SECTION 5.0 WATER MANAGEMENT STRATEGIES USED TO MEET PLAN OBJECTIVES

5.1 Overview of This Section

Included in the State's IRWMP Guidelines (Appendix A, Plan Standards) are 20 water management strategies to be considered for implementation as part of an IRWM Plan. Of the 20 water management strategies, 11 of them are required to be addressed in a Plan (see below). Because all 20 water management strategies are currently being implemented within the Region and are consistent with the IRWM Plan objectives, the Watersheds Coalition of Ventura County (WCVC) determined that all of the strategies would be discussed in the Region's IRWM Plan.

Water Management Strategies

- Ecosystem restoration*
- Environmental and habitat protection and improvement*
- Water supply reliability*
- Flood management*
- Groundwater management*
- Recreation and public access*
- Stormwater capture and management*
- Water conservation*
- Water quality protection and improvement*
- Water recycling*
- Wetlands enhancement and creation*
- Conjunctive use
- Desalination
- Imported water
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Source: Table A, Appendix A, Integrated Regional Water Management Grant Program Guidelines
* Denotes water management strategies which are mandatory, as indicated in the Guidelines

In one way or another all of the water management strategies are included as part of local Urban Water Management Plans, watershed management/protection plans, facility master plans, capital improvement plans, habitat conservation plans, flood and stormwater management plans, water conservation plans, water quality improvement plans, groundwater management plans and other plans addressing water supply, water resources and related issues. These plans have been developed and implemented for a variety of reasons: based on local needs and priorities, grant funding availability, regulatory requirements, and/or conditions placed on project approval.

Many of the programs and projects currently being implemented in the Region are a direct result of past regional planning efforts. Local agencies have been working collaboratively to implement these strategies since the 1970s (see Section 1 for background on Section 208 Water Quality Management Planning efforts). Implementation of these strategies also achieves the objectives

identified by the WCVC in more recent efforts to address local water problems and enhance water management.

5.2 Water Management Strategies

Each of the 20 strategies outlined in the State Guidelines are described more fully below and include the following information: description, benefits of implementation, existing efforts (policies, projects, programs), constraints to implementation (if applicable), related documents and websites, recommended future projects or actions, integration with other strategies, and possible funding sources.

Δ In future updates to the IRWMP these strategy sections may be rearranged to group like strategies together, eliminate duplication of descriptive text and to better integrate the discussion. They are currently listed in alphabetical order.

5.2.1 Conjunctive Use (Management)

Description

Through the water management practice of "conjunctive use," surface-water and groundwater resources can be coordinated to maximize the utility of an area's collective water resources. Conjunctive use involves using surplus surface water when available (e.g., storm runoff, surplus surface water flows, or recycled water) to recharge groundwater basins containing adequate storage capacity. The surplus surface water may be used to replenish groundwater either by:

1) spreading water on permeable surface areas

2) simply substituting ground water production with surface water deliveries (i.e., in-lieu groundwater storage). The water is then stored in the aquifer so that it may be subsequently withdrawn in dry periods when surface supplies are scarce.

3) by directly injecting water into the groundwater basin through injection wells.

All three techniques are used in Ventura County. Considerations in assessing the feasibility of conjunctive use projects, and for improving existing projects, include:

- Method of getting the water into the subsurface (spreading or injection), pros and cons
- Local hydrogeology
- Source water quality and availability
- Receiving water quality
- Potential geochemical mixing and reactions
- Extraction water quality
- Beneficial uses of the aquifer
- Basin Plan water quality objectives
- Regional Water Quality Control Board criteria and process for evaluating the project, and
- Point of compliance for water quality objectives

Conjunctive use also can work on an inter-basin scale. Water can be transferred from areas with surplus surface water and either stored in another basin or delivered to another basin for use in lieu of groundwater pumping. When surface water is less plentiful, e groundwater can be pumped. This type of conjunctive use has also been implemented in Ventura County.

One form of conjunctive use is groundwater banking. In groundwater banking operations, surplus surface water is injected or recharged for storage in the aquifer, and then extracted at a later time when surface water supplies are limited. This form of conjunctive use has also been implemented in Ventura County.

Background and Existing Efforts – Local and Statewide

Ventura County has some of the most extensive use of conjunctive use facilities in the state. The construction of these facilities was prompted by seawater intrusion within coastal groundwater basins. Seawater intrusion was first detected on the Oxnard Plain in the vicinity of the Hueneme and Mugu submarine canyons in the early 1930s and became a serious concern in the 1950s. Lowered groundwater levels from overpumping, which reversed aquifer flow to onshore (instead of the historical offshore flow) and pulled seawater into the aquifer, formed a distinct pumping trough in the southern Oxnard Plain.

Conjunctive Use Through Surface Recharge

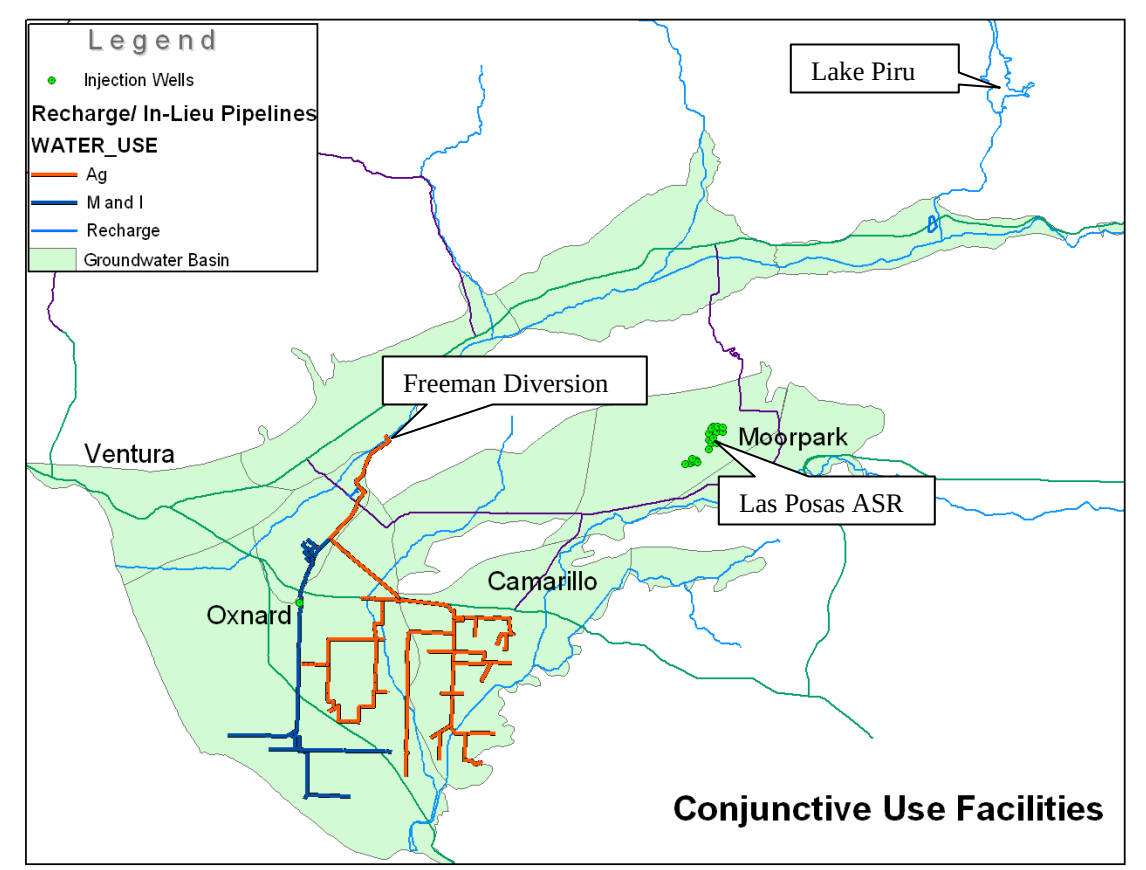
The first conjunctive use facilities in Ventura County were temporary diversion dikes constructed in the Santa Clara River; water diverted at these structure was routed to adjacent spreading ponds and percolated into the aquifer. Without these dikes, this diverted water would have otherwise flowed to the ocean along with other stormflow. The Freeman Diversion (1991), which replaced the temporary diversion dikes in the Santa Clara River with a permanent concrete structure, now allows for diversion of river storm flows throughout the winter rainy season. As a side benefit, the Freeman Diversion helped stabilize the riverbed after years of degradation caused by in-stream gravel mining.

The spreading ponds connected to the river diversion were expanded several times into the existing Saticoy, El Rio, and Noble spreading basins, which increased the ability of the Freeman Diversion to recharge groundwater. Currently, the Freeman Diversion helps recharge on average almost as much water as is pumped from the groundwater basins that it serves, helping reverse seawater intrusion in the upper of the two aquifers systems beneath the Oxnard Plain. An additional set of recharge basins is currently being developed from unused gravel basins by the City of Oxnard and United Water Conservation District.

Conjunctive Use Through In-Lieu Deliveries

In addition to surface recharge ponds, the Freeman Diversion also supplies river water to two pipeline systems that deliver this water to agricultural pumpers in lieu of their pumping groundwater. The Pleasant Valley Pipeline delivers this river water to Pleasant Valley County Water District for distribution to pumpers. The Pumping Trough Pipeline conveys diverted river water to agricultural pumpers on the Oxnard Plain, thus reducing the amount of groundwater extractions in areas susceptible to seawater intrusion. When river water is not available, United Water Conservation District uses five Lower Aquifer System wells to pump water into the pipeline.

In a different type of in-lieu delivery, United Water Conservation District also pumps and delivers groundwater to the cities of Oxnard and Port Hueneme and Naval Base Ventura County. This water is pumped from wells adjacent to the surface spreading ponds, where the aquifers are readily recharged. The cities and Naval Base Ventura County use this water in lieu of pumping their own wells closer to the coastline, where pumping could pull seawater into the aquifers.



A newer in-lieu system operated by Camrosa Water District diverts flows from Conejo Creek and delivers the water to Pleasant Valley County Water District to meet local irrigation demands within the overdrafted Pleasant Valley basin. The Conejo Creek Diversion Project diverts a combination of natural stream flow and recycled water released into the creek from wastewater treatment plants upstream.

Conjunctive Use Through Inter-Basin Transfers

The Conejo Creek project generates credits from the Fox Canyon Groundwater Management Agency by supplying in-lieu water to Pleasant Valley. These credits can then be recovered through the Supplemental M&I Water Program, a joint United Water Conservation District-Calleguas Municipal Water District project. The credits are pumped from the Oxnard Plain Forebay basin adjacent to the spreading ponds discussed above and the pumped water can be delivered through United Water Conservation District's potable pipeline to the cities of Oxnard, Port Hueneme and other customers. This project effectively shifts Lower Aquifer System pumping in the Pleasant Valley basin to Upper Aquifer System pumping in the Oxnard Plain Forebay basin. Through its pricing structure, this program also reimburses Calleguas Municipal Water District for their investments in the Conejo Creek project, a precedent that may allow similar types of projects in the future.

