

Section 6

Additional Water Management Issues

This inventory and analysis of Butte County water resources focuses on the county's supply and demand of surface and groundwater resources, and does not cover the breadth of all water resource issues. This section addresses the range of issues identified at many forums on Butte County water resources, and suggests how the data or analysis could be improved in the future. These recommendations are included in the conclusions of this report and the executive summary. The issues to be discussed include:

- Water Quality
- Environment
- Flood Control
- Water Use Efficiency
- Water Demand Forecasting

6.1 Water Quality

While substantial, the current status of ground-and surface-water quality and water quality data needs improvement in Butte County. Requirements for the control of non-point sources of urban and agricultural runoff will be discussed briefly. Nitrate pollution of groundwater will be highlighted, along with the general water quality data available from various groundwater sources. Surface-water quality data from DWR and local urban and agricultural water districts will be illustrated.

Surface Water

Point and Nonpoint Source Discharge

Butte County faces several major future challenges to continue to meet water quality standards and National Pollutant Discharge Elimination System (NPDES) permitting processes. It is likely that future regulatory changes will affect existing effluent limits for point source discharges and increased control of nonpoint sources. Municipal and industrial discharges in areas where water quality standards have not been attained may be subject to limiting their discharges for specific pollutants even more than they are now.

Litigation from the environmental community has been a primary motivation for the increased focus and faster pace for the development of Total Maximum Daily Load (TMDL) standards in recent years. For example, consent decrees resulting from EPA's settlement of lawsuits by environmental groups have set the pace of TMDL development in southern California and on the north coast.

In general, the Clean Water Act does not authorize EPA to regulate nonpoint source pollution. Nevertheless, EPA has consistently taken the position that nonpoint sources must be included in TMDLs and has confirmed that position in recently issued TMDL guidance. In *Pronsolino v. EPA*, landowners within California's Garcia River Watershed and the California Farm Bureau Federation allege, among other things, that EPA exceeded its statutory authority when it placed the Garcia River on the list requiring the establishment of a TMDL. The plaintiffs contend that Clean Water Act section 303(d) specifically limits the listing of waters to those that fail to meet water quality standards due to point sources of pollution. Because EPA determined that the Garcia River was impaired due to nonpoint sources of pollution, and natural background conditions, the plaintiffs contend that EPA exceeded its authority in listing the river under section 303(d).

Groundwater

The nitrate contamination in the Chico area is a concern for the long-term continued use of groundwater supply for residents. In response, the Chico Urban Area Nitrate Compliance Plan was developed to address nitrate contamination problems of groundwater in the Chico urban area, report actions taken and recommend solutions. The report concludes that septic tank discharge is the primary source of groundwater nitrate in the area, and identifies specific regions that must be sewered to eliminate contamination. Transfer of 7,800 of the areas 12,000 septic tank users to sewer connections is proposed. Other proposed actions include public education for owners of septic systems and the limiting of new residential development on septic systems.

Additional nitrate contamination issues are possible in the future within the Paradise Irrigation District and Del Oro Water Company service areas because all residents and commercial enterprises are currently on septic systems. New water supply wells are also being considered for drought protection within these areas.

Another issue has been raised over the past few years regarding the overall water quality of supplies from the Lime Saddle Marina Area of Lake Oroville. While the overall quality of water from the lake is excellent, there is concern that it varies substantially as the lake level lowers in the Lime Saddle area of the West Branch. Recently, the issue has expanded into specific concerns over pollution caused from the MTBE additive to fuel.

An issue raised at a number of forums is the quality of groundwater pumped from private wells. One issue is the amount of industrial, commercial, and residential water use that is self-produced. While the amount of self-produced groundwater in relation to the total water use is relatively small, a survey method for gathering these data is suggested for future water inventories.

