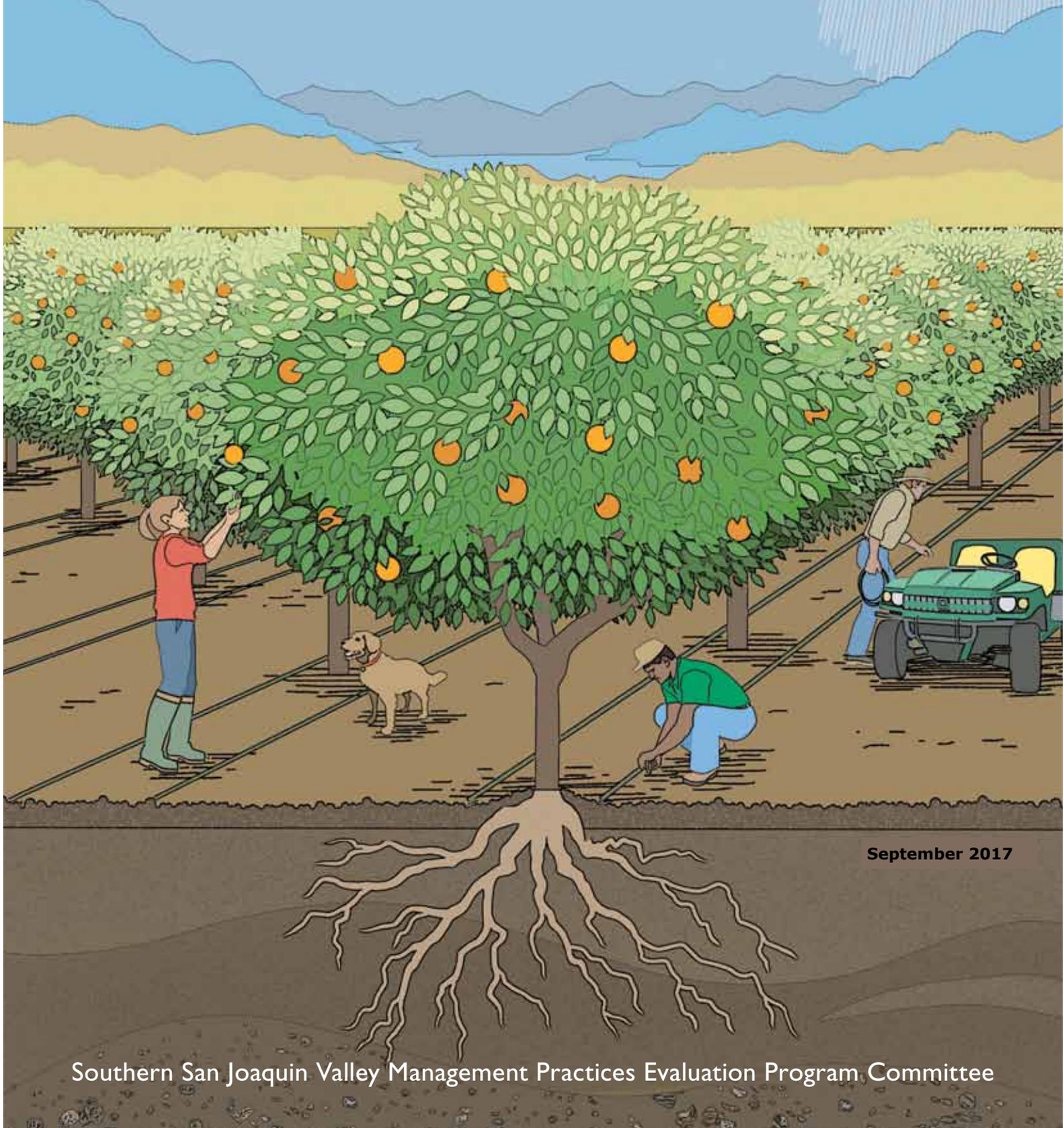


FINAL MANAGEMENT PRACTICES EVALUATION WORKPLAN



September 2017

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**Southern San Joaquin Valley
Management Practices Evaluation Program Committee**