In another inter-basin transfer, the United Water Conservation District's Saticoy Wellfield was constructed adjacent to one of the Forebay spreading basins to pump shallow water from the recharge mound underlying the spreading grounds in wet years and deliver the water to users along

United's existing agricultural pipeline system (Pleasant Valley and Pumping Trough Pipelines) – which moves water from the easily-recharged Forebay basin to the overdrafted Oxnard Plain and Pleasant Valley basins.

Conjunctive Use Through Groundwater Banking

In East Ventura County, there is a conjunctive use project in operation where treated State Project water is stored. Centered in the Moorpark area in a deep 1000 foot confined aquifer within the Calleguas Creek Watershed, the Las Posas Aquifer Storage and Recovery (ASR) Project stores treated surplus water underground so that it will be available for later use. This project helps maximize water yield and ensure adequate emergency supplies.

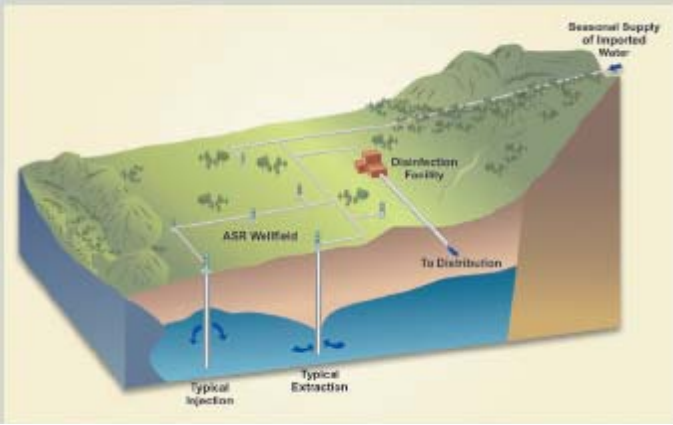
Calleguas Municipal Water District (Calleguas) is working in partnership with the Metropolitan Water District of Southern California (Metropolitan) on the Las Posas Basin ASR Project. Costs for the project have been shared, with staff from both agencies involved in planning, design, construction, and startup. Both Calleguas and Metropolitan benefit from the project. For Metropolitan, the project provides water that can be delivered to its member agencies during dry years, allowing Metropolitan to balance supplies and demands, provide reliability for emergencies and water quality events for 17 million Southern California residents. For Calleguas, the project provides a reliable source of water when imported supplies are limited due to scheduled maintenance shutdowns, drought, earthquake, or other emergency. Ventura County does not have access to a redundant treated water source of imported water, and receives all of its potable supplies from Metropolitan through a single treatment plant and tunnel. Lake Bard, which provided enough local storage for redundancy and emergency supply when it was built in the 1960s, is no longer adequate to meet current demands during periods when supply may be limited.

An Alternative to Open Reservoir Storage – This ASR project is an effective alternative to storage in an open surface water reservoir. Groundwater storage does not take up valuable land because the water is stored beneath the surface. Unlike reservoirs or lakes, no water is lost through evaporation. Another benefit of storing water in the aquifer is that it raises groundwater levels, requiring less energy to pump water out of the ground, not only for Calleguas but for nearby well owners. Underground storage also protects the water, making it less susceptible to water quality degradation. The Las Posas Groundwater Basin is ideally located for groundwater storage. The lower aquifers are primarily confined and protected from surface contamination by impervious clay layers. The Basin acts like an enormous natural bowl, 18 miles long and 4.5 miles wide that can store about 300,000 acre feet of imported water from Northern California. An acre-foot is enough

water to supply two families for a year. Calleguas will have the capacity to pump 70,000 acre feet per year during dry years or emergencies.

How Does the ASR Process Work? – ASR wells are ordinary groundwater extraction wells with a critical difference: additional pipes, valves, and controls allow operations personnel to reverse the normal flow and deliver water into, as well as out of, the ground. During wet years, when there is excess water available from Northern California, surplus water is injected into the aquifer and "banked" until needed. During drought years, when water supplies are scarce, the stored water is pumped out of the aquifer to meet water demands. The water injected into the wells is high quality drinking water. When this water is pumped out of the ground, it is treated one more time before being distributed.

The Las Posas Basin ASR project currently has 18 wells, each with the capacity to extract water at about 4 cubic feet per second (cfs) and to inject water at 3 cfs. The wells are 800 to 1200 feet deep and perforate the Fox Canyon Aquifer. The wells are equipped with 600- to 800-horsepower vertical turbine pumps. Operations personnel operate and control the pumps from a remote location using a Supervisory Control and Data Acquisition (SCADA) system.



Benefits of Implementation

The primary benefits of conjunctive use programs to Ventura County include: increased recharge to overdrafted basins and reversal of seawater intrusion, increased reliability of water supplies in droughts and in emergencies (e.g., earthquake cutting imported water supply pipeline), decreased reliability on imported water pumped from the Bay-Delta (which has its own environmental problems), and possible reduced pumping costs to agricultural and municipal users when groundwater levels rise as a result of enhanced recharge with surplus water when available. Conjunctive use is the primary tool to manage the county's groundwater basins and maintain water quality.

Constraints to Implementation

The primary constraints to implementation of conjunctive use programs are cost, cooperation among users, and environmental balancing. Cooperation among users is essential for larger programs that may move water between agencies and supply water to agricultural users who must

be willing to pay for and use in-lieu water. Good cooperation in the past has been a major asset in Ventura County, which has some of the best cooperative water management in the state. There is no expectation that this should change.

Environmental balancing of water needs has taken on a more important role in both Ventura County and the state. There are ongoing consultations with State and Federal agencies on providing adequate water for endangered fish (primarily southern California steelhead) on both the Santa Clara River and the Ventura River. Ventura County agencies are trying to find the optimal solution to river flows, dam releases, and diversions that maximize water supplies and recharge while ensuring adequate flows for fish. Similar issues have recently been resolved on releases of State Water down Piru Canyon to ensure recovery of endangered frogs. It is likely that these issues will be regularly re-visited and adjusted in the future.

Cost is a constraint on conjunctive use programs, particularly as the easier projects have already been implemented and the more expensive projects are the next to be designed and constructed. County taxpayers and groundwater pumpers have shared much of the cost of the current conjunctive use projects with Federal and State agencies (discussed under *Possible Funding Sources*). Surface recharge operations are paid by pumpers through per-acre-foot pump charges, whereas in-lieu, basin-transfer, and groundwater banking projects are paid for by the end user of the water. This strategy works as long as costs can be allocated across a wide user group. As future conjunctive use projects become more focused on solving problems in specific areas, cost subsidies will have to be considered because the cost of delivered water to a small number, of users or where sophisticated treatment is involved, will be too high to be borne exclusively by the users of the water.

Related Documents and Websites

Documents

The Fox Canyon Groundwater Management Agency (FCGMA) overlies the Oxnard Plain, Pleasant Valley, Las Posas Valley, and Santa Rosa Valley. Although the agency does not operate conjunctive use facilities (by statute), projects are discussed and approved through FCGMA processes. The FCGMA is currently updating its Groundwater Management Plan (submitted as part of this application) which covers the range of current and potential future conjunctive use strategies. This document is the best one-stop resource for current conjunctive use planning.

United Water Conservation District (United) builds and operates the surface water recharge facilities along the Santa Clara River and delivers water through the primary potable and irrigation in-lieu pipelines. United prepares annual reports on the different basins that are available from United and are on their website (see below). Calleguas Municipal Water District has also prepared documents related to its storage project, including engineering and technical reports (many on their website listed below). The City of Oxnard has completed planning and environmental review for its Groundwater Recovery Enhancement and Treatment (GREAT) Program, which includes a recycled water conjunctive use element, and has begun permitting work and final design of the first phase of recycled water treatment and distribution facilities.

Web Resources

- Fox Canyon Groundwater Management Agency. (http://publicworks.countyofventura.org/fcgma/) – Groundwater Management Plan includes extensive discussion of current and potential future conjunctive programs.

- United Water Conservation District (http://www.unitedwater.org/) – annual reports on groundwater conditions and conjunctive use operations.
- Calleguas Municipal Water District (http://www.calleguas.com/) – reports on Aquifer Storage Project.
- City of Oxnard (http://www.oxnardwater.org/projects/great/) – GREAT recycled water project documents.
- Camrosa Water District (http://www.camrosa.com/) – documents on Conejo Creek Diversion conjunctive use project.

Recommended Future Projects or Actions

The Fox Canyon Groundwater Management Agency Groundwater Management Plan referenced above has a prioritized list of future conjunctive use projects that have been discussed by stakeholders in the county. These include:

- Greater use of recycled water (e.g., GREAT project delivery of recycled water in-lieu deliveries and direct injection)
- Development of additional surface recharge facilities (e.g., Riverpark gravel pits turned to recharge basins)
- Importing additional water for recharge when SWP surplus is available or unused portions of Ventura County's State Water allocation can be purchased.
- Increase diversions and recharge of flood flows (e.g., increase diversion capacity of Freeman Diversion on Santa Clara River).
- Increase use of river diversions for conjunctive use (e.g., extend in-lieu delivery pipelines to new areas, treat river water for direct injection during the winter months when irrigation demand is low and in-lieu deliveries are limited).
- Developing intertie connections between water agencies to facilitate conjunctive use projects (eg. West Ventura County Water Supply Reliability Project and Casitas-Ventura Intertie)

Integration with Other Strategies

Conjunctive management of water supplies involves and benefits many of the water management strategies contained in this IRWMP. The primary positive impacts and links are found in the following strategies:

- *Groundwater Management*
- *Imported Water*
- *Water Recycling*
- *Water Supply Reliability*
- *Water Conservation*
- *Flood management*
- *Stormwater capture and management*
- *Water quality protection and improvement*
- *Desalination*
- *Surface storage*
- *Watershed planning*
- *Water and wastewater treatment*
- *Water transfers*

Possible Funding Sources

- Local funding (current projects are partially funded through joint funding from water districts' general funds, property taxes, groundwater pump charges, customers' rate base, and user fees)
- Current conjunctive use projects have been partially funded through a combination of Federal funds (Bureau of Reclamation, special legislation) and State funds (State Water Resources Control Board, Department of Water Resources Prop 13 grant).