Information sources

There are many varied sources of water quality information that are important to Butte County. For example, DWR prepares an annual water quality assessment of the State Water Project (SWP), and has completed an analysis of MTBE in the SWP. DWR also prepares surface water quality monitoring station reports for the Sacramento and Feather Rivers, Butte Creek, and Big Chico Creek. In addition, water quality data is accumulated by the Central Valley Regional Quality Control Board, California Department of Health Services, and the Butte County Environmental Health Department. The amount of data gathered is generally less extensive for groundwater than surface water. However, given that the data is collected from the wide array of sources, it is difficult to analyze the overall trends in the Quality of Butte County's water resource. Future water inventories would be improved, if all these data were summarized in one chapter on water quality.

6.2 Environmental Issues

There has been an attempt to cover the wide range of environmental issues that affect water supplies and demands in this report. Nevertheless, many county residents have raised issues relating to the impact of water demands on environmental habitat and endangered species. The total amount of environmental demands need to be addressed more comprehensively in future inventories.

Environmental Water

The primary focus of this report, related to environmental water use, has been on water supplied to wildlife refuges and flooding of rice fields for rice straw decomposition and waterfowl habitat. The attention to environmental water demands and supplies increased substantially during the 1990s, but the assessment of overall environmental demands lags behind that of the agricultural and urban sectors. For example, much research has focused on estimating the consumptive use of agricultural crops, but little to the water demands of various habitat types. The design and implementation of a program to estimate the acreage of various habitat types, and establish unit water use values for those habitats, is a critical need for Butte County and the state. However, funding for the acquisition of basic land and water use data has been a low priority for state and federal programs over the past two decades.

Endangered Species

The presence of threatened and endangered species (T & E species) affects the management and maintenance of water resources in Butte County. Project construction or modification generally requires consideration of endangered species through a biological consultation to discover possible impacts and mitigation requirements. Permitting can be expensive and time consuming and can potentially delay or halt projects. New projects must receive suitable approval, and significant impacts must be properly mitigated. Elderberry bushes, for example, that are within a

proposed project must be relocated or replaced based on guidelines by the U.S. Fish and Wildlife Service associated with protection of the elderberry beetle.

In the presence of T & E species, routine maintenance can also require increased planning and effort. Guidelines for lessening impacts on T & E species limit times for maintenance. For example, Western Canal Water District grades its water supply



canals one side of the ditch at a time and never during dawn or dusk to lessen the impact on the state and federally threatened giant garter snake. In addition, elderberry bushes impeding maintenance cannot be removed without mitigation. Because of these requirements, the cost of routine maintenance can increase significantly. Also, adequate instream flows must be maintained while chinook salmon are migrating and spawning; therefore, valley farmers must adhere to an irrigation prohibition.

Water dams and diversions can pose a significant risk to threatened and endangered aquatic species by impeding upstream migration of anadromous species. Water diversions can entrain juveniles, resulting in increased mortality. Many dams and water diversions have been removed along the length of Butte Creek in an effort to restore fish passage for spring-run Chinook salmon. The work has been completed as a cooperative effort between Western Canal Water District (Western Canal), Department of Interior, and California Urban Water Agencies. Western Canal removed the Point Four Dam in 1993. During 1998, 4 dams were removed and 12 unscreened water diversions were eliminated, including the Western Canal Main Dam, Western Canal East Channel Dam, McGowan Dam, and McPherrin Dam.

In 1998, Durham Mutual Water Company, working in conjunction with the U.S. Bureau of Reclamation (USBR), DWR, and Department of Fish and Game (DFG), installed two fish screens and an improved high-volume fish ladder to eliminate entrainment and improve fish passage on Butte Creek and the Durham Mutual Dam. Additionally, in 1995, a pool-and-chute fish ladder was designed and installed at Parrot-Phelan Dam by DFG, USBR and DWR to improve fish passage. In 1998, Gorrill Ranch and Rancho Esquon installed new fish screens and fish ladders on Butte Creek.

Two additional dams owned by Pacific Gas and Electric Company are currently under assessment to determine the potential for modification or removal to allow fish migration into the upper canyon reach of Butte Creek.

