of Water Applied (Inches)		Range of N Applied (lbs/ac)		Range of Yield (lbs/ac)	
			MIN	MAX	MIN	MAX	MIN	MAX
Watermelons	WME2	551	24	26	54	214	20539	116090
Wheat Silage	WSI2	569	9	10	45	285	7443	41083
Wheat Grain	WWH2	504	7	8	61	243	2030	10049

TABLE 5-3. RANGE OF MANAGEMENT SIMULATED IN THE AUTOMATION FOR THE SACRAMENTO VALLEY DOMAIN

Crop	Crop Code	# of Runs	Range of Water Applied (Inches)		Range of N Applied (lbs/ac)		Range of Yield (lbs/ac)	
			MIN	MAX	MIN	MAX	MIN	MAX
Alfalfa	ALF3	209	31.3	38.7	4.5	111.4	2436	28014
Almonds	ALM3	566	27.2	38.4	31.2	430.0	-	4270
Barley Grain	BAR3	503	6.5	6.9	42.8	171.3	1726	8729
Bell Pepper	BEP3	566	21.9	23.0	82.1	328.3	11907	78586
Cherries	CHE3	711	22.9	30.5	8.2	165.9	-	24904
Corn	COR3	533	24.2	25.5	85.6	343.5	3277	19237
Cotton	COT3	566	28.0	29.5	66.0	264.1	533	3089
Corn Silage	CSI3	568	22.9	25.4	53.5	342.6	18160	101218
Cucumber	CUC3	480	17.2	18.1	44.6	178.4	7938	41672
Wine Grapes	GRW3	757	14.0	19.7	6.7	160.6	-	37060
Kiwis	KIW3	719	26.6	37.4	15.2	215.9	-	49790
Lima Beans	LIM3	590	17.7	18.6	0.0	171.3	1015	5684
Olives	OLI3	884	26.0	32.5	8.9	240.0	-	23223
Pasture Grazing	PAG3	23	0.0	19.5	11.6	278.4	-	-
Pasture Hay	PAS3	305	25.1	31.3	15.2	364.0	1523	23751
Peaches	PEA3	719	25.9	36.4	13.4	196.3	-	60447
Pear	PER3	759	27.6	34.4	12.5	189.1	-	75902
Pistachios	PIS3	646	27.2	38.4	24.1	305.1	-	7106
Plums	PLU3	731	31.0	41.3	12.5	189.1	-	41858
Prunes	PRU3	731	31.0	41.3	16.1	235.5	-	13113
Safflower	SAF3	560	5.5	5.7	39.3	157.0	971	4175
Sorghum Grain	SGG3	533	20.5	21.5	50.0	199.8	2374	13829
Sorghum Hay	SGH3	568	19.4	21.5	31.2	199.8	3857	21721
Sunflower	SUN3	566	20.5	21.5	42.8	171.3	583	3787
Process. Tomato	TOM3	480	18.3	19.3	82.1	328.3	34567	190120
Vine Seed	VIN3	558	18.7	19.7	42.8	171.3	238	1496
Walnut	WAL3	703	30.9	41.3	23.2	310.5	-	9663
Wheat Silage	WSI3	568	2.7	3.0	31.2	199.8	7145	38403
Wheat Grain	WWH3	504	6.5	6.9	60.7	242.7	1827	10150

APPENDIX 6 – SENSITIVITY ANALYSIS

As requested by the CVRWQCB in the GWP Formula conditional approval letter, this Appendix provides a sensitivity analysis on the estimates N losses simulated in CV-SWAT for the top five crops by acreage. However, the top five crops were all perennial crops, so the top sixth crop, processing tomato, was also included to illustrate an annual crop. The N losses include denitrification, ammonia volatilization, N lost in surface runoff and lateral flow, N stored in soil organic matter, and N stored in perennial tissue. Section 2.2.2 outlines how these processes were handled and calibrated within the CV-SWAT framework. This analysis was executed on the data within the GWP Root-zone Library from CV-SWAT simulations across the Central Valley. Data used for the sensitivity analysis for these top six crops is reported in Table 6-1.

TABLE 6-1. ACREAGE AND GWP ROOT-ZONE LIBRARY DATA POINTS FOR THE TOP SIX CROPS BY ACREAGE

Crop	2019 INMP/NMP Reported Acreage	Hydrologic Response Units	Crop Management and Yield Scenarios	Total Data Points for Analysis
Almonds	1,003,908	10,128	566	5,732,448
Pistachios	371,376	10,128	646	6,542,688
Walnuts	274,889	10,128	704	7,130,112
Wine Grapes	169,017	10,128	758	7,677,024
Oranges	136,206	6,479*	770	4,988,830
Processing Tomatoes	133,294	10,128	480	4,861,440

* Oranges were only simulated in the Tulare Lake Basin and San Joaquin River Watershed given the minimal 2019 INMP/NMP reported acreage in the Sacramento Valley (117 acres). The remaining five other crops were simulated in all 3 modeling domains.