5.2.2 Desalination

With Excerpts from the California Water Plan Update 2005

Description:

Desalination is a water treatment process for the removal of dissolved salts from water for beneficial use. Desalination is used on brackish (low-salinity) water as well as seawater. In California, the principal method for desalination is reverse osmosis. This process can be used to remove salt as well as specific contaminants in water such as trihalomethane precursors, volatile organic carbons, nitrates, and pathogens.

Current Desalination Issues and Projects in California

Desalination began in California in 1965. The last decade has seen a rapid rise in installed capacity. This is primarily due to dramatic improvements in membrane technology and the increasing cost of conventional water supply development. The 2005 California Water Plan (SB 1062) includes desalination as one of the State's water resource management strategies. Currently there are about 24 desalting plants operating in California that provide water for municipal purposes. The total capacity of these plants is approximately 79,000 acre feet per year. These include 16 groundwater, one surface water, and seven seawater desalination plants.

Currently there are six new groundwater desalting plants and one plant expansion in the design and construction phases for a total of about 29,500 acre feet per year in new capacity. There are no seawater desalting plants in the design and construction
phases at this time.

Recognizing the increasing use of desalting technologies and processes in California, during the 2002 session, the State Legislature enacted, and the Governor signed Assembly Bill 2717 (Hertzberg, Chapter 957, Statutes of 2002). AB 2717 directed the Department of Water Resources (DWR) to convene a Desalination Task Force (DTF) charged with evaluating the following:

- Potential opportunities for desalination of seawater and brackish water in California
- Impediments to using desalination technology
- What role, if any, the State should play in furthering the use of desalination

The DTF, comprised of members from 27 desalination stakeholders, completed its mission in October 2003 after six months of deliberations. Excerpts of some of the DTFs 18 recommendations, organized under three major broad categories, are summarized below:

General Recommendations:

- Desalination projects, where economically and environmentally appropriate, should be considered as an element of a balanced water supply portfolio, which also includes conservation and water recycling to the maximum extent practicable.

- The State should create mechanisms that allow the environmental benefits associated with transitioning dependence on existing water resources to desalinated water to be realized.

- Results from monitoring at desalination projects should be reported widely for the broadest public benefit; desalination operational data should be shared amongst agencies; and a statewide database and repository for storing and disseminating such information should be created.
- Create an Office of Desalination within the DWR to advance the State's role in desalination.

Energy and Environment Related Recommendations:

- Ensure seawater desalination projects are designed and operated to avoid, reduce, or minimize impingement, entrainment, brine discharge and other environmental impacts. Where feasible and appropriate, utilize wastewater outfalls for blending/discharging desalination brine/concentrate.
- Consider desalination projects as part of State and local conjunctive use strategies, and identify ways to improve water quality by mixing desalinated water with other water supplies.
- Recognizing the importance of power costs to the costs of desalination; consider energy supply strategies such as: applicability and access to non-retail power rates; and development of renewable energy systems in California, in conjunction with desalination implementation strategies.
- Identify creative ways that desalination can be used in a manner that enhances, or protects the environment, public access, public health, viewsheds, fish and wildlife habitat and recreation/tourism.

Planning and Permitting Related Recommendations:

- Encourage peer review processes for desalination projects coordinated amongst regulators, affected stakeholders and the public in order to improve communication, cooperation and consistency in permitting processes.
- Evaluate the efficacy of all new water supply strategies, including desalination projects, based upon adopted Community Plans, Urban Water Management Plans, Local Coastal Plans, and other approved plans that integrate regional planning, growth and water supply/demand projections.
- Environmental reviews of desalination projects should ensure that growth-related impacts of desalination projects are properly evaluated.

California Ocean Water Desalination Projects, Capacity and Costs

Recent technological advances in various desalination processes have significantly reduced the cost of desalinated water to levels that are comparable, and in some instances competitive, with other alternatives for acquiring new water supplies. Desalination technologies are becoming more efficient, less energy demanding and less expensive. Significant progress and innovation in membrane technologies such as reverse osmosis (RO) has helped reduce costs. The RO process has been proven to produce high-quality drinking water throughout the world for decades.

The following table shows the range in total unit water cost that can be expected from plants desalting groundwater (or brackish), wastewater, and seawater. These costs are based on the expected lifetime of the plant (20-30 years).

Desalting total water costs[1]

Type of Desalting Plant	Total Water Cost - $ per Acre Foot
Groundwater	$250-500
Wastewater	$500-2000
Seawater	$800-2000

1Unit costs obtained from a variety of sources including agency reports, technical journals, and general periodicals, and are not based on a standard costing procedure.

Currently, 7 of the 24 existing desalination plants in operation in the State involve the desalination of seawater. Water production from existing seawater desalination plants represents only 1150 out of the 79,000 acre feet total of the State's current desalination plant production capacity according to DWR.

As of June 2006, DWR reports that there were an additional 10 seawater desalination plants either in design and construction and/or planned within the state. Total additional water production capacity projected to be realized from those 10 seawater desalination plants is 187,350 acre feet.

Statewide, DWR projects a potential of 500,000 acre feet of additional annual water production coming from desalination projects by 2030. Of that statewide total, 40 percent, or 200,000 acre feet is projected to come from ocean water desalination, with the remaining 300,000 acre feet coming from brackish water desalination projects.

Total capital investment needed to attain this additional desalination water production capacity statewide is projected by DWR within the range of $1 to 2 billion. RO is generally thought to be the most cost-effective desalination process in California irrespective of the source water being desalted.

Currently, DWR estimates total amortized production costs for seawater RO desalination projects would range from $860 to $1300 per acre foot of water produced. By comparison, DWR estimates total amortized production costs for brackish water RO desalination projects would range from $130 to $1250 per acre foot of water produced.

RO desalination processes are particularly and highly sensitive to fluctuations in electricity costs, and the aforementioned DWR cost projections assumes electricity costs of $0.08 per kilowatt hour (kWh). On average, DWR projects that an increase in electric energy costs of $0.01 per kWh would increase the cost of membrane desalination processes by about $53 per acre foot of water produced from such processes.

In addition to desalination process production costs, DWR projects distribution costs ranging from $100 to $300 per acre foot, with the caveat that such costs are highly dependent on site-specific conditions. Also, on average, DWR projects that annual operations and maintenance costs for desalination projects may range from as little as 50 percent to as high as 70 percent of plant production costs.

Regarding potential future costs of seawater desalination processes in the State, DWR projects that given rapid advances in cost-effective membrane technologies and dramatic decreases in unit

production costs of membrane treatment units, total amortized production costs of seawater desalination projects in the State could drop to below $750 per acre foot within the next five years.

Benefits of Implementation

There are a number of benefits associated with implementation of brackish water or seawater desalination projects, including:

- Increase in water supply/new water supply
- Reclamation and beneficial use of waters of impaired quality
- Increased water supply reliability during drought periods
- Diversification of water supply sources
- Improved water quality
- Removal of salts from local watersheds through brine disposal
- Use of brines for salt-tolerant crops and wetlands habitat restoration
- Protection of public health
- Reducing groundwater overdraft
- Restoring use of polluted groundwater

Existing Efforts in Ventura County

Brackish Water Desalination

Brackish water, also referred to as low-salinity water, is water characterized with moderate levels of dissolved minerals and salts, typically less than 5000 ppm total dissolved solids (TDS). The presence of these impurities renders the water less desirable or unusable for many applications.

Salinity sources within the Calleguas Creek and Santa Clara River Watersheds include concentration from agricultural irrigation, salts in imported water, salts from seawater intrusion, and salt-loading by water consumers, both residential and industrial. These salts enter local surface water resources and build up in the soil and shallow aquifers impacting local and regional surface and groundwater resources. Discharge of treated wastewater and increasing use of recycled water also adds to the salt-loading within the Region. In addition to these sources, groundwater picks up dissolved minerals from long contact with underground mineral deposits.

To prevent impairment of beneficial uses of water, salts must be removed from degraded water sources and exported from the watershed. Brackish groundwater desalting is an effective means of treating impaired groundwater, providing a safe water supply and providing capacity for additional groundwater storage in areas with suitable hydrogeology

In 1991, as part of its Local Resource Program, Metropolitan Water District of Southern California (Metropolitan) established a Groundwater Recovery Program (GRP) to improve regional long-term water supply reliability through the recovery of otherwise unusable groundwater that was degraded by minerals and other contaminants. The GRP currently provides financial incentives of up to $250 per acre foot of water produced. Over 278,000 acre feet of new supplies have been delivered under this program, with salinity reduction a primary focus.

Brackish water desalination solves both reliability and quality goals in the region. By desalting ground and surface water, salinity is reduced in the watershed for the benefit of all users. At the same time those impaired water resources, once treated, augment local supplies and further insulate the Region from threats to imported water. There are a number of brackish desalination projects within the Calleguas Creek Watershed that are either in planning or under construction. Some of these projects are briefly discussed below.

The Calleguas Municipal Water District (Calleguas) Salinity Management Project is a 35-mile Brine Line that is integral to the construction of a series of brackish groundwater desalters in the Calleguas Creek Watershed. The Brine Line will also provide disposal of tertiary treated effluent for several wastewater treatment plants (Camrosa Water Reclamation Facility, Camarillo Water Reclamation Plant, Hill Canyon Wastewater Treatment Plant, Moorpark Wastewater Treatment Plant, Simi Valley Water Quality Control Plant) and brine disposal for numerous brackish groundwater desalters (Camarillo, Camrosa, University Well, Somis, Moorpark and Simi Valley, and potentially the Tapo Canyon Water Treatment Plant). In addition, the Brine Line serves as a regional conveyance facility that moves saline water from areas where it is a nuisance to areas where it can be an asset for salt tolerant crops and wetlands restoration. These projects cannot be implemented without the Salinity Management Project, as the Brine Line provides the sole mechanism for brine disposal in the Watershed. In May of 2006, Calleguas was awarded a Proposition 50 grant for its Metals Recovery from Brine research project which will help to identify treatment options for metals that may be coincident with brackish water, but may not be addressed through typical desalting processes.

In the Santa Clara River Watershed, the City of Oxnard's Groundwater Recovery Enhancement and Treatment (GREAT) Program includes the construction of a 15 mgd desalination facility. The City is currently constructing Phase 1 of the Blending Station No. 1 Desalter, which will produce 7.5 mgd, expandable to 15 mgd. The desalter will remove minerals from brackish groundwater produced by City wells, which will then be blended with either groundwater produced by City wells or groundwater purchased from United Water Conservation District (UWCD). The phase 1 facility should be completed in early 2008. The City is also considering the feasibility of a second desalter at its existing Blending Station No. 3 facility.

Ocean Water Desalination

Currently, there are no ocean water desalination projects underway in the County.