6.3 Flood Control

Butte County has major flood control problems. The Butte Basin Overflow Area is an essential element of the flood management system of the Sacramento River. The Rock

Creek/Keefer Slough area north of Chico has been subject to repetitive flood damage. Major floods in the Feather River area have occurred largely outside of the county, but a major proposal under the Proposition 13 (2000 Water Bond) by Yuba County Water Agency affects DWR's Butte County Facilities.

Regional efforts are ongoing to address flooding issues. Following the devastating floods of 1997, the state formed a Flood Emergency Action Team (FEAT) to



Photograph from DWR

recommend a series of potential strategies that would improve flood management. As part of the strategy, the Sacramento and San Joaquin River Basins Comprehensive Study includes a comprehensive study and framework plan focusing on the immediate need for flood protection with integrated ecosystem restoration. Initial projects proposals include the *Glenn and Butte Counties Flood Damage Reduction and Ecosystem Restoration*, located within the Sacramento River riparian corridor on the western boundary of Butte County immediately south of Highway 32.

Butte Basin Overflow Area

The Butte Basin Overflow Area lies from the confluence of Big Chico Creek and the Sacramento River near Chico landing and extends outside the county to the Butte Slough outfall gates near Meridian in Sutter County. Overflows eventually enter the Sutter Bypass. At high stages of the Sacramento River, water flows into the Butte Basin at several locations, thus reducing the peak discharge and stage between the main levees of the Sacramento River Flood Control Project. The northernmost overflow point is at a degraded levee called the M&T flood relief structure, the next is at a natural overflow area known as the 3 B's, and the southernmost in Butte County is at another degraded levee known as the Goose Lake flood relief structure. There is much concern over the long-term management of the Butte Basin overflow area, because of the maintenance of flood control facilities in concert with the management of the Sacramento River Conservation Area.

Rock Creek Keefer Slough

Subdivisions were developed in the Keefer Slough area based on the flood plain maps prepared by the Federal Emergency Management Agency (FEMA) in 1988. Subsequent flooding showed the flood plain maps to be in error. However, newly proposed flood plain maps appear to show flood prone areas more accurately. The area was severely damaged by floods in 1995, 1997, and 1998 and was designated as a Federal disaster area. The total cost of these disasters has been calculated at over \$76 million. Currently, Butte County is working with the U.S. Army Corps of Engineers and DWR to develop flood control alternatives. The objectives of these alternatives are to:

- Eliminate repetitive residential and agricultural flooding caused by excessive peak flood flows in Rock Creek and its tributaries;
- Reduce flood flows to volumes that can be retained in channels;
- Maintain natural low flows in existing channels
- Develop environmentally compatible facilities that enhance habitat; and
- Develop low maintenance facilities.

Long-term funding for the Rock Creek/Keefer Slough flood management effort will be sought from a wide array of sources. The project will also provide useful data on the effectiveness of environmentally compatible flood control solutions. Funding will be sought from the Proposition 13 (2000 Water Bond) Flood Corridor Protection Program to implement environmentally compatible practices.

Feather River

A significant component of Proposition 13, the Costa-Machado Water Act of 2000, was the Yuba-Feather Flood Protection Program, which provides for flood protection along the Feather and Yuba Rivers. Two of the features of this program are proposed for the State Water Project in Butte County. These elements involve the reoperation of Thermalito Afterbay and increased flood storage in Lake Oroville.

Analyses by the Yuba County Water Agency indicate that modifying the operation of the afterbay could result in a reduction in flood volume on the Feather River. A reduction of 36,000 acre-feet in floodflows would occur below the confluence of the Feather and Yuba Rivers. This option is the most cost-effective element of the program, and needs to be analyzed carefully to determine its impacts on agricultural and environmental water management needs in Butte County.