September 2017

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EXECUTIVE SUMMARY

Background

The Tulare Lake Basin (TLB) includes nearly 3 million acres of irrigated cropland and approximately 10,700 growers. It includes four counties (Fresno, Kern, Kings, and Tulare) that account for nearly 50 percent of the State's crop and livestock production value due to the large area of irrigated, high-value crops and the presence of many large dairies. The Long-term Irrigated Lands Regulatory Program (LTILRP), as it applies to the Southern San Joaquin Valley (SSJV, also known as the TLB), is mostly described in General Orders given to water quality coalitions, and in related documentation from the Regional Water Quality Control Board, Region 5 (Central Valley Water Board).

The General Orders for irrigated lands focus on controlling nitrate (NO₃) contamination of groundwater by irrigated agriculture, and require a Management Practices Evaluation Program (MPEP) to evaluate and demonstrate which management practices are effective in protecting water quality, and how their implementation on the landscape effects this protection. To comply with the requirements of their General Order, individual growers in the TLB are organized under water quality coalitions. Under a Coordination Agreement dated November 18, 2014, and updated in November 2015, the following coalitions agreed to implement the MPEP through the Group Option: Kings River Watershed Coalition Authority, Tule Basin Water Quality Coalition, Kaweah Basin Water Quality Association, Kern River Watershed Coalition Authority, Cawelo Water District Coalition, Westside Water Quality Coalition, and Buena Vista Coalition. These coalitions are organized as the SSJV MPEP Committee (Committee), and represent growers irrigating approximately 1.85 million acres of the 3 million-acre TLB. The primary goal of the Committee is to develop and implement an MPEP that meets the objectives of the General Order in a sound, scientific, and efficient manner. This Management Practices Evaluation Workplan (Workplan) describes the planning and implementation of tasks necessary to demonstrate to the Central Valley Water Board which agricultural management practices are effective in protecting water quality, and how these practices have been or will be implemented to achieve this protection.

There are no ready-made templates for the MPEP. Although water quality has been regulated for decades, and some of this regulation has been aimed at nonpoint sources, and some at projects involving irrigation, never has such an ambitious program of regulating farming as it occurs across such a large and economically important landscape been undertaken. To pollute groundwater, applied nitrogen (N) must first travel through the crop and soil system, with transit times that might entail months to many decades. Once beyond the root zone, nitrate generally is not influenced by grower actions. Rather, transport is controlled by vadose zone and aquifer properties and conditions. Thus, the effects of today's farming will, in most of the TLB, not begin to influence groundwater quality for a long time. Accordingly, MPEP progress will be demonstrated by documenting increasing frequency of protective practices on the landscape, as reported by growers in required annual Farm Evaluations. This allows progress to be demonstrated earlier, as nitrate sources are attenuated, instead of awaiting changes in groundwater quality, which are a) slow in emerging, and b) influenced by many unrelated factors, such as the volume and quality of recharge from other sources. Grower outreach will occur early and often to

inform growers of protective practices for specific irrigated lands settings (unique crop, soil, and management combinations), and to promote implementation of the practices.

The MPEP is one of several components of the General Orders. Following is a summary of how it inter-relates with the other components to achieve the groundwater quality protection goals of the Irrigated Lands Regulatory Program (ILRP):

- Groundwater Assessment Reports lay the groundwork for the ILRP, identifying the location and type of groundwater impairments in an area, along with some of the causes of these impairments.
- Farm Evaluations identify practices in use by growers, and provide an indication of how they change over time.
- Nitrogen Summary Reports relate nitrogen applied by growers (and removed by crops) to other management, crop, and soil information in our diverse landscapes.
- The Groundwater Quality Management Plans prescribe what actions are needed to diminish loss of specific constituents (like nitrate) from crop root zones; these actions are mostly drawn from the MPEP.
- Both the Farm Evaluation and Nitrogen Summary Report help characterize farming as it occurs on the landscape, which is crucial to the assessment of farming's influence on groundwater quality, which must be done as part of the MPEP.