Ocean Water Desalination encompasses a variety of water treatment processes designed to efficaciously and cost effectively remove dissolved salts from seawater. Salinity concentrations in seawater are appreciably higher and chemically more variegated than salt concentrations in brackish water.

A variety of ocean water desalination processes currently exist, each with its own set of resource management, economic sustainability, and regulatory permitting challenges. The table below provides a general description of desalination processes available for use in California today.

Membrane Processes	Thermal or Distillation Processes	Alternative Processes (Not Yet Competitive)
Reverse Osmosis (RO)	Vapor Compression: ➢ Thermal (TVC) ➢ Mechanical (MVC)	**Freezing**
Electrodialysis (ED)	Multi-Stage Flash Distillation (MSF)	**Membrane Distillation**
Nanofiltration (NF)	Multi-Effect Distillation (MED)	**Air Humidification/ Dehumidification**
Microfiltration (MF)		

Constraints to Implementation (Brackish and Ocean Water Desalination)

Cost and Affordability – Historically, ocean water desalination costs have been perceived by water suppliers, elected decision-makers, and the public, as prohibitively expensive. However, dramatic improvements in membrane treatment technology, ongoing and accelerating reductions in the per-unit cost of membrane filters and rising cost of conventional water supplies have made brackish water desalination competitive with imported water and recycled municipal wastewater today.

Higher costs of desalting may, in some cases, be offset by the benefits of increased water supply diversity and reliability, water quality improvements, and/or the environmental benefits from substituting desalination for a water supply with higher environmental costs.

Environmental Impact and Permitting – In marked contrast to brackish water desalination plants, which have fairly routine environmental and permitting requirements, coastal ocean water desalination plants face much greater permitting hurdles and closer regulatory, stakeholder and public scrutiny. Based on their location within the coastal zone, ocean water desalination plants, with their need for water intakes and brine outfalls, face a myriad of resource management and regulatory challenges from permitting agencies.

Seawater Intakes – Existing seawater intakes associated with cooling power plants located in the coastal zone throughout the State are proposed as the source of ocean water supply for almost all of the currently proposed ocean water desalination plants. Generally speaking, existing seawater intake systems have been shown to have fairly significant impacts on the coastal zone. As a result, a number of coastal power plants that use once-through cooling water from the ocean may convert to a "dry" cooling system. Additionally, a number of coastal power generating plants are not in continuous operation, which may limit the potential capacity of ocean water desalting projects on the California coast.

Concentrate Discharge–.The discharge of seawater desalting brine is on the order of twice as salty as the ocean. Unless the discharge is extremely hot (another adverse impact), even the most diffused brine will drop to the bottom of the ocean and stay there. Relatively small changes in temperature and salinity (the two primary factors of seawater density) power the ocean currents. Discharge of brine from seawater osmosis is not sustainable. Discharge of brine from brackish water desalting, of which Ventura County has an abundance, is less salty than seawater. It will float on the ocean surface (like river water does) and gradually mix with wave action. The discharge of brine from brackish water osmosis is sustainable

Several ocean water desalination plants currently under consideration are proposed to be co-located next to existing coastal power generating plants in order utilize existing ocean outfall systems to take advantage of dilution and mixing prior to ocean discharge. The availability of power plant cooling system to dilute the concentrate prior to discharge to the ocean will also be affected by the future of coastal power plants in the state.

Energy Use – Ocean water desalination's primary operation cost results from the cost of electricity. According to the DWR, a 50 mgd seawater plant (which produces approximately 50,000 acre feet per year assuming operating 90 percent of the time) would require about 33 megawatts of power. The state-wide forecast for seawater desalination of about 187,000 acre feet per year would therefore require about 123 megawatts of new power.

The rising cost of electricity, is the most significant factor in the overall cost of desalination; however, technological improvements, the potential of renewable energy project development and co-location with coastal desalination plants will drive these costs lower over time. The reduction in unit energy use has been among the most dramatic improvements in recent years due to improvements in energy recovery systems.

Growth Inducing Impacts – In California, the availability of water has been a contentious and substantial limitation on development in a number of locations, primarily coastal communities. Since the unit cost of desalination treatment technologies for both brackish and ocean water desalination processes has decreased dramatically, and is projected to continue to decline , desalination projects may offer a more affordable new water supply option in comparison to the past. Accordingly, the increasingly affordability, reliability, diversification and quality benefits of desalination projects may be perceived by some as removing past constraints on coastal development.

Related Documents and Websites

Documents

Water Desalination Task Force (AB 2717 [Hertzberg, Chapter 957, Statutes of 2002])

"Water Desalination – Findings and Recommendations," Department of Water Resources, October 2003

Draft Desalination Issues Assessment Report, Center for Collaborative Policy, California State University, May 2003

"Seawater Desalination and California Coastal Act," California Coastal Commission, March 2004

"Seawater Desalination: Opportunities and Challenges", National Water Research Institute, March 2003

"Tapping the World's Largest Reservoir: Desalination", Western Water, January/February 2003

Web Resources

California Water Plan: http://www.waterplan.water.ca.gov/

California Department of Water Resources, Water Use Efficiency, Proposition 50 Chapter 6(a) Desalination Grants: Chapter 6(a):
http://www.owue.water.ca.gov/recycle/DesalPSP/DesalPSP.cfm
http://www.owue.water.ca.gov/recyclle/DesalPSP/Geographic_Dist2006.pdf.
U.S. Desalination Coalition: http://www.usdesal.org/

Recommended Future Projects or Actions

Future desalination efforts in the Region will focus on brackish water. Treatment and distribution of brackish water is more cost-effective and feasible than ocean water desalination at this time and provides water quality benefits in addition to increasing water supply.

Integration with Other Strategies

Desalination of brackish water or seawater can positively benefit the following other water management strategies contained in this IRWMP:

- Ecosystem restoration
- Environmental and habitat protection and improvement
- Water supply reliability
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Water recycling
- Wetlands enhancement and creation
- Conjunctive use
- Desalination
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Possible Funding Sources

- State and Federal Funding
- Grant Funding (Proposition 50 –Chapters 6* and 8)
- Metropolitan's Local Resource Program

*Chapter 6(a) authorized $50 million in grants for brackish water and ocean water desalting projects. In the 2005 funding cycle, grants totaling $25 million have been awarded for research and development studies, pilot and demonstration projects, full-scale plant construction, and feasibility investigations.

Proposition 50 Grants

DWR carried out the first round of funding under this grant program during FY 2004-05 by awarding $24.75 million to 24 different desalination projects. In September of 2006, DWR announced final funding awards under it second round of funding under this grant program. Three desalination projects submitted by Ventura County water suppliers were awarded funds by DWR under this second and final round of Proposition 50 grant funding, though none of them involved ocean water desalination. The following table depicts those three Proposition 50 grant funded desalination projects.

Agency	Project	Type	Total Cost	Funds Requested	Grant Award
City of Oxnard Water Division	GREAT Program Desalter Blending Station No.1	Construction Project	$20,000,000	$3,000,000	**$2,000,000**
City of Oxnard Water Division	Blending Station No. 3 Desalter	Feasibility Study	$374,000	$187,000	**$187,000**
City of Camarillo	Brackish Water Desalination Pilot Study	Pilot Project	$767,744	$383,872	**$383,872**

Metropolitan Seawater and Brackish Desalination Grants

In November 2001, Metropolitan issued a Request for Proposal (RFP) under its Seawater Desalination Program. The current objective is 150,000 acre feet per year of sustained production. Through a competitive process, selected projects will be eligible for financial assistance up to $250 per acre foot of water produced.

The objective of the grant program is to assist local public agencies with the development of new local potable water supplies through the construction of brackish water and ocean water desalination projects and help advance desalination technology and its use by means of feasibility studies, research and development, and pilot demonstration projects.

5.2.3 Ecosystem Protection and Restoration Strategies

(Includes the following three water management strategies: Ecosystem restoration, environmental and habitat protection and improvement, wetlands enhancement and creation)

"Ecosystems have incredible potential for natural recuperation. Nevertheless, every system has its limitations. Our species exists at a singular point in our evolution; we are aware of the impact our lifestyle has on the earth, yet we fail to accede that we possess the means to effect change. At this unique stage in our history, between feigned ignorance of environmental problems and gradual acceptance of their solutions, restoration ecology is poised to become a powerful tool for facilitating the Earth's innate recuperative mechanisms." E. O. Wilson, 1992.

Description

Ecosystem protection comprises a comprehensive approach and strategy to watershed management. In a hierarchy of actions, protection is first, while restoration, enhancement and finally creation actions follow to improve watershed health, quality and productivity.

Habitat protection and improvement, and wetland enhancement and creation are included as a subset of Ecosystem Protection. Habitat loss is the leading cause of both species extinctions (Wilson 1988) and ecosystem service decline (Daily et al. 1997). There are two ways to reverse this trend of habitat loss: conservation of currently viable habitat and restoration of degraded habitat.

Water-related ecosystem restoration can include:

- changing the flows in streams and rivers
- restoring fish and wildlife habitat
- controlling waste discharge into streams, rivers, lakes or reservoirs
- removing migration barriers in streams and rivers so salmon and steelhead can spawn, and
- permanent protection of groundwater recharge areas, wetlands, and estuaries.

The state's ecosystems, from mountain watersheds to coastal beaches, form California's natural infrastructure and support our population and economic growth. Ecosystem protection and restoration is an investment in improving the condition of California's natural infrastructure. Water management strategies that include protection and restoration of natural infrastructure provide long-term benefits to water supply reliability and water quality improvements along with benefits to endangered species and to water-related recreational activities.

Land development projects and water development projects have often had significant, primary and secondary environmental impacts. Today, project planning must include investment in ecosystem restoration to avoid ecosystem damage and reduce long-term maintenance costs. Water

management projects can help restore ecosystems because they can ensure flows in streams and rivers at flow rates and patterns to facilitate restoration actions.

The Issue

California Rivers, A Public Trust Report (State Lands Commission, 1993) concluded that California's rivers are in poor health and their viability as sustainable ecosystems is in peril. The report urged State agencies to undertake a comprehensive program to protect river basins, bays, estuaries, lakes and watersheds.

The condition of California's fisheries reveals the need for ecosystem improvement. Thirty-three fish populations are listed as threatened or endangered in California, with some in each of the hydrologic regions. Ventura County watersheds and coast are home to 29 threatened or endangered species including southern California steelhead, tidewater goby, arroyo toad, and California red legged frog; all are affected by modified stream flows. (http://www.fws.gov/ventura/es/spplists/species).