The option of increasing the flood storage behind Oroville Dam could have the most direct flood management benefits to Butte County. There is a potential for additional flood storage of 75,000 acre-feet or more by the installation of a series of 10-foot-high inflatable rubber dams called Obermeyer Gates. The rubber dams would be placed across the emergency spillway to increase flood storage. The additional storage would also reduce the frequency and need for releases over the emergency spillway, causing additional downstream problems.

Other Flooding Concerns

There are other flood management concerns in Butte County in addition to those previously mentioned. The flood management needs of other areas in the county as documented by the Butte County Office of Emergency Services are:

- Sedimentation of the Cherokee Canal;
- Drainage and flood control in the Palermo area; and

- Drainage and flood control in the Durham area.

6.4 Water Supply Reliability

Both recent updates of the California Water Plan (Bulletins 160-93 and 160-198) and CALFED recognized that, critical water shortages may occur which severely impact the health, welfare, and economy of California. To avoid such serious impacts, the Governor convened a panel in July 2000, chaired by the Director of the Department of Water Resources, for the purpose of developing a contingency plan to reduce the impacts of critical water shortages. Butte County was represented on the panel.

The plan identifies available resources (e.g., water transfers, water exchanges, groundwater programs, local partnerships), building upon the experience gained with Governor's Water Bank, to minimize such shortages. However, many on the panel, particularly those from Northern California, are concerned that the report did not represent a comprehensive drought contingency plan. The Governor's Panel will submit the plan to the Governor early in 2001, but the Northern California Water Association is requesting that a panel be convened to continue the work of developing a comprehensive drought plan.

Agricultural Water Use Efficiency

For many years many parties have disagreed as to the efficiency of agricultural water use. One of the reasons for the disagreement is the definition of irrigation efficiency. For example, an economist might describe irrigation efficiency in terms of agricultural production per unit of water. The term irrigation efficiency is often used interchangeably with agricultural water use efficiency in the agricultural community. However, irrigation efficiency is a term developed for the design and management of irrigation systems on individual farm fields. In many cases, the equations used to calculate irrigation efficiency have been misused when applied to larger geographic areas. Recently, a mathematical expression has been developed that relates on-farm irrigation efficiency, and the efficiency of a district or basin, to the amount of reuse. The reuse coefficient, ranging from zero to 1, is estimated from drainage water, tailwater and groundwater that was previously applied on-farm and reused. When there is no reuse, the coefficient is zero, hence the on-farm efficiency will be equal to the district or basin efficiency. The coefficient moves toward 1 as the number of times irrigation water is reused within a basin or district, thus the regional efficiency is higher than the on-farm efficiency. Although no detailed calculations were made for this report, it is apparent that the Butte Basin has much reuse of surface water between farms and districts, and by the management of ground and surface water.

Another concept that has been formulated in the past decade is that of "irrigation sagacity." This concept expands the notion that there are other beneficial uses of applied on-farm irrigation water that are not accounted for in expressions of on-farm or regional irrigation efficiency. For example, many farms in the Butte Basin support additional habitat with applied irrigation water. Some practices, such as flooding rice

fields to increase fall/winter waterfowl habitat and to decompose rice straw to improve air quality, use additional water that is not part of agricultural water demands, but can be considered sagacious uses of water.

Using the concepts outlined above, the Agricultural Water Management Council, formed in July 1997, comprised of signatories to the *Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California*, adopted a list of Efficient Water Management Practices (EWMPs). These practices can be evaluated to take into account regional efficiencies and sagacities. However, on-farm irrigation management is still important to many individual growers in Butte County in terms of yields, pesticide and fertilizer applications, and disease. The EWMPs go beyond a water supplier assisting with information for traditional on-farm irrigation management practices. The EWMPs that could be implemented if cost-effective are shown in Table 6-1. Western Canal Water District and Butte County are currently signatories to the Agricultural MOU.