Together with monitoring data from focused field surveys, calibrated modeling results, and long-term groundwater quality trend monitoring, these provide the feedback we need to initiate, assess, and verify progress in protecting groundwater quality.

Approach

Substantial information related to careful management of nitrogen (and the irrigation water that may carry it beyond the root zone before plants can consume it) is available in scientific and extension (outreach) literature, and through the extensive hands-on irrigation and nutrient management expertise of knowledgeable growers and grower advisors. Matching this information to applicable field situations and extending it to additional growers through early outreach, is a priority to make rapid, impactful progress in reducing nitrate loading to groundwater. The MPEP will draw on guidance from industry (e.g., commodities groups), public sector expertise (e.g., University of California Cooperative Extension and Experiment Station, California State University campuses, and the United States Department of Agriculture [especially the Natural Resources Conservation Service]), as well as the coalitions and their membership. Where existing knowledge needs to be supplemented, focused field investigations will be warranted. When this is the case, technical experts can help design, implement, interpret, and summarize field studies so that findings can be used by others to adjust management practices, where necessary. Therefore, key technical experts with deep knowledge and the ability to perform studies to expand this knowledge will be engaged as technical partners. To facilitate this interchange, the

Committee has contracted with a team of agronomists, horticulturalists, plant nutritionists, soil scientists (specialists in management, soil fertility, soil physics, and modeling), and hydrogeologists.

The following are key features of the MPEP technical approach:

- A systematic, scientific approach to evaluating the influence of management practices on water quality in a variety of settings,
- Identification of known protective practices and fast-tracking these to grower outreach to accelerate implementation,
- Prioritization of nitrate sources based on readily available information,
- Identification of significant gaps among known protective practices and means to address these knowledge deficits,
- Where necessary, assessment of performance of field evaluations in representative locations and incorporation of findings into evaluations and outreach,
- Leverage of coalition and other spatial data to assess landscape-level source strength, and
- Allowance for a diversity of tools and specific monitoring and analytical approaches.

The individual components of the technical workflow include the following, and are summarized in Figure ES-1:

1. Inventory known protective practices and fast-track these to early outreach (Sections 2.4 and 3.11).
2. Characterize the root zone (including crops, climate, and irrigation methods that affect it) and sub-root-zone (geology, hydrogeology) of irrigated lands (Section 3.5).
3. Explore and illustrate the relationship between root-zone and groundwater nitrate observations, and thus demonstrate the relevance of root-zone results across the broader landscape for assessment of the level of groundwater protection afforded by various land use and management regimes (Sections 3.6 and 3.9).
4. Quantify actual and minimized loading from root zones by considering existing and alternative management practices (Section 3.6).
5. Establish prioritization criteria by building on those identified in the Groundwater Assessment Reports (GARs). Example criteria include total crop acreage, average nitrogen application rate in the area, and hydrogeologic setting (Section 3.7).
6. Prioritize crops and settings relative to potential influence on groundwater (Number 5). Invest resources, according to priority, to define protective management practices that minimize nitrate leaching (Section 3.7).

7. Assess and/or verify N balances, N surplus, and fate and transport in high-priority systems (including sets of practices) based on existing knowledge (Section 3.6) and, where necessary, focused field studies (Section 3.8).
8. Share results of fate-and-transport assessments through outreach with growers, and assess rate of protective management practice adoption (Sections 3.8, 2.4, and 3.11).
9. At regular intervals, assess adoption of management practices (Section 3.6). Incorporate findings into source modeling to accurately reflect management changes (Number 10; Section 3.10). Employ findings as feedback to outreach to gauge practice acceptability and outreach efficacy (Number 8; Sections 2.4 and 3.11).
10. Use characterization and source information (Numbers 2 and 4) to parameterize the Soil and Water Assessment Tool (SWAT) by employing scientifically based crop-, water-, and nutrient-management model(s). Use fate-and-transport results (Number 7) to calibrate, validate, refine, and update the landscape-level model (i.e., SWAT) (Section 3.10). Use practice-adoption information (Number 9) to assess the performance changes that result from adoption of protective practices.
11. Incorporate refined knowledge about performance and landscape-level output into outreach programs (Number 8; Sections 2.4 and 3.11).
12. Across the broader landscape, relate root-zone results (Number 10) to groundwater quality via a) vadose zone and groundwater modeling, and b) evaluation of groundwater monitoring data from groundwater monitoring networks (e.g., LTILRP trend monitoring wells) (Section 3.9).