The sensitivity analysis was completed on the data stored in the GWP Root-zone Library because 1) the Library contains a vast quantity of data points to evaluate any combinations of California specific climate, soil, topography, crop, and management information and 2) these are the actual data points that have the potential to be used to calculate GWP Values. It must be noted that it is not possible to completely isolate the effects of a single model parameter because every discrete modeling unit (hydrologic response unit [HRU]) is comprised of a unique combination of model inputs where multiple model parameters may differ. Furthermore, across crop management and yield modeling scenarios, typically more than one crop and/or management parameter is adjusted. Thus, the results of this sensitivity analysis are compounded by the nature of the approach and the effects of the parameters evaluated are also influenced by variability in other model parameters across and two data points. Hence, the result from this sensitivity analysis captures the effect of changes of one variable to changes in potential N losses by testing a wide range of many potential combinations of input parameters present in the Library, which is the strength of the approach.

The purpose of this analysis is to demonstrate how sensitive the simulated N losses are in CV-SWAT and to identify which model parameters exhibit the biggest influences on these loses. While a portion of this analysis quantifies average N losses as a function of model parameters, actual estimated losses from INMP/NMP data matched to GWP Root-zone Library information is presented in Section 3.3 of the main document for the top five crops in each modeling domain. The results presented from this sensitivity analysis consider crops grown across all hydrologic response units (climate, soil, topography) and are not specific to where they are grown currently.

There are five main categories of model parameters in CV-SWAT that can affect the simulated suite of rootzone processes including N losses. These categories are climate, soil, topography, crop, and management. For each category, there are a number of potential parameters to evaluate. For this analysis, a subset of representative model parameters from each category were selected and in Table 6-2.

TABLE 6-2. CV-SWAT PARAMETERS EVALUATED IN THE SENSITIVITY ANALYSIS

Input	Variable Name	Symbol	Minimum Value	Maximum Value	Number of Bins	Units
Climate	Total annual precipitation	PRECIPmm	163.2	723.3	39	mm
Climate	Mean annual air	MAT_C	14.36	18.19	39	Celsius
Soil	Hydrologic soil group	HYDGRP	A	D	4	-
Soil	Effective saturated hydraulic conductivity	Keff	12	240	9	mm/hr
Soil	Available soil water holding capacity	AWC	13.8	1210	9	mm
Soil	Soil carbon in the top layer	SOL_CBN1	0	41.7	8	%
Topography	HRU slope	HRU_SLP	0	0.42	10	m/m
Crop	Radiation use efficiency*	BIOE	0.25	1.35	21	-
Crop	Harvest index*	HVSTI	0	1.15	33	-
Crop	N removed in yield*	CNYLD	0.85	1.1	6	-
Crop	Perennial biomass returned as residue*	BIO_LEAF	0.65	1.2	26	-
Management	Nitrogen application rate*	N_application	0.15	2.05	33	-
Management	Irrigation*	Irrigation	0.71	1	14	-

* Fraction of variable value from baseline

The following text outline the approach taken to aggregate and analyze the vast amount of information housed in the GWP Root-zone Library. For each model parameter evaluated, the range of values (including minimum and maximum extremes) for that parameter were assessed and data were grouped into evenly spaced bins for aggregation. Within each model parameter bin, the acre-weighted average N losses were evaluated. This approach allows for a meaningful compilation of the data into a format that is straightforward to understand and interpret. It is important to note that these results show the response of N losses across the range on values for various model parameters, but do not display the how prominent certain conditions and N losses are across the landscape. Furthermore, as mentioned, no individual model parameters are changed while holding the others constant. Therefore, there are confounding factors in this analysis. For example, climate is one of the soil forming factors. As such, specific soil types will be geographically related to climate types, meaning they confound one another when trying to evaluate the effects of either. Regardless, the results presented below show in general how N losses vary across the selected model parameters (Figure 6-1 through Figure 6-6 display the differences between the maximum and minimum acre-weighted average for each N loss for each binned model parameter for each crop).