The information necessary to evaluate the expressions of regional irrigation efficiency, sagacity, and thus cost-effectiveness, in most agricultural areas of California including the Butte Basin, are not readily available. These data will need to be collected in order to evaluate the effectiveness of agricultural water use efficiency options the next inventory and analysis of Butte County's Water Resources.

Table 6-1 Efficient Agricultural Water Management Practices
<p>Generally Applicable EWMPs (considered cost-effective for all water suppliers)</p> <ul style="list-style-type: none"> • Prepare and adopt a water management plan; • Designate a water conservation coordinator; • Support the availability of water management services to water users; • Where appropriate, improve communication and cooperation among water suppliers, water users, and other agencies; • Evaluate the need, if any, for changes in policies of the institutions to which the water supplier is subject; and • Evaluate and improve efficiencies of water supplier's pumps.
<p>Conditionally Applicable EWMPs (cost-effective practices subject to net benefit analysis outlined in the MOU, or those that are demonstrably inappropriate)</p> <ul style="list-style-type: none"> • Facilitate alternative land use (in drainage problem areas); • Facilitate use of available recycled water that would not be used beneficially; • Facilitate the financing of capital improvements for on-farm irrigation systems; • Facilitate voluntary water transfers that do not unreasonably affect the water user, water supplier, and the environment or third parties; • Line or pipe ditches and canals; • Increase flexibility in water ordering by, and delivery to, the water users within operational limits; • Construct and operate water supplier spill and tailwater recovery systems; • Optimize the conjunctive use of surface-and groundwater; and • Automate canal structures.
<p>Other EWMPs (must go through net benefit analysis)</p> <ul style="list-style-type: none"> • Water measurement and water use report; and • Pricing or other incentives.

Urban Water Use Efficiency

A difference between urban and agricultural water management is that urban water use is not generally described in terms of efficiency. The most commonly used term for comparison has been per-capita water use, expressed as gallons per-capita daily (gpcd), which is the water produced by the system of a water supplier divided by the population served. All categories of urban use - residential, commercial, industrial, and institutional - are included in gpcd. Analyzing the change in gpcd can help an agency track changes in its use patterns and conservation, but it is not a useful comparative tool when comparing one agency to another. For example, a large manufacturing sector in a small community will result in high gpcd values, whereas a community with largely multi-family housing (apartments, trailer courts, etc.) and little manufacturing or commercial enterprises will normally have low gpcd values.

Another difference between urban and agricultural water use efficiency is that over 400 urban water suppliers having more than 3,000 connections, or delivering over 3,000 acre-feet of water annually, have been required to prepare urban water management plans since 1983. The Urban Water Management Planning Act (California Water Code Sections 10610-10656) requires that plans be developed every 5 years. Completed plans were due on December 31, 2000. For example, Paradise Irrigation District held public hearings on its plan update during December 2000. The plan covered all areas required under the law, including:

- Plan Adoption, Public Participation, and Planning Coordination
- Paradise Irrigation District—History and Water Facilities
- Past, Current, and Projected Water Use
- Water Shortage Contingency Analysis
- General Water Use Information
- Water Demand Management Measures

The other agencies in Butte County that are required to submit plans are California Water Service Company (Chico & Oroville), Del Oro Water Company, Thermalito Irrigation District, Oroville-Wyandotte Irrigation District, and the cities of Gridley and Biggs. The urban water management plans require projections of demands to 2020. In most cases these forecasts are made using a time series analysis based on the assumption that past trends in water use will continue into the future.

As might be expected, good urban water use efficiency analysis requires data on water pricing and other water conservation factors. The Urban Water Conservation Council was formed in 1991 to provide statewide leadership in urban conservation practices and analyses. The Best Management Practices (BMPs) promulgated in the

• *Memorandum of Understanding Regarding Urban Water conservation in California,*” have provided the basis for the demand management measures in the Urban Water Management Planning Act and in forecasts of future urban demands. The urban BMPs are listed in Table 6-2.