In addition, habitat fragmentation has become an increasing problem in remaining open space areas including streams and rivers. Habitat fragmentation is the emergence of discontinuities in a biological system. Through land use changes (e.g. development, agriculture) and "natural" disturbance, ecosystems are broken up into smaller parts. Small fragments of habitat can only support small populations and small populations are more vulnerable to extinction. Further, fragmenting ecosystems decreases interior habitat. Habitat along the edge of a fragment has a different range of environmental conditions and therefore supports different species than the interior. Fragmentation is devastating for those species which require interior habitat and may lead to the extinction of those species. Restorative projects can increase the effective size of a habitat by simply adding area or by planting habitat corridors that link two isolated fragments. Reversing the effects of fragmentation and increasing habitat connectivity are central goals of restoration ecology. California's coastal and foothill sage, a significant habitat in Ventura county, is considered to be one of thirty-four of the most critical biodiversity hot spots on land (a geographical area with large numbers of endangered species) and in most critical need of immediate attention (Conservation International, 2006).

Mitigation of environmental impacts has become common in California. Mitigation is similar to ecosystem restoration, but mitigation simply compensates for project impacts. As long as mitigation programs only help to compensate for project impacts elsewhere in the watershed that are truly unavoidable, and do not serve to encourage otherwise unacceptable habitat degradation, they can benefit focused efforts to restore important habitats and wetlands. Mitigation banks, which tend to perform restoration work first and then sell credits to entities that are required to mitigate, or in-lieu fee programs, which can contribute funding to acquisition and restoration projects that are underway, are both viable forms of mitigating damaging effects of construction projects in sensitive areas.

In contrast, ecosystem restoration raises the overall level of ecosystem health. One example is the Tri-County Funding for Improved Salmonid Habitat (F.I.S.H.) Team. Ventura, Santa Barbara and San Luis Obispo Counties collaborate through a Memorandum of Understanding to improve salmonid habitat conditions and to implement restoration work that promotes long-term recovery of naturally-spawned salmonid populations. This group includes environmental groups, local and state agencies, and fishing interests. Progress depends upon grant funding to accomplish restoration work, much of it focused on elimination of in-stream barriers. Opportunities exist

whereby property owners and watershed protection districts could implement many of the plans of this group to raise the level of ecosystem health.

Supplying water for ecosystem needs is often viewed as competing with supplying water for human needs (a win/lose paradigm), or responsible for increasing the cost of supplying human needs. There are many examples of integrating ecosystem restoration and water supply management with a resulting synergistic benefit for both people and the ecosystem of which people are a part. Examples include protection of upland areas and habitat cover to reduce erosion and siltation and structural and impervious-surface set backs from flood plains and streams to reduce loss of property and allow beneficial percolation of water. An integration of watershed management goals has the potential to reduce the conflict over water management actions, increase the support for ecosystem restoration and provide cost effective multi-issue solutions.

Background and Existing Efforts – Local and Statewide

Within the Region's three major watersheds, local groups work to bring about protection, restoration and enhancement and creation of integrated watershed management strategies with a focus on ecosystem restoration, recreation, and wetland protection. Jurisdictional barriers and limited funding has made measurable progress slow. Much of the efforts have been piecemeal with limited continuity, but there have been incremental improvements. Given the number of the groups listed below and their common goals, the potential for real and sustainable improvement is great. Therefore a primary goal is to bring together these groups under integrated watershed management planning strategies to effectively maximize their respective missions. Their efforts can be coordinated with the interests of water suppliers for long-term sustainability of the resource.

The list below includes an overview of some of the local groups and their efforts underway.

County and Incorporated Cities General Plan Policies. The Ventura County General Plan contains a list of Goals, Policies and Programs pertaining to water quantity and quality. One of the seven goals is to "Effectively manage the water resources of the County by adequately planning for the development, conservation and protection of water resources for present and future generations". The goals and policies are implemented through programs carried out by multiple County agencies. Part of the work of this plan is to identify the status of these programs and their effectiveness for both the Cities and the County. (See Land Use Section) (http://www.ventura.org/planning/plans/plans.htm)

County Resource Management Agency Wetland Mapping, Digital Database of Biological Resources and Reports. In addition to the Wetland and Streambed alteration permitting requirements, this website also provides a collection of resource documents, reports and studies for biological resources in the Ventura County.
http://www.ventura.org/planning/programs_services/bioresources/bio_resources.htm

Federal and State regulatory programs (Section 404 and 401 programs, Lake and Streambed Alteration program, Section 402 NPDES permit) The Ventura County Resource Management Agency Planning Division website provides information concerning permit requirements for any project that may affect streams and wetlands. Included on the website is the Wetland Project Permitting Guide which describes and provides information on Federal and State permitting processes with a focus on Ventura County. In addition, there is a Guide to Native and Invasive Streamside Plants along with other publications concerning protection of water resources and habitat protection.

(http://www.ventura.org/planning/programs_services/bio_resources/bio_resources.htm)

Santa Monica Mountains Conservancy. Through direct action, alliances, partnerships, and joint powers authorities, the Conservancy strategically buys, preserves, protects, restores, and enhances treasured pieces of Southern California to form an interlinking system of urban, rural and river parks, open space, trails, and wildlife habitats that are easily accessible to the general public. http://www.smmc.ca.gov/mission.html)

Southern California Wetland Recovery Project. SCWRP is a broad-based partnership, chaired by the State's Resources Agency and supported by the State Coastal Conservancy that has public agencies, non-profits, scientists, and local communities working cooperatively to acquire and restore rivers, streams, and wetlands in coastal Southern California. Using a non-regulatory approach and an ecosystem perspective, SCWRP members work together to identify wetland acquisition and restoration priorities, prepare plans for these priority sites, pool funds to undertake these projects, implement priority plans, and oversee post-project maintenance and monitoring. The following link provides a complete list of the studies, projects and habitat purchases supported or sponsored by this group. (http://www.scwrp.org/index.htm)

Southern California Coastal Water Research Project. SCCWRP is a joint powers agency focusing on marine environmental research. A joint powers agency is one that is formed when several government agencies have a common mission that can be better addressed by pooling resources and knowledge. The mission of this group is to gather the necessary scientific information so that member agencies can effectively, and cost-efficiently, protect the Southern California marine environment. The group also ensures the data collected and synthesized effectively reaches decision-makers, scientists and the public. Member agencies include Orange County, City of Los Angeles Bureau of Sanitation, California State Water Resources Control Board, California Regional Water Quality Control Board, Los Angeles Region, California Regional Water Quality Control Board, San Diego Region, U.S. Environmental Protection Agency, Region IX, Ventura County Watershed Protection District, and County of Los Angeles Public Works. (http://www.sccwrp.org/about/goals.htm)

Tri-County Funding for Improved Salmonid Habitat (F.I.S.H.) Team. The F.I.S.H. Team is a partnership between local government agencies, sponsoring agencies, and non-governmental organizations within San Luis Obispo, Santa Barbara and Ventura Counties to develop a regional approach to improve salmonid habitat conditions and to implement restoration work that promotes long-term recovery of naturally-spawned salmonid populations. Membership includes participants from San Luis Obispo, Santa Barbara and Ventura Counties. http://www.tcft.org/Participants.htm One of the main goals of the F.I.S.H. Team is to ensure that government agencies, special interest groups, and non-governmental organizations have equal opportunity to participate in the F.I.S.H. Team efforts. To date 15 agencies and organizations have signed the F.I.S.H. Team MOU (indicated by an asterisk) and a number of other groups actively participate in our regular public meetings. The following link provides a list of participating agencies. (http://www.tcft.org/Default.htm)

The University of California Cooperative Extension's Natural Resources Program. This program provides research-based information to serve as a basis for sound natural resource management in Los Angeles and Ventura Counties. With water as a primary limiting factor in Southern California, areas of focus for the Natural Resource Program are promoting a watershed approach to land and resource management, protecting and restoring aquatic habitat for

endangered species, and addressing the myriad factors that impact water quality in this urban-rural-wild landscape. http://celosangeles.ucdavis.edu/natural_resources/index.html

Ventura County Resource Conservation District Programs. Through various Federal, State and local funding sources, the VCRCD runs several programs out of its Somis office.

- Hillside Erosion Control Program (HECO)
- Calleguas Creek Watershed Stream bank Conservation Practice Permit Coordination Program
- Water Resources Conservation and Development
- Arundo Seed Viability Study
- VCRCD Long Range Plan
- Upper Santa Clara River Watershed Arundo/Tamarisk Removal Plan (SCARP)
- Ventura County Arundo Removal Demonstration Project
- Calleguas Mulching and Stream Restoration Program
- Watershed Protection and Flood Prevention Projects (PL-566)

(http://www.vcrcd.org/pages/programs.html)

Ventura County Watershed Protection District Stormwater Monitoring Program. The primary objectives of the municipal stormwater program are to effectively prohibit non-stormwater discharges and reduce the discharges from stormwater conveyance systems to the maximum extent practicable. This is accomplished through Best Management Practices (BMP's) and conditions placed on new development proposals. Specific information on the Stormwater Quality Urban Impact Mitigation Plan (SQUIMP) is provided in the web site listed below.
http://www.vcwatershed.org/Water&EnvironmentalResources/WaterQualityMonitoring.htm

Calleguas Creek Watershed Management Plan Steering Committee. The Calleguas Creek Watershed Management Plan Steering Committee with broad stakeholder participation and support, have been in existence since 1996 to address long range comprehensive water resource supplies, land use, economic development. Open space preservation, enhancement and management; and a public facility provision strategy which is cost-effective and provides benefits for all participants within the Watershed. The Calleguas Creek Watershed Management Plan, which was formally adopted by participating agencies in 2005, recommends a series of actions developed by participants to address Watershed-wide issues and needs in the categories described above. The Calleguas Creek Watershed Management Plan also examines existing data, and acquires and develops new data necessary to produce an accurate characterization of the Watershed. These data enable participants to develop additional action recommendations based on dependable technology and good science. (http://www.calleguascreek.org/ccwmp/index.)