FIGURE 6-1. DIFFERENCES IN MAXIMUM AND MINIMUM AVERAGE N LOSSES FOR ALMONDS

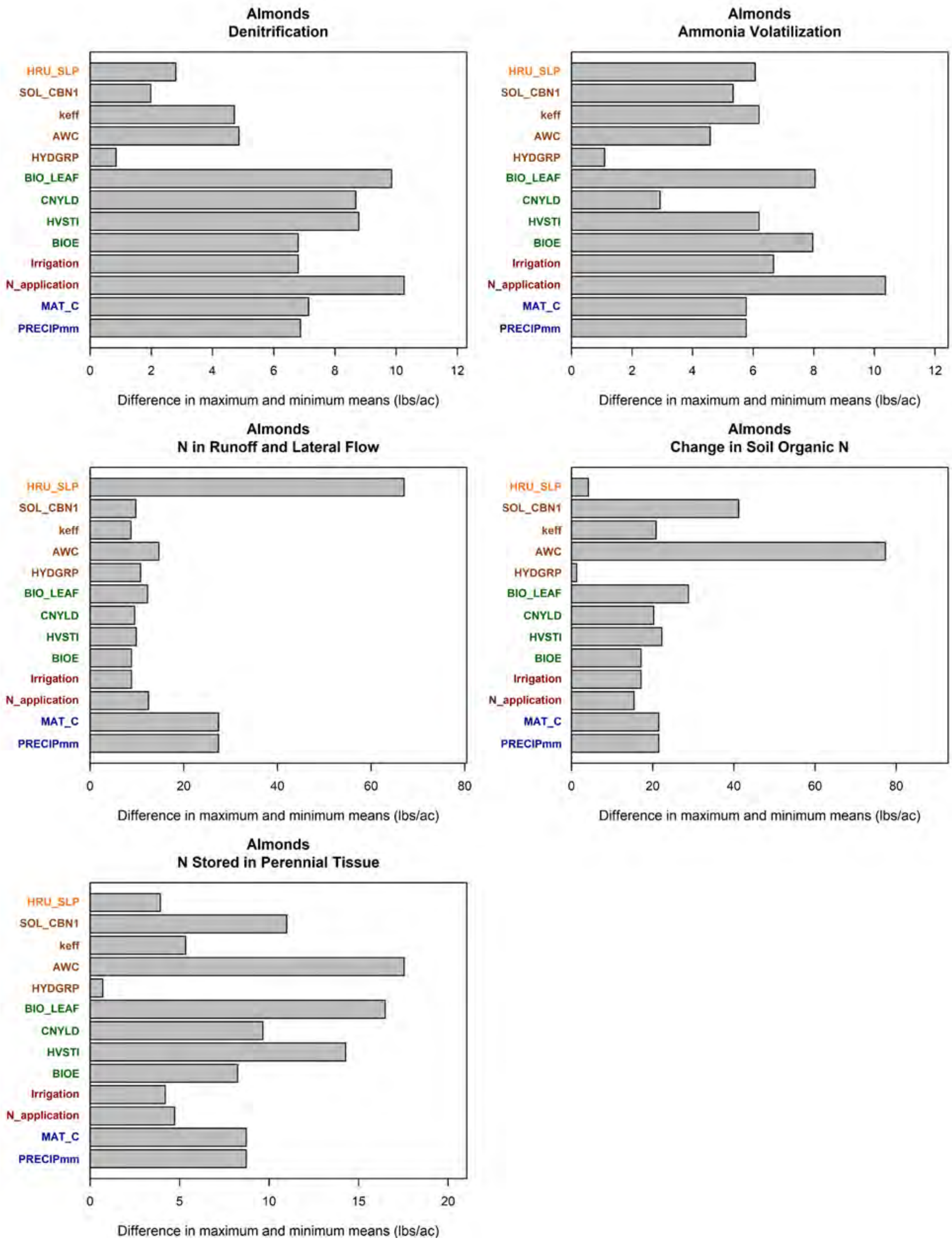


FIGURE 6-2. DIFFERENCES IN MAXIMUM AND MINIMUM AVERAGE N LOSSES FOR PISTACHIOS