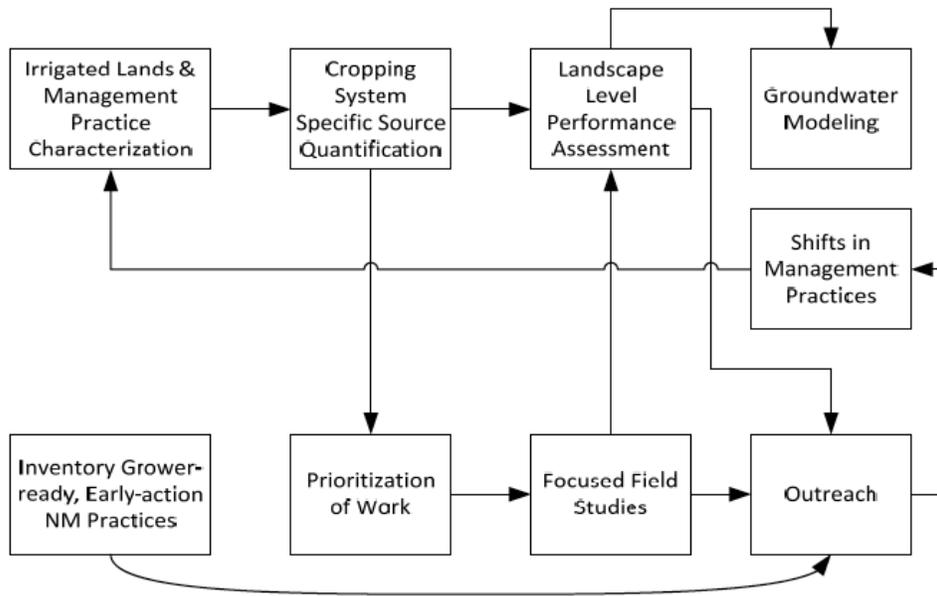


FIGURE ES-1. SUMMARY OF MPEP TECHNICAL WORKFLOW (SEE FIGURE 2-2 FOR ADDITIONAL DETAIL ON THE TECHNICAL WORKFLOW RELATED TO THE ROOT-ZONE.)

Grower Outreach

Effective grower outreach related to MPEP results is the key for success of the program. Numerous information resources are available for growers (e.g., United States Department of Agriculture Natural Resources Conservation Service, University of California Cooperative Extension, commodities groups, Certified Crop Advisers, etc.), using a variety of formats (e.g., online tools, targeted mailings, online and paper literature, word-of-mouth, etc.). A diversity of information platforms and communication tools exists among growers and those who have (or can access) the information they need. The SSJV MPEP will seek to leverage these existing resources to provide the following types of information to growers:

- Program and process information, explaining regulatory obligations and how to meet them, schedules, meetings, and where to find information on protective practices,
- Referrals to technical advisors who can assist growers in fitting suites of protective practice to their specific settings and needs,
- New information on protective practices and environmental performance, as it is collected and made available, and
- Peer information from other/neighbor growers regarding crop selection, location, and management, mainly obtained through the coalitions.

The success of outreach will therefore depend on prioritizing practices that growers can use and that have potential to increase levels of groundwater quality protection, and on leveraging the broad range of existing information-sharing resources through collaboration and partnership.

In September 2016, the SSJV MPEP Committee was awarded \$2M through the USDA NRCS Conservation Innovation Grant program. This grant award, combined with match contributions exceeding \$2M, provides part of the funding necessary for successful implementation of this Workplan.



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