Malibu Creek Stream Team. The Stream Team is a citizen monitoring program collecting high quality useable data to track the environmental health of the Malibu Creek Watershed. The Stream Team efficiently partners the information needs of environmental groups, local, State, and Federal agencies with citizens who actively volunteer their time. The combined efforts of this partnership enhance the ecological function and improve water quality throughout the watershed, which in turn will improve water quality at the Malibu Lagoon State Park and Surfrider Beach. In fact, the data collected by Stream Team volunteers has already been instrumental in creating new and more protective water quality standards in the Malibu Creek

Malibu Creek Watershed Advisory Council. The Malibu Creek Watershed Advisory Council is made up of a long list of representatives working to protect and preserve the health of the Malibu Creek Watershed and its adjoining watersheds. These representatives helped create the *1995 Natural Resources Plan*, which serves as a planning guide for overall watershed health. This Natural Resources Plan outlined 44 Action Items, later distilled to the Top Ten Watershed Restoration Priorities in the 2001 *Making Progress: Restoration of the Malibu Creek Watershed* report. Led by the Resource Conservation District of the Santa Monica Mountains, the Council meets every other month to discuss watershed-related issues pursuant to these priorities. The meeting is public; we welcome your attendance. To receive Advisory Council meeting notices, please contact the Resource Conservation District at (310) 455-1030. http://www.malibuwatershed.org/2ndLevel/about.html

Santa Clara River Parkway. The Santa Clara River Parkway is a project of the California State Coastal Conservancy, in collaboration with The Nature Conservancy's LA-Ventura Project, Friends of the Santa Clara River, private landowners and local governments, to restores river and floodplain lands for habitat, flood protection, and recreation. http://www.santaclarariverparkway.org/

The Santa Clara River Watershed Committee (Lower Watershed Only). This Committee is developing the lower Santa Clara River Watershed component of the Watersheds Coalition of Ventura County (WCVC) Integrated Regional Water Management planning effort. The Committee has so far reviewed projects within the Ventura County portion of the Santa Clara River Watershed for inclusion in the WCVC Integrated Regional Water Management Plan, and is serving as a forum for discussion of the process for selecting actual projects to be included in the Plan in the future. The Committee is also working with stakeholders from the upper reaches of the Santa Clara River Watershed, which are located in Los Angeles County. Several upper watershed representatives have attended the meetings. Currently, the conveners of the Committee are: Sue Hughes, County of Ventura Executive Office, susan.hughes@ventura.org; Bruce Hamamoto, Los Angeles County Department of Public Works, bhamamo@ladpw.org; and E.J. Remson, Nature Conservancy, eremson@tnc.org, Dana Wisehart, UWCD, dana@unitedwater.org.

The Nature Conservancy Conservation Plan for the Santa Clara River Watershed. One of Southern California's last large free-flowing rivers, the 84-mile long Santa Clara River and associated riparian habitats are crucial to the survival of many sensitive species of wildlife, including the unarmored three-spine stickleback, the southern California steelhead trout and the California red-legged frog. Other native species that rely on the river include the arroyo toad, southwestern pond turtle, bobcat and many species of migratory songbirds. The Nature Conservancy identified key areas along the Santa Clara River, at Ormond Beach and in the Santa Susana Mountains that must be safeguarded, interlinked, and connected to already protected lands such as the Los Padres National Forest. The Conservancy is currently expanding the project area to encompass major tributaries of the Santa Clara River's eastern headwaters. Conservancy scientists also conduct studies to guide the recovery of the endangered southern California steelhead trout. (http://www.nature.org/wherewework/northamerica/states/california/press/vulcan072105.html)

Santa Clara River Trustee Council. The Santa Clara River Trustee Council is made up of representatives from the Department of Fish and Game Oil Spill Prevention (OSPR) and U.S. Fish and Wildlife. The Council was established to implement Santa Clara River Restoration projects using settlement funds paid by ARCO Pipeline Company following an oil spill that polluted 16 miles of the Santa Clara River. Since 1994, funded programs have included inventory of habitat and some land acquisition for protection of endangered species.

http://www.dfg.ca.gov/Ospr/organizational/admin/news/osprnews/Spring2006-OSPR-NEWS.pdf

Ojai Valley Land Conservancy. The Ojai Valley Land Conservancy has, over the past 7 years, protected nearly 2,000 acres and over 3 miles of the Ventura River in the Ojai Basin. It is currently involved in numerous restoration projects along the river, has recently completed an extensive planning effort for upcoming restoration of the Ventura River Preserve, and is working towards implementation of the Ventura River Parkway with its project partners. http://www.ovlc.org

Trust for Public Land. The Trust for Public Land, is developing a plan for the Ventura River Parkway with its project partners, which, in close coordination with the planned removal of Matilija Dam, will provide fisheries and habitat protection, flood management benefits, water quality improvements, and recreational access on the Ventura River. http://www.tpl.org

Ventura Hillsides Conservancy. The Ventura Hillsides Conservancy (VHC) is developing a plan for protection of the hillsides above the City of Ventura, including protection and restoration of coastal watersheds that flow to Ventura's popular beaches. VHC's proposed Hillsides Preserve will provide habitat linkage to the Ventura River Parkway project as well as northward to protected areas around the Ojai Valley. http://www.venturahillsides.org

Ventura River Stream Team. As a program coordinated by the Santa Barbara Channelkeeper, Stream Team recruits and trains community members to take part in monthly water quality monitoring sessions. Although the Cities and Counties test ocean and creek water weekly at many spots, there is no regular and comprehensive testing of either the Ventura River Watershed or the Goleta Slough Watershed. http://www.stream-team.org/index.html

Matilija Coalition. The Matilija Coalition is an alliance of community groups, businesses, and individuals committed to the environmental restoration of the Ventura River Watershed. Starting with the removal of Matilija Dam, the Matilija Coalition is working for the recovery of the bioregion to benefit the recovery of the southern California steelhead trout and to restore the natural sediment supply to the beaches of Ventura. http://www.matilija-coalition.org

Ventura River Habitat Conservation Plan. The Ventura River Multiple Species Habitat Conservation Plan (MSHCP) is a regional, multi-agency Habitat Conservation Plan focusing on the conservation of endangered species and their associated habitats in the Ventura River watershed. These endangered species include: southern California steelhead, least Bell's vireo, California red-legged frog and tidewater goby. One of the most challenging issues facing communities in the Ventura River basin is providing municipal services adequate to sustain domestic, industrial, and agricultural needs, while at the same time, maintaining and improving the ecological quality to support recreation, fish and wildlife, and other environmental demands. Opportunities for growth, prosperity, and quality of life in the Ventura River basin are, in part, dependent upon effective management of the Ventura River and its tributaries. In this light, a number of public agencies have joined in a cooperative effort to develop this MSHCP for their activities in and adjacent to the Ventura River.

The Cooperating Agencies operate and maintain facilities that may affect listed species or their habitats in the Ventura River watershed. To comply with the Federal Endangered Species Act (Act), they have undertaken the preparation of a MSHCP to serve as a basis for an Incidental Take Permit

under Section 10 of the Act. The Cooperating Agencies anticipate that the Permits issued by the National Oceanic and Atmospheric Administration Fisheries and the U.S. Fish and Wildlife Service will authorize them to "take" listed or endangered species and their habitat within limits defined by the Permits. Such "take" would be incidental to the otherwise lawful activities associated with providing essential services to communities within the Ventura River watershed.

The Ventura River Steelhead Restoration and Recovery Plan, December 1997, prepared for the Cooperating Agencies by Entrix, Inc., (1) identified measures to mitigate impacts of ongoing operations and maintenance activities and of future projects and (2) identified and evaluated opportunities to promote recover and restoration of steelhead in the watershed, including the removal of Matilija Dam. http://www.casitaswater.org/ventura hcp/ventura river HCP.htm

Ventura River Watershed Council. This council is developing the Ventura River Watershed component of the County Watersheds Coalition's of Ventura County Integrated Regional Water Management planning effort. The Council monitors the Watershed Coalition activities, reviews projects within the Ventura River Watershed for inclusion in the WCVC Integrated Regional Water Management Plan, and is a forum for discussion of the process for selecting actual projects to be included in the Plan. (Bob Thiel, State Coastal Conservancy, Post Office Box 23440,Santa Barbara, CA 93121,805.957.9299, bthiel@scc.ca.gov)

Ventura County Watershed Protection District and Army Corps of Engineers. Water diversion and storage structures, such as the Matilija Dam and Reservoir commonly have harmful impacts on natural habitat. This 190 foot high concrete arch dam, completed in 1947 has various problems, including large volumes of sediment deposited behind the dam and the loss of the majority of the water supply function and designed flood control capability; the deteriorating condition of the dam; the never-functional fish ladder and overall obstruction to migratory fishes such as the Federally listed endangered southern California steelhead trout; the loss of riparian and wildlife corridors between the Ventura River and Matilija Creek; and the loss of sediment transport contributions from upstream of the dam, with resulting erosion to downstream reaches of the Ventura River, the estuary and the sand-starved beaches along the Ventura County shoreline. Sedimentation behind the dam has rapidly reduced the ability to store a significant amount of water for future use and has significantly altered the natural river ecosystem. It is estimated that approximately 6 million cubic yards of sediments (silts, sands, gravels, cobbles and boulders) have accumulated behind the dam. A relatively small and shallow lake remains behind the dam, presently estimated to be less than 500 acre feet or barely seven percent of the original capacity.

In September 2004, the Army Corps of Engineers issued the Matilija Dam Ecosystem Restoration Feasibility Study Final Report, recommending full dam removal in one phase and short-term storage of a portion of the trapped sediment within the reservoir basin.
http://www.matilijadam.org/

Benefits of Implementation

Natural ecosystems provide people with food, fuel and timber. More fundamentally, ecosystem services involve the purification of air and water, detoxification and decomposition of wastes, regulation of climate, regeneration of soil fertility, and pollination of crops. Such processes have been estimated to be worth trillions of dollars annually (Daily et al. 1997).
http://www.actionbioscience.org/environment/esa.html.

Restoration can improve plant and animal life, increase diversity and connectivity of habitat, help endangered species, and improve watersheds. Restoration can rehabilitate natural processes to support native communities with minimal ongoing help. Restored habitats are likely to help sustain reproduction, foraging, shelter, and other needs of fish and wildlife species. By broadening restoration to the ecosystem level, rather than focusing on restoration for only a handful of species, we improve
our chances for long-term success by incorporating species relationships, such as between predators and prey, physical processes, genetic variability, and other factors that we don't fully understand.

As understanding of the linkage between water management and the health of the natural infrastructure grows, the benefits of restoration to water supply reliability and water quality improvements are increasingly evident. As ecosystems such as wetlands and sloughs are restored, their natural pollutant filtering capabilities can improve water quality. As floodplains and
seasonal lakes and ponds are restored, groundwater recharge can increase. The result will be a more reliable, higher quality water supply supported by a sustainable ecosystem.

The economic benefits that improved rivers, estuaries, wetlands, wildlife, beaches, and their surrounding habitats can have in the state may far exceed the investments for restoring ecosystems.

The Millennium Ecosystem Assessment released in 2005 showed that 60 percent of ecosystem services are being degraded or used unsustainably (wikipedia.org).