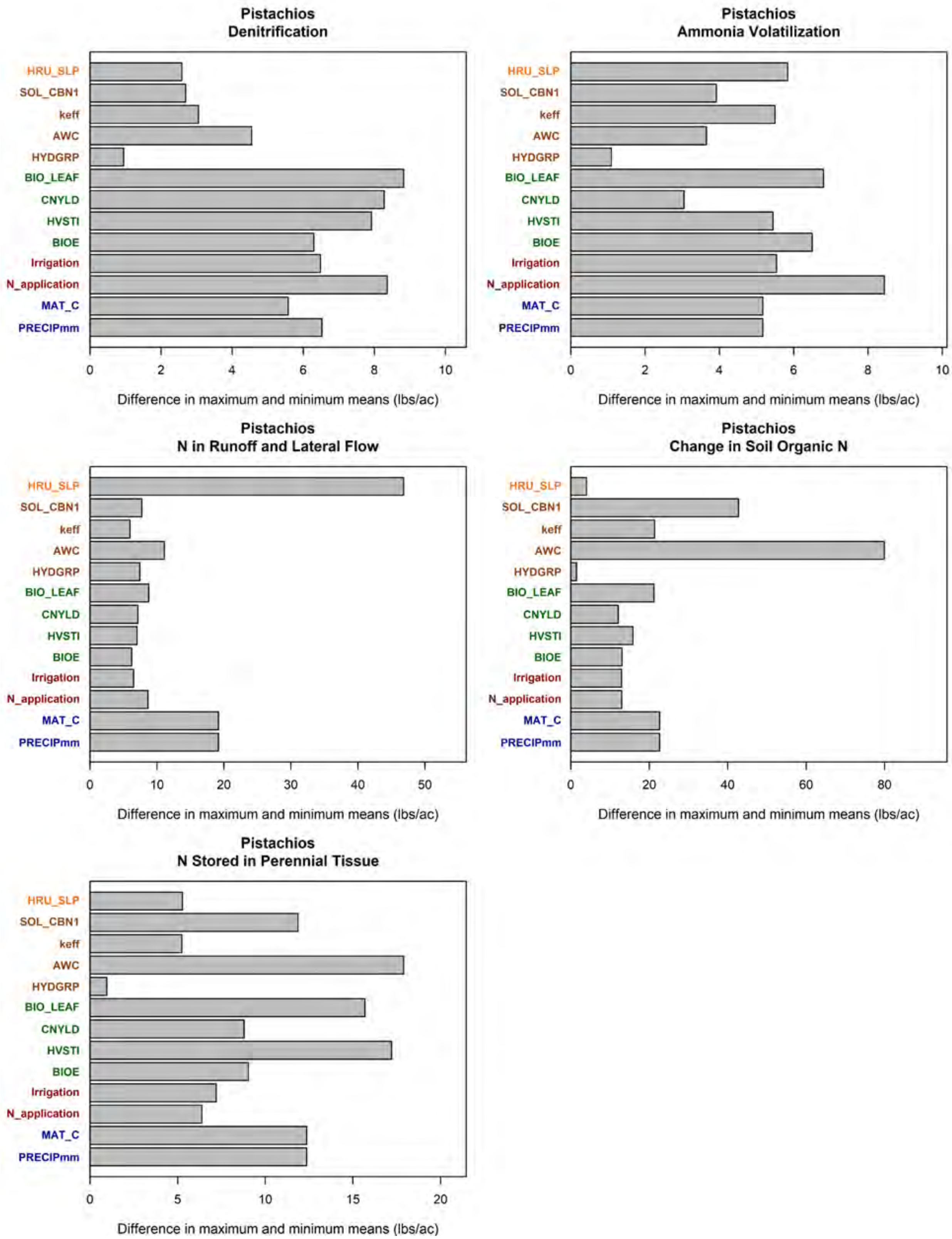


FIGURE 6-3. DIFFERENCES IN MAXIMUM AND MINIMUM AVERAGE N LOSSES FOR WALNUTS

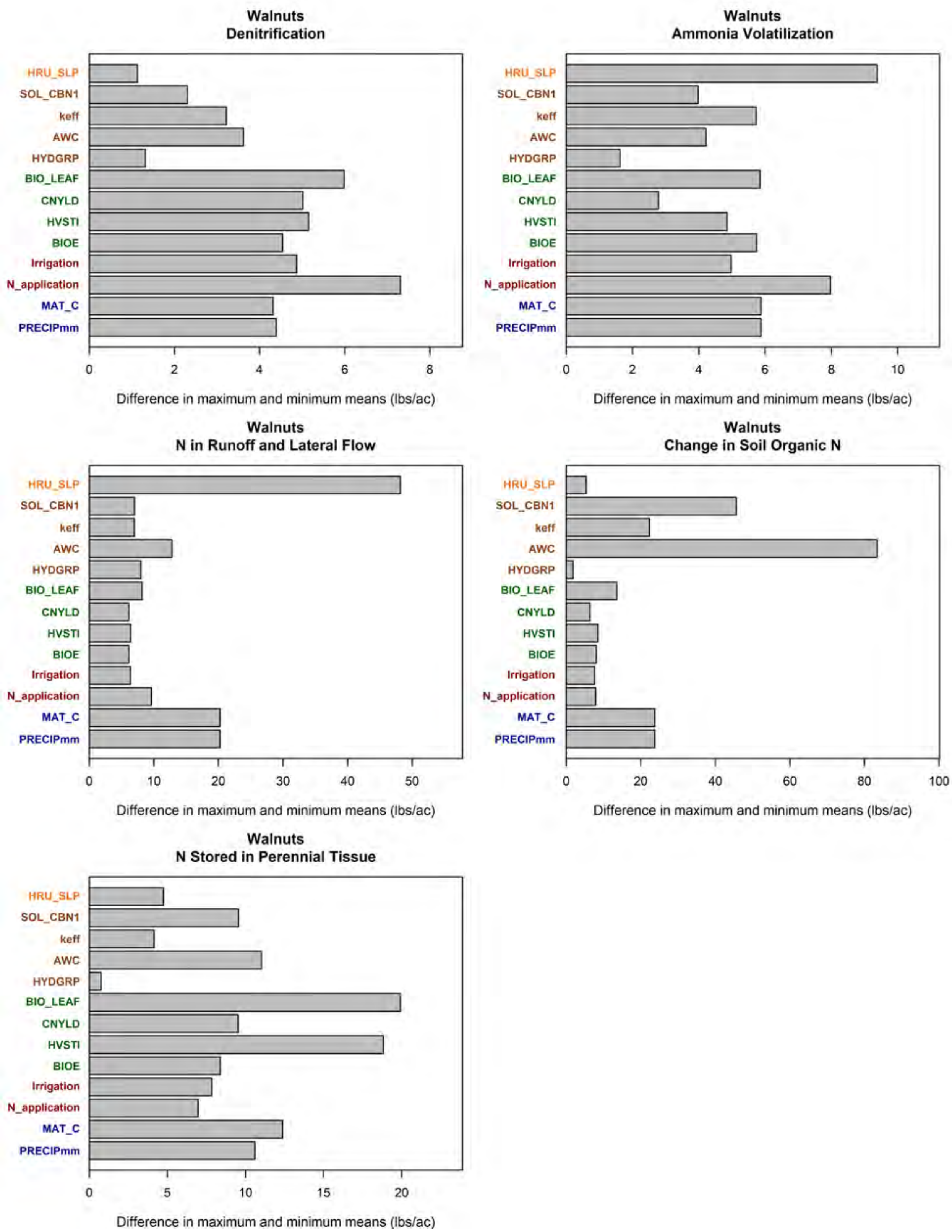


