EXCERPT FROM 1994 WATER QUALITY ANNUAL REPORT
NARRATIVE SUMMARY OF ACCOMPLISHMENTS

California can be characterized as having an extremely diverse agricultural industry. Almost every crop grown in the United States is grown in California. Likewise, extensive diverse animal production units exist within the state. Climate ranges from the desert with almost no rainfall to coastal and mountain areas with very high participation. Many soil types exist in the state. Water for crop production comes from a combination of precipitation, surface irrigation water and groundwater. Water quality ranges from almost distilled water (snow melt) to very saline waters. Large increases in population have led to significant interaction between the rural and urban communities. Within this framework it is difficult to develop a clearly defined and focused water quality program.

Likewise, the institutions and activities directed towards protecting water quality are extensive. Statewide programs in the University of California on integrated pest management and sustainable agriculture address significant issues related to water quality. The California Department of Food and Agriculture has developed the Fertilizer Research and Education Program which as the name implies supports both research and educational activities related to nutrient management within the state. The State Water Resources Control Board, supported by their regional Boards, manage and support numerous activities related to water quality.

Within this complex and diverse environment, it is difficult to clearly identify a unique role as Water Quality Coordinator. The activities undertaken in the Plan of Work summarized in this report represent only a small part of the total involvement within California related to water quality. Furthermore, it is almost impossible to assign which of the many accomplishments have resulted from the water quality programming in California. As will be pointed out below, some significant positive trends have been identified related to management for water quality. Assigning credit to the appropriate institution leading to the trends is probably less important than the accomplishments per se.

The success of the Rice Demonstration Project and the three HUAs studies can be directly related to the Water Quality Program. Adoption of management practices demonstrated in these units is continuing to increase with time. The specific targeted nutrient management, pesticide management and animal waste management programs adopted in the Plan of Work have also achieved positive results. The educational activities carried out under the Water Quality Program in previous years have certainly contributed to many of the present successes even though it is difficult to quantify those.

The following is a listing of some of the trends identified by extension advisors on their information sheet. They are presented in random order.

1. Four very large nurseries have dramatically reduced irrigation and nitrate runoff from their operations.
2. There was no subsurface drip irrigation in Kings County in 1990. There are presently approximately 1,500 acres with one grower hoping to expand up to 7,000 acres within the next three years. Water savings has been approximately one-acre foot per acre per crop by one grower who adopted the subsurface drip irrigation system.
3. Reduced winter month application of animal waste and wider distribution of animal waste to land in the fall has reduced spring water concentration of BOD and ammonium.
Several farms have built fences along seasonal creeks resulting in grass and shrub growth which reduced sediment and waste movement into the stream flows.

4. Within Kern County, more than 30,000 acres have been converted from sprinklers or border strip irrigation to micro irrigation systems within the last five years on permanent crops. This represents more than ten percent of the permanent crop acreage within the county.

5. Within Lake County about 65 percent of the grape acreage is now in drip irrigation. For pears, approximately five percent of the acreage has been switched to micro sprinklers. Presently, 70 percent of the acreage is in solid-set sprinklers as opposed to furrow or flood irrigation.

6. Increased use of reclaimed water for turf and landscape irrigation is expected to improve water quality in the estuary and other surface waters previously contaminated with effluent water. Pesticide application has been reduced by selection of more suitable turf grass species/cultivars and is expected to reduce environmental degradation due to the pesticide. Substitution of some nitrogen with iron on turf grass fertilization is reducing the total nitrogen application which should reduce water pollution from nitrates.

7. All watermelon growers in western Riverside County have switched to drip irrigation within the last four years.

8. Within Ventura and Santa Barbara Counties, an increase from 1,000 to 5,000 acres of drip irrigation in vegetables occurred in the last three years. There is increasing use of foliar nitrogen application on citrus with reductions in soil applications. Four growers have reduced nitrogen from 150 pounds per year on lemons to 60 pounds per year with no reduction in yield and some increase in quality. At least 18 growers are using cover crop to reduce erosion and improve infiltration. This practice will reduce pesticide and fertilizer and surface drainage water that has degraded the waters at Magu Lagoon.

9. In the vegetable growing area of Salinas Valley, use of nitrogen quick-tests to schedule fertilizer has increased approximately five percent last year. Winter cover cropping to reduce nitrate leaching during the rain season has increased approximately two to five percent.

SUCCESS STORIES

The success stories will be characterized as the Demonstration Project, regional accomplishments and individual farmer activity.

The Rice Demonstration Project is clearly a success story. By modifying water management practices, there has been more than a 90 percent reduction of pesticide discharge to surface streams.

The Coachella Valley in Riverside County represents a regional success story. In an analysis comparing the early 1980s to the early 1990s, it was found that there has been a reduction of approximately 150,000 acre feet of water applied to grapes and citrus annually and a reduction of approximately 670 tons of nitrogen applied to grapes. This success was achieved by a combination of conversion to micro irrigation systems, better irrigation scheduling, and use of slip plowing to improve soil physical properties. With excess water applications in the early 1980s, much of the land had high water tables which required subsurface drainage systems. With better irrigation scheduling in the early 1990s, one-third of the tiled-drained land in the region has become dry. Associated with reduced irrigation and drainage was reduction in the
salinization process. In 1991, it was estimated that micro irrigation was practiced on 90 percent of grape land, 85 percent of citrus, 18 percent of dates and seven percent of vegetables. This represents a total of 40 percent of all irrigated acreage. Recently it has been estimated that there is approximately 3,000 acres per year converted to micro irrigation systems.

The following represents a series of individual farm successes.

1) A citrus grower in Southern California applying approximately two-thirds of the nitrogen through micro irrigation system and one-third by foliar application has reduced the nitrogen application by approximately 25 percent.

2) One walnut grower has been converting existing groves and planting new groves with subsurface drip irrigation. Although his soil is very fine textured, he has reached yields of approximately 2.5 tons per acre where typically yields on these type of soils are approximately more than 1.5 tons per acre. In addition to improved yields, the farmer reports applying an average of 125 pounds of nitrogen per acre with five injections through the irrigation systems whereas typical walnut production uses 150 to 200 pounds of nitrogen per acre with two applications. Additionally, weed control is a secondary benefit from drip irrigation. Weeds are mowed occasionally for "cosmetic" purposes and the herbicide "Roundup" is used for spot treatment for weeds in spring and early summer. This practice contrasts with the use of preemergent herbicides in orchards with flood or sprinkler irrigation.

3) One grower, who has peach and walnut orchards in the Sacramento Valley of California, has been converting from surface irrigation to micro sprinklers. Fertilizers are applied through the irrigation system and the amount of nitrogen applied has been reduced from the 70 to 80 pounds of nitrogen per acre under flood irrigation to 40 pounds of nitrogen per acre through the micro sprinklers. Furthermore, conversion of irrigation system result in no runoff from the field which potentially could carry chemicals to other surface water supplies. This farmer has also been adopting integrated pest management practices to reduce the application of chemicals. He has used the pheromone mating disruption to control Oriental Fruit Moth which is a major peach pest. Additionally, he uses Bacillus thuringiensis for Peach Twig Bore, another damaging insect. By coupling these two biological methods of control, he has effectively eliminated several insecticide sprays. Furthermore, he notes that through biological controls, he has not disrupted the pests natural enemies. Thus, this has also reduced the need for spraying to control secondary pests such as mites.