"New York City is a case in point. Before it became overwhelmed by agricultural and sewage runoff, the watershed of the Catskill Mountains provided New York City with water ranked among the best in the Nation by Consumer Reports. When the water fell below quality standards, the City investigated what it would cost to install an artificial filtration plant. The estimated price tag for this new facility was six to eight billion dollars, plus annual operating costs of 300 million dollars – a high price to pay for what once was free. New York City decided instead to invest a fraction of that cost ($660 million) in restoring the natural capital it had in the Catskills watershed. In 1997, the City raised an Environmental Bond Issue and is currently using the funds to purchase land and halt development in the watershed, to compensate property owners for development restrictions on their land, and to subsidize the improvement of septic systems "(Ecological Society of America, http://www.actionbioscience.org/environment/esa.html)

A strategy of incremental steps and programs towards ecosystem protection can begin the process of creating a sustainable watershed regime. One recommendation for the local participating jurisdictions is a water course set back ordinance. Such an ordinance would establish a minimum "set back" for all structures and paved areas to allow for protection of river and creek meander, maximize groundwater recharge, riparian growth, and result in fewer structures damaged or lost during storm flows.

Crissy Field Restoration: San Francisco Bay, National Park Service

Before:

After:

(Photo courtesy of Society for Ecological Restoration International, ser.org)

Constraints to Implementation

- Political resistance
- Jurisdictional barriers
- Too costly to implement or lack of funding
- Existing policy and opposition to change (internal)
- Public resistance/fear of the unknown (external)
- Competing priorities (internal and external)

Related Documents and Websites

Preservation and Conservation of the Ecosystem
http://www.forestwonderer.com/conservation_preservation_id17.html

Santa Clara River Restoration http://www.fws.gov/ventura/ec/scriver-restoration/scriver.html

Society for Ecosystem Restoration http://www.ser.org/

Santa Clara River Parkway http://www.santaclarariverparkway.org/wkb/projects/scrfeasibility

Fish and Wildlife Service http://www.fws.gov/ventura/ec/scriver-restoration/scriver.html

Department of Fish and Game http://www.delta.dfg.ca.gov/erp/

South Coast Wildlands http://www.scwildlands.org/

A Guide to Restoration Ecology

Center for Biological Diversity http://www.sw-center.org/swcbd/press/4forests4-2-02.html

Matilija Dam Ecosystem Restoration Project - http://www.matilijadam.org/

Society for Ecological Restoration International – official website.

Society for Ecological Restoration Primer of Ecological Restoration

Ecological Restoration- Journal published by the University of Wisconsin Press for people interested in all aspects of the practice of ecological restoration.

Restoration Ecology – Journal published on behalf of the Society for Ecological Restoration International

Recommended Future Projects or Actions

Ecosystem Protection and Restoration Recommendations for Programs and Projects
Objectives
Protect and enhance native ecosystem diversity
Control, remove and prevent invasive species
Protect existing habitats from degradation
Create new wetlands in appropriate hydrologic settings
Protect, restore and enhance existing wetlands and waterbodies
Promote urban stream restoration and revitalization
Recommended Programs and Actions
Create Watershed Councils – Bring together the various water and watershed management groups by watershed to more effectively achieve mutual goals.
Coordinate ecosystem restoration efforts with goals of water suppliers to achieve long term sustainability of the Region's water resources.
Acquire land and/or easements for protection and restoration of habitat areas landscape linkages/wildlife movement. Specific project locations being supported by conservation organizations include: •Lower Conejo Creek Acquisition – Future restoration activities would include widening the flood plain and allowing the creek to meander more freely in this area. •Ormond Beach Wetlands Restoration Plan - restoring tidal action to portions of the property; restoring historic drainage patterns disrupted by filling and tile drainage systems installed for agricultural use; and recreating a mix of tidal and seasonal wetlands with associated grasslands. •Ormond Beach Wetlands Acquisition – Future acquisition of adjacent agriculture property could provide a buffer to the wetlands. •Matilija Dam Ecosystem Restoration Project – The purpose of the project is to remove barriers to steelhead passage (including Matilija Dam), restore sediment transport and natural hydrologic regimes on the river, and restore riparian and wetland habitat. •Santa Clara River Parkway Acquisitions - Acquire fee title or conservation easements to approximately 4,000 acres along the lower 15 miles of the Santa Clara River for inclusion in the Santa Clara River Parkway. •Ventura River Arundo Removal Demonstration Project – Remove giant reed (*Arundo donax*) from a 5-acre parcel adjacent to the Ventura River and revegetate with native riparian species. The project served as a demonstration project to understand the cost and efficacy of various removal methods. •Ventura River Parkway – This project will acquire fee title or conservation easements along the lower 15 miles of the Ventura River to create a comprehensive River Parkway that protects habitat creates wildlife linkages and reconnects the river to its floodplain.

Protect and restore fish and wildlife migration corridors and landscape linkages; where necessary create or modify structures to facilitate fish and wildlife movement, such as fish ladders, road under-crossings, etc.
Submit proposals for fish restoration projects in collaboration with the Tri County Funding for Improved Salmonid Habitat (F.I.S.H.) Team.
Restore natural hydrograph and sediment transport in local watercourses
Establish mitigation banking and in-lieu fee program opportunities
Integrated Watershed GIS "Spatial Database"
Conduct hydrogeomorphic modeling
Identify and collect biological resources data for comprehensive database: 1) ecosystem function analysis 2) water quantity and quality needs of fish and wildlife.
Provide for long-term stewardship of natural resources, especially public land : staff, funding, organizational structure (district or conservancy) monitoring and enforcement
Adopt conservation plans that evaluate multiple scale habitat needs of aquatic and riparian dependent species
Recommended Actions for Land Use Planning Documents and Programs
Conduct updates and modifications to general plan policies
Develop and implement watercourse setback ordinances or policies
Define and protect riparian corridor buffers
Reduce impervious surface areas in new development; promote/require low impact development (LID)
Implement floodplain development restrictions
Map sensitive biological areas overlay zones
Map flood hazard zones
Require evaluation of footprint impacts in newly developing areas
Eliminate disincentives for restoration areas in Land Conservation Act areas
Create incentives (tax credits) for land owners to protect and restore habitats and ecosystems on their property

Integration with Other Strategies

One measure of integrated regional watershed management planning is how well water management strategies work together to produce a compatible or synergistic effect in water management. By definition, ecosystem protection and restoration strategies have as their basis the long-term sustainability and adaptability of biological, chemical, and hydrogeological environment to the benefit of water supply and water quality. The strategies listed below can be found in other sections of the plan but are directly linked to and promote ecosystem conservation and restoration.

- Buffers/watercourse setbacks provide: opportunities for natural and "soft" flood management, capture and infiltration of stormwater, water quality improvement for rivers/stream/wetlands, decreases NPS pollution/sheet flow.

- Land use policy revisions or new policy mandates for a more comprehensive approach to development, floodplain management, and long-term protection of biological resources.
- Water conservation by residents and agricultural operations allows for more water for habitats, especially in areas of the Region that do not rely on State water (Santa Clara River, Ventura River).
- Protection and enhancement of rivers/streams/wetlands improves the quality of passive recreational opportunities
- Removal of invasive vegetation increases surface water storage capacity, groundwater management, river/stream/wetland/floodplain enhancement, water supply reliability, flooding/erosion management

Possible Funding Sources

- Local funding (i.e. joint funding from water districts' general funds, user fees, surcharges or other local funding mechanisms)
- State and Federal grants (DWR, USBR, EPA, SWRCB/RWQCB, DFG)

5.2.4 Flood Management

Description

With Excerpts from the California Water Plan Update 2005

Flood management reduces risks to life and property and benefits natural resources. Flood management accepts period flooding and generally is a preferred alternative to keeping rivers in their channels and off floodplains. Seasonal inundation of floodplains provides essential habitat for hundreds of species of plants and animals, many of them dependent on periodic floods. There are also benefits to the economy, agriculture, and society to keeping rivers and their floodplains connected, including water quality improvements and groundwater recharge. Examples of flood management objectives include:

1. *Minimize impacts of floods on buildings and farmland*
2. *Remove obstacles in the floodplain, voluntarily or with compensation*
3. *Prevent interference with the safe operation of the flood management systems*
4. *Maintain or restore natural floodplain processes*
5. *Educate the public about avoiding flood risks and about planning for emergencies*
6. *Reduce flooding risks to humans.*

Floods occur when runoff exceeds the capacity of river or stream channel, overflowing into the low-lying lands called floodplains. Human activity in the floodplain areas, often contribute to flood damage.

Physical damage from floods includes the following:

Inundation of structures, causing water damage to structural elements and contents.

Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.

Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects. Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.

Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed.

Floods also cause economic losses through closure of businesses and government facilities, disrupt communications, disrupt the provision of utilities such as water and sewer, result in excessive expenditures for emergency response, and generally disrupt the normal function of a community. Flood management strategies recommended in this document will serve as guidelines to address concerns and prevent some of the damage listed above.

Background and Existing Efforts – Local and Statewide

Flood management is generally guided by local, State, and Federal entities but relies upon the local communities for implementation. Local communities like cities, through the adoption of

ordinances and the formation of special districts, manage development in floodplains and implement flood mitigation projects that prevent flood damages.

Existing flood management efforts by the Ventura County Watershed Protection District (District) and other local entities (eg. Cities) include application of hydrologic design standards to evaluate the increase in flooding due to proposed development. The results of the design studies are used to develop mitigation strategies for reducing developed peak flows in the channel system. The District also engages in sediment transport studies of the major streams to evaluate the effects of development on scour and deposition in the channels and their effect on flooding.

In order to develop regional solutions to flooding, the District has devoted significant funds and staff resource in watershed-level feasibility studies on all of the major streams such as Calleguas Creek, Santa Clara River, and Ventura River (Matilija Dam Ecosystem Restoration project). The District has also developed an Integrated Watershed Protection Plan (IWPP) that identifies local and regional problems and opportunities to reduce flooding in the County and outlines funding needs over a 20-year planning horizon. Development of the IWPP documents are coordinated with local Cities and other agencies. The objectives of the county-wide IWPP are the following:

1. To provide a systematic process for the inclusion of projects into the District's Capital Improvement Plan (CIP) over its five-year planning period.

2. To improve the long-range District planning process for the 20-year period subsequent to the CIP by allocating projected revenues to identified projects.

3. To provide program goal and priority articulation.

4. To improve interagency project coordination.

5. To help identify funding opportunities.

Many of the projects included on the IWPP project list are updated in conjunction with the watershed-level feasibility studies. By comparing the total projected revenues to the total problem solution costs for the IWPP project list within a zone, an appropriate level of service for solving flooding problems is determined. The Level-of-Service evaluation assists the District, their Board of Supervisors, and stakeholder groups in identifying the need for additional funding to achieve desired flood mitigation levels.