FIGURE 6-4. DIFFERENCES IN MAXIMUM AND MINIMUM AVERAGE N LOSSES FOR WINE GRAPES

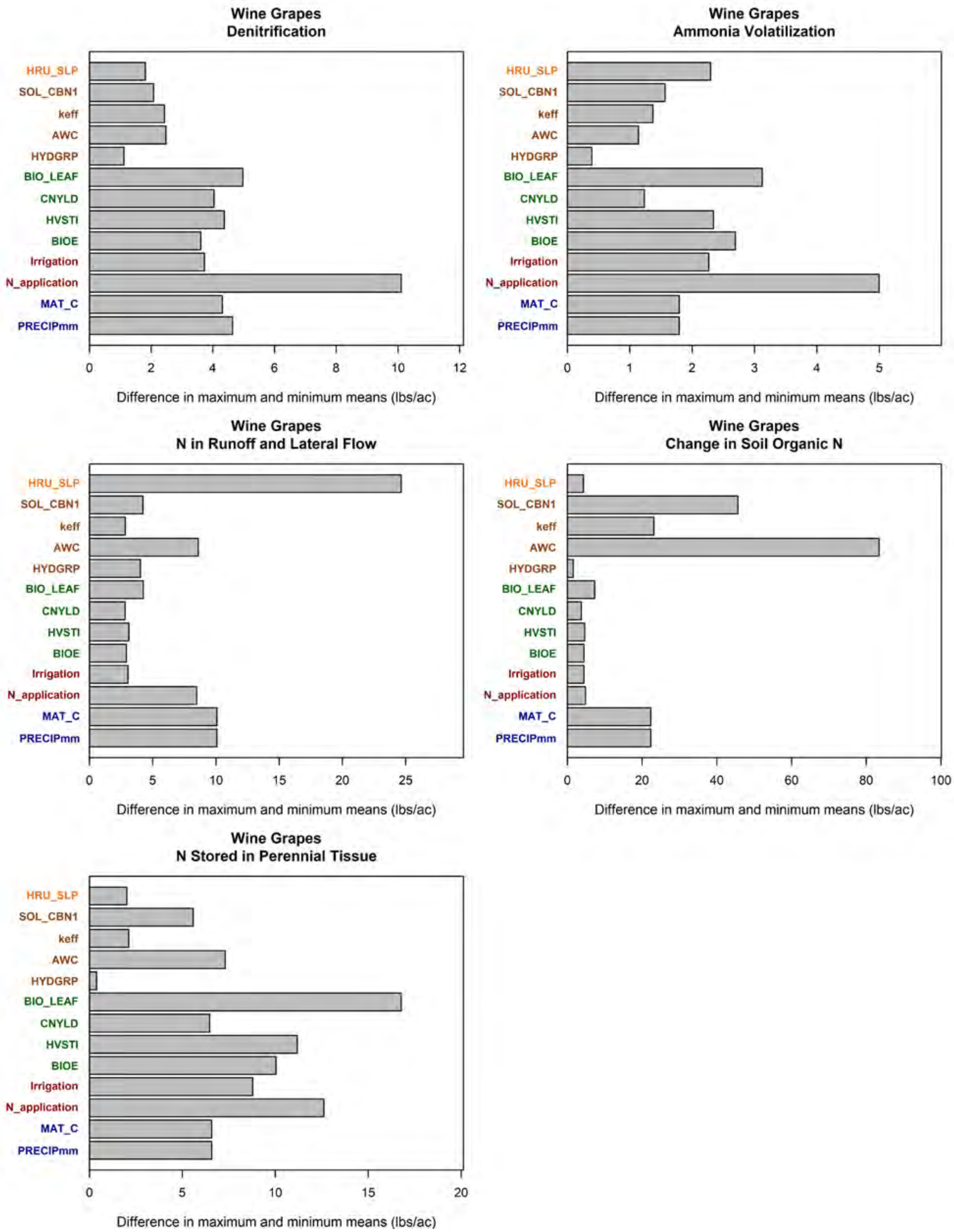


FIGURE 6-5. DIFFERENCES IN MAXIMUM