Table 6-2 Urban Best Management Practices
<ul style="list-style-type: none"> • Water survey programs for single-family and multi-family residential customers; • Residential plumbing retrofit; • System water audits, leak detection, and repair; • Metering with commodity rates for all new connections and retrofit of existing connections; • Large landscape conservation programs and incentives; • High-efficiency washing machine rebate programs; • Public information programs; • School education programs; • Conservation programs for commercial, industrial, and institutional accounts; • Wholesale agency assistance programs; • Conservation pricing; • Conservation coordinator; • Water waste prohibition; and • Residential ULFT replacement programs.

Many of the BMPs are applicable to Butte County urban water suppliers if proven to be cost-effective. California Water Service Company, and Del Oro Water Company, are signatory to the Urban MOU.

Water Recycling

Water recycling is normally considered another water use efficiency action. It could form a potential source of supply for groundwater recharge. The amount of treated effluent generated in Butte County is small compared to the overall water supply. Additionally, like conservation, it will be most cost-effective in coastal areas where the effluent is lost to the ocean and can't be reused. There is little need for much analysis in this area, but it could become more important in the future as the number of sewer connection increases.

6.5 Forecasts and Trends in Water Use

No forecasts or detailed analysis of trends are part of this inventory and analysis, but the public has insisted that good estimates of forecasted urban and agricultural water use are very important to Butte County. Various methods are used to project or forecast demands. This discussion focuses on methods that could be adopted by the county for future updates of this inventory and analysis. General trends are identified from other sources or observations.

Urban Water Use

Butte County's urban water needs will certainly increase in the future. For example, Paradise Irrigation District estimates that trends in its demands indicate an increase of

about 10 percent by 2020 in their most recent urban water management plan. When all the urban water management plans are completed for the agencies mentioned previously, DW&RC can estimate trends in overall urban demands in the county.

In order to increase the precision of urban demand estimates in the future a forecasting model is preferred. The most sophisticated model currently available is the IWR Main Model originally refined by the Corps of Engineers Institute for Water Resources. The most recent version of the model runs on Windows 95, 98, and NT, under copyright to Planning and Management Consultants Ltd. This model prepares forecasts for all categories of urban water use based on a number of factors. The information requirements are shown in Table 6-3.

Agricultural water use

Current trends in agricultural water use indicate little change in demand in the Sacramento Valley. However there has been no attempt to forecast future cropping patterns, irrigation methods, and water supplies. One option in future reports is to develop a computer simulation similar to the Central Valley Production Model for Butte County. This regional model of irrigated agricultural production and economics simulates the decisions of agricultural producers in the Central Valley. The model assumes that growers maximize profits subject to resource, technical, and market constraints. The model has been run for a region that includes most Feather River riparian and appropriative users and would need to be tailored to fit Butte County. Rigorous agricultural water forecasts are necessary to conserve and protect the county's agricultural and water resources.

Table 6-3 IWR Main Information Requirements
<ul style="list-style-type: none"> • Definition of the study area including base and forecast years to be used and sectors to be evaluated; • Weather data encompassing cooling degree days, total rainfall, and average daily maximum temperatures; • Conservation data from statistical abstracts, manufacturer estimates, published studies, and surveys; • Employment data by major industry groups; • Definition of the study area including base and forecast years to be used and sectors to be evaluated; • General study area data for base and forecast years to include population, housing units, employment, and unaccounted water; • Housing data for base and forecast years by number of housing units and housing types; and • Residential base and forecast year variables for each housing type incorporating median household income, persons per household, housing density, and water and wastewater prices.

Environmental Water Use

Based on the data accumulated to date, and analyses to date, it could be assumed that environmental water demands would continue to increase. More wildlife and waterfowl areas will continue to be set aside, instream flows will continue to increase, and more flooding of rice land will be necessary for air quality and waterfowl purposes. However, as noted previously, there has been little analysis of environmental water use in this, or other reports, that is as rigorous as that found in the other sectors.