AND MINIMUM AVERAGE N LOSSES FOR ORANGES

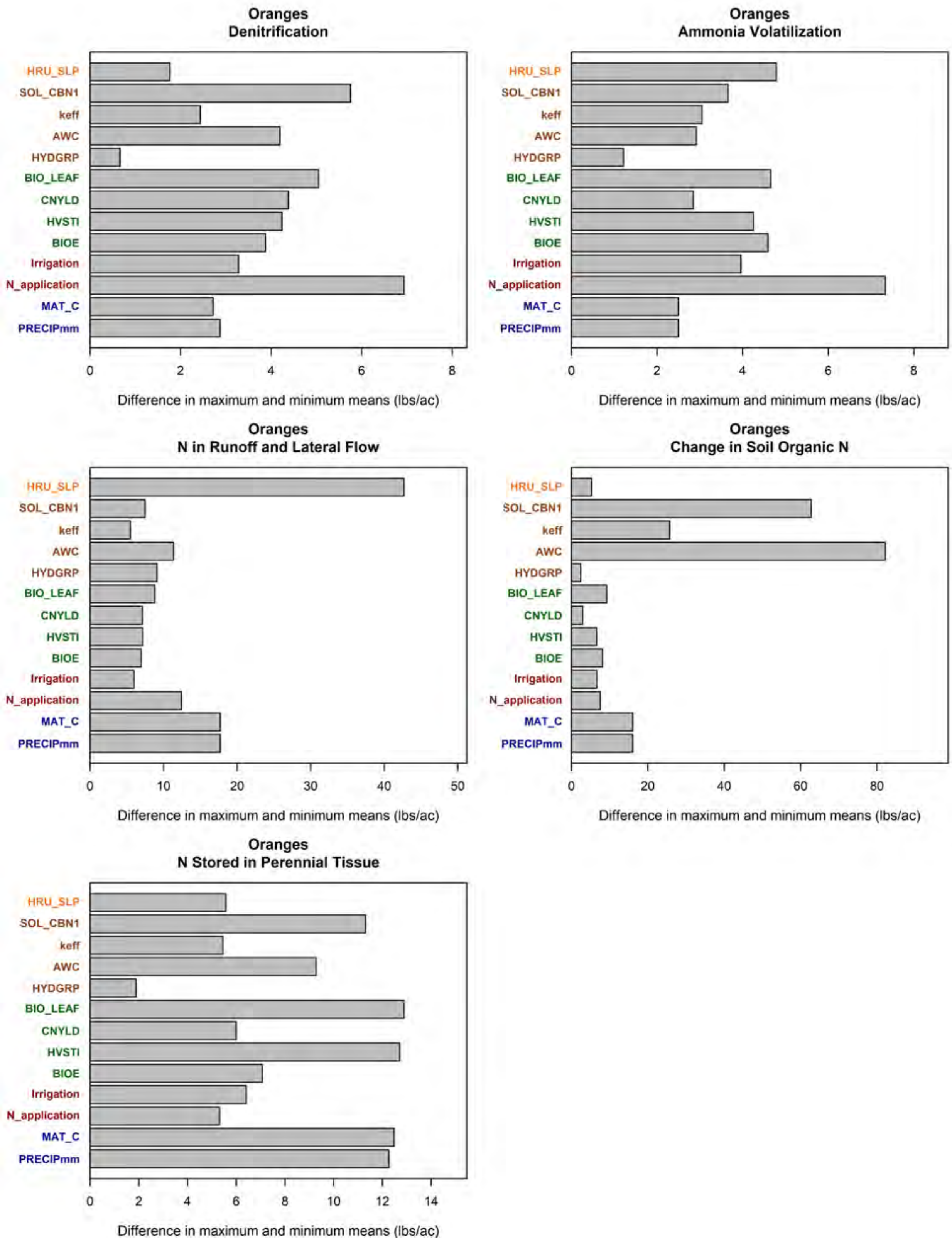


Figure 6-6. Differences in Maximum and Minimum Average N Losses for Processing Tomatoes

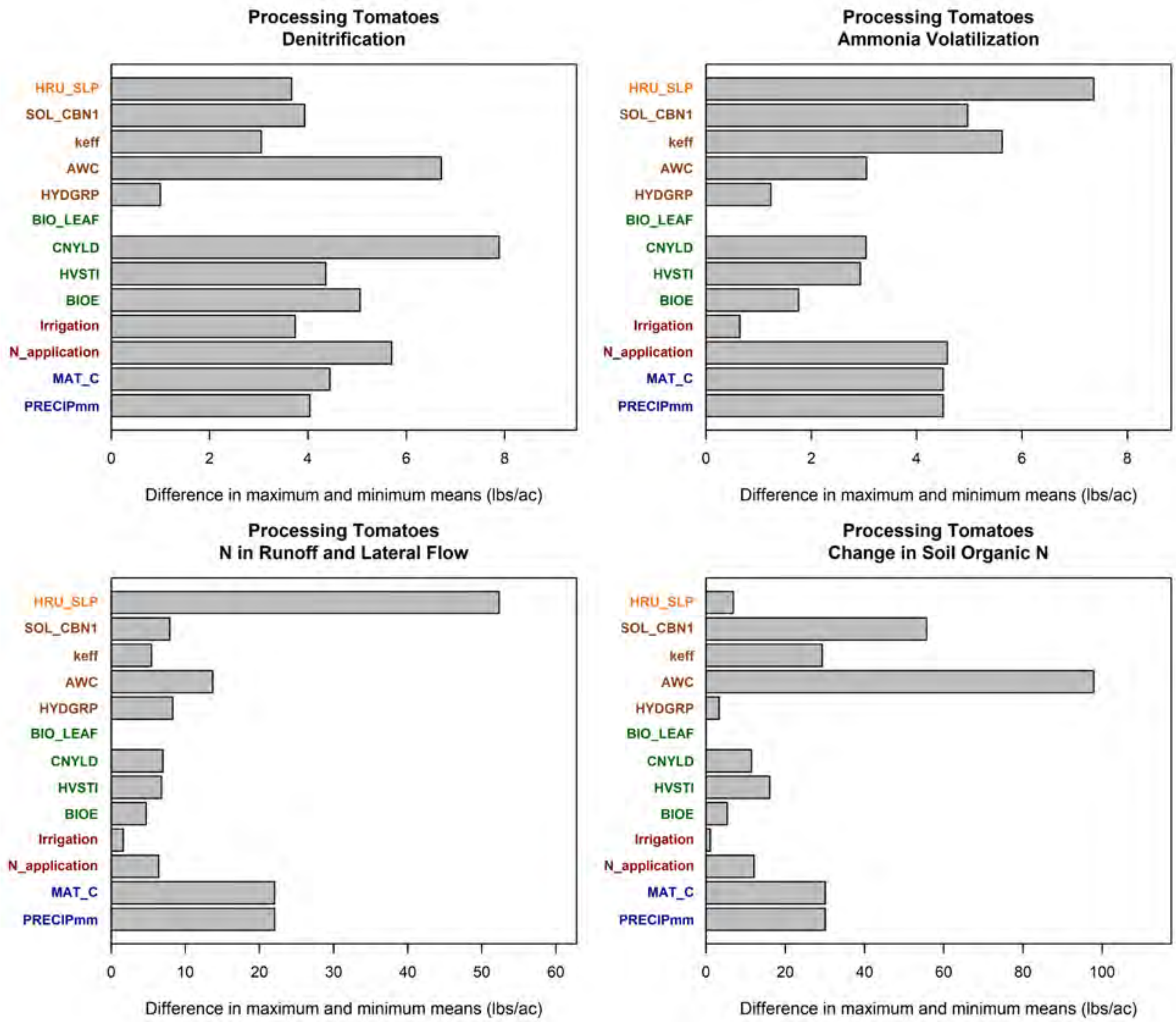


Exhibit G

ENVIRONMENTAL LAW FOUNDATION

1222 Preservation Park Way, Suite 200, Oakland, California 94612 · (510) 208-4555 · www.envirolaw.org
Nathaniel Kane, Executive Director · nkane@envirolaw.org

September 1, 2021

Via E-mail

Eric Warren
Central Valley Regional Water Quality Control Board
1685 E Street
Fresno, CA 93706
Eric.Warren@waterboards.ca.gov

Re: Comments on Groundwater Protection Formula Submitted by Central Valley Coalitions

Dear Mr. Warren:

We appreciate the effort put into developing the Groundwater Protection Values (GWP Values) by the numerous agricultural coalitions who were involved in its development. We also acknowledge and appreciate the careful review by the Central Valley Regional Water Quality Control Board and staff's availability and responsiveness during this process.

We do, however, continue to have concerns about the transparency of the GWP Values. ELF and American Rivers provided comments on this issue a year ago upon submission of the Groundwater Protection Formula, on September 11, 2020. In response to these comments and others, the Executive Officer of the Central Valley Regional Board directed that the GWP Values should include "Documentation of model inputs and results used to develop the Root-zone Library (crop growth parameter definitions and values, management parameters, irrigation method and volume by crop, crop coefficients, assumed irrigation efficiency, etc.)." (GWP Values at p. 2.)

It was ELF's hope that this direction to dominant "model inputs" would result in field-level data being reported as part of the GWP Values. But this has not happened—the methodology has not changed. The Values collect and use secret individualized data and only report aggregated township data. (GWP Values at pp. 6, 7-9.) As a result, the Values suffers from the same issues as the Formula: it is a black box. The public cannot reproduce the results of the Values process because the input data is secret.

The GWP Values document makes clear that the process relies on secret data. Step 1 of the process is to compile "detailed soil, parcel, Irrigation and Nitrogen Management Plan (INMP), and Nitrogen Management Plan (NMP) data as reported by growers to the Coalitions." (GWP Values at p. vii.) This data is then run through the CV-SWAT model to "estimate percolation and nitrate transport and fate within the root-zone." (*Ibid.*) Only then are the results aggregated to the township level. (*Ibid.*)

The inputs to the model are the field level data from the INMP Summary Reports and the NMP Summary Reports. These, under the ESJ Order, are secret. This violates the Nonpoint Source Policy's requirement that nonpoint source programs "include sufficient feedback mechanisms so that the RWQCB, dischargers, and the public can determine whether the program is achieving its stated purpose(s), or whether additional or different MPs or other actions are required."[1] The public cannot tell whether the program is working because the inputs to the model are secret.

Nor is the program "reproducible," as without the input data, the public cannot run the numbers to check the Coalitions' work.[2] The public must simply trust that it was done correctly. The GWP Values are definitely not "available to the public."[3]

Our comments on the Formula set out the legal basis for our objections in more detail and are fully incorporated by reference and attached as Exhibit A. The Executive Officer should reject the submission of the GWP Values and insist that the field-level inputs be made public. In the ESJ Order, the State Board stated its intention to revisit the order's provisions permitting secret data if the program was not functioning properly. (E.g. State Water Resources Control Board Order No. WQO-2018-002 (2018), at p. 48.) As it has become clear that field-level data is necessary to generate the GWP Values and ultimately the GWP Targets, that data must be made public. The program cannot "function properly" without it as the public and the Water Boards cannot verify or reproduce the results.

We appreciate the opportunity to comment and would be happy to discuss any questions you might have.

Sincerely,

Nathaniel H. Kane

Nathaniel Kane
Executive Director
Environmental Law Foundation

---

[1] Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program (2004). (Nonpoint Source Policy) at p. 11.)

[2] Nonpoint Source Policy at p. 14.

[3] *Ibid.*