The IWPP and Feasibility Studies provide a list of potential projects to mitigate flooding problems in Ventura County. More general strategies to address flooding concerns were developed in the "Flood Mitigation Plan for Ventura County, California (WPD, 2005)." The Flood Mitigation Plan (FMP) was written to outline the planning efforts to reduce risks associated with flooding, post-fire debris flow, dam failure, and to mitigate the losses from repetitively damaged structures in the County. The FMP gives the County the ability to apply for project grants to implement the FMP strategies.

FMP strategies to mitigate flooding damages include:

1. Build and support local capacity and commitment to become less vulnerable to flood hazards.

2. Promote public understanding, support, and demand for regional flood hazard mitigation.

3. Reduce the possibility of damage and losses to assets, particularly people, critical facilities, and District-owned facilities, due to floods.

4. Reduce the possibility of damage and losses to assets, particularly people, critical facilities, and District-owned facilities, due to dam failure.

5. Reduce the possibility of damage and losses to assets, particularly people, critical facilities, and District-owned facilities, due to post-fire debris flows.

6. Reduce the number of repetitively damaged structures and the associated claims to the National Flood Insurance Program.

The IWPP provides for several categories of specific projects intended to reduce flooding in Ventura County. Projects are proposed to address the flooding concerns identified in each of the four watersheds of Ventura County; Ventura River, Santa Clara River, Calleguas Creek and Malibu Creek.

Countywide flooding issues are addressed through a number of different project categories as follows: Operation and Maintenance (O&M); Structural Life; Detention/Debris Basin Retrofit and Upgrade; Flooding Mitigation; Deficiency Study; Right-of-Way/Jurisdiction; Dam Safety and Retrofit; Environmental and Aesthetic Enhancement; and Demonstration Projects.

The definition of each category is provided in the following sections. A project can sometimes fit into more than one category, so a project is generally categorized according to the most important element associated with the project. For example, if a facility has been identified that requires frequent maintenance due to flooding problems, it is generally put into the O&M category, instead of the Flooding Mitigation category. On the other hand, facilities that are subject to extensive flooding, but do not require extensive maintenance, would be put into the Flooding Mitigation category.

Operations and Maintenance Projects

The O&M projects include facilities with known historic or current problems that require repairs and remediation. The known O&M problems include channel bank erosion, excessive sediment deposition, inadequate drainage facility capacity, channel lining damage, lack of capacity due to vegetation growth, and lack of access to perform necessary maintenance activities.

Structural Life Projects

Structural Life Projects represent channel reaches that may require upgrading or replacement because they are reaching the end of their design life. For planning purposes, Watershed Protection District facilities are assumed to have a useful life of approximately 50 years. Using a 2020 planning horizon, structures built prior to 1970 that will be 50 years or older by 2020, will be candidates for replacement. Channels that are approaching their design life and also lack capacity for current design peak flow estimates are given priority for repair/replacement.

Detention/Debris Basin Retrofit and Upgrade Projects

The detention and debris basins constructed prior to 1970 were built primarily to capture debris and do not provide significant detention or attenuation of inflow peaks. These basins with storage or safety deficiencies may require operability improvements. These include the debris/detention basins in the Watershed Protection District's Debris Basin Manual (1999). However, more recently constructed basins were generally built for both runoff detention and debris capture.

Basins throughout the region have been evaluated to determine whether existing conditions warrant basin improvements or removal. The evaluation of existing conditions consisted of field reconnaissance of each basin to take photos of the basins, principal spillways, emergency spillways, riser structures and downstream channels. The general conditions of the basins such as vegetation, rip-rap, basin side slopes, and upstream drainage area were also documented. Preliminary analyses consisted of sediment yield estimates and hydrologic/hydraulic analyses to determine if the basins could be retrofitted to improve their flood control capabilities. Several basins were identified as having inadequate operational and emergency spillways that could lead to flooding in downstream developments.

Dam Safety and Retrofit Projects
There are a number of dams with possible structural and performance problems due to design, construction, or maintenance issues which have been identified.

Right-of-Way/Jurisdiction Projects
The Right-of-Way (ROW)/Jurisdiction projects include those facilities that have access or jurisdictional issues.

Flooding Mitigation Projects
The Flooding Mitigation Projects consist of the channel reaches along District jurisdictional channels that are located within the 100-year Federal Emergency Management Agency (FEMA) floodplain boundaries. Flood damages were estimated based on FEMA 100-year floodplain information, land use data, and structural value information contained in the Ventura County's parcel database. Flood mitigation project costs were estimated based on the associated damages, and detailed deficiency analyses were not performed to determine the improvements to solve the flooding problem. The resultant projects are general flood mitigation projects with construction costs equal to the flooding damages.

For detailed information on the IWPP Implementation process, see the IWPP Reports at http://www.vcwatershed.org/Projects_IWPP.html.

Local cities operate local storm drain projects; many of the storm drains feeding into the WPD facilities are built by cities or developers for cities.

Benefits of Implementation

Flood management provides many safety, ecosystem and economic benefits. By encouraging wise land use decisions along river corridors, flood management can
save lives, improve ecosystems and reduce property and livestock losses. By making better land use decisions, more open space, such as agriculture and native habitats, could be maintained. Controlling development within the floodplain, and even removing some property from the floodplain, can significantly reduce potential future flood risk to people and property and reduce operation and maintenance costs. Periodic flooding of the floodplain can provide rearing habitat that favors native fish over exotics. Reconnecting rivers to floodplains helps ecosystems and increases groundwater recharge, benefiting groundwater supplies.

Creative strategies for flood management will also lead to reduced costs to the Watershed Protection District for flooding damages, environmental mitigation requirements, and reduced facility construction costs.

Constraints to Implementation

The constraints associated with specific and programmatic actions for flood management are mostly financial. For the IWPP projects, the monies available from the Watershed Protection District's revenue stream each year only allow a small percentage of the flood management projects to be built. Even the more generalized programmatic projects identified in the FMP require resources that the Watershed Protection District does not currently have after meeting the day-to-day requirements of permit review, hydrology studies, and design studies. In order to complete the projects identified above, alternative sources of funding must be identified in order to achieve some of the goals and reduce flooding damages in Ventura County.

Related Documents and Websites

Documents

California Water Plan (Bulletin 160-2005) Volume 2, Chapter 25.

CALFED Bay-Delta Program. 2000. Strategic Plan for Ecosystem Restoration.

California Floodplain Management Task Force, 2002. California Floodplain Management Report.

Calleguas Creek Watershed Management Plan Committee. *Calleguas Creek Watershed Management Plan, A Cooperative Strategy for Resource Management and Protection and Integrated Regional Water Management Plan*. June 2005.

Ventura County Watershed Protection District. *Integrated Watershed Protection Plan*. Fiscal Year 2005, Zone 1. November, 2004.

Ventura County Watershed Protection District. *Integrated Watershed Protection Plan*. Fiscal Year 2005, Zone 2. November, 2004.

Ventura County Watershed Protection District. *Integrated Watershed Protection Plan*. Fiscal Year 2005, Zone 3 (Calleguas Creek Watershed). November, 2004.

Ventura County Watershed Protection District. *Integrated Watershed Protection Plan*. Fiscal Year 2005, Zone 4. November, 2004.

Ventura County Watershed Protection District. *Santa Clara River Enhancement and Management Plan*. Prepared by AMEC Earth and Environmental. 2004.

United States Army Corps of Engineers, Los Angeles District. *Matilija Dam Ecosystem Restoration Feasibility Study – Final Report*. September 2004.

United States Army Corps of Engineers 2001. *Matilija Dam Ecosystem Restoration Feasibility Study, Ventura County, CA: Project Management Plan*. United States Army Corps of Engineers, Los Angeles District, South Pacific Division, April. http://www.matilijadam.org/pmp.pdf.

Ventura Countywide Proposition 50 Projects - Flood-Related Goals, Problems and Issues, Prepared By Ventura County Watershed Protection District, February 2005.

Web Resources

For detailed information on the IWPP Implementation process, see the IWPP Reports at http://www.vcwatershed.org/Projects_IWPP.html.

For a pdf copy of the Flood Mitigation Plan- http://www.vcwatershed.org/

For documents related to the regional hazard mitigation plan
http://www.countyofventura.org/rhmp/

Recommended Future Projects or Actions

The FMP provides detailed objectives for achieving the goals for each flood management strategy. Based on these strategies, a number of prioritized action items were developed, including:

1. Work with the Watershed Protection District, the communities and FEMA to produce updated flood hazard studies within the major watersheds.

2. Update flood layers in Geographic Information System (GIS) upon FEMA approval of Letter of Map Revision/Letter of Map Amendment (LOMRs/LOMAs) and send updated FIRM layers to affected communities.

3. Work with the Watershed Protection District to enhance ALERT system by adding gauges, calibrating models, and establishing system capacities and peak flow levels that would lead to flooding.

4. Retrofit dams with inadequate emergency spillway capacity to minimize the possibility of dam failure during storm events.

5. Develop, maintain and update a Repetitive Loss Database that identifies structures by number of losses, dollar amount of losses, location of structure, and location of structure relative to the 100-year floodplain.

6. Host local California Department of Water Resources workshops for the community. Workshops should include: Floodplain Management and Duties of the Local Administrator; FEMA Elevation Certificate; Substantial Improvement and Substantial Damage; and Approximate A Zone.

7. Join the National Flood Insurance Program's Community Rating System.

8. Remove repetitively damaged, high-risk structures from the floodplain and coastal areas. Survey property owners in floodplain and coastal damage areas regarding voluntary buyout or elevation of flood-prone buildings and structures.

9. Implement minor physical flood mitigation project that do not duplicate the flood-prevention activities. These include modification of existing culverts and bridges, installation or modification of floodgates, stabilization of streambanks, and creation of small debris or flood/stormwater retention basins in small watersheds.

The FMP provides detailed information about the action items and the process for achieving the desired goals, including responsible organization, potential funding source, implementation timeline, economic justification, and priority level.

If additional funding is available, a specific project from the prioritized IWPP project list can be selected and constructed to reduce flooding.

Integration with Other Strategies

Projects for flood management to reduce flooding impacts and damages and programmatic efforts are related to many of the water management strategies contained in this IRWMP. Construction of detention dams may contribute to water storage, enhanced infiltration, and thus water conservation and conjunctive use. Other projects will provide for joint use of floodplains, enhancing recreation and public access opportunities. Preserving floodplains and restoring wetland areas to reduce flooding will provide for ecosystem restoration, wetlands enhancement and creation, water quality protection and improvement and stormwater capture and management. The proposed projects are all part of watershed planning efforts that take a comprehensive look at the watersheds to provide for cost effective regional solutions to flooding problems.

Proper implementation of flood management projects can provide benefits to the following other water management strategies:

- Ecosystem Restoration
- Environmental and habitat protection and improvement
- Water Supply Reliability
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Water recycling
- Wetlands enhancement and creation
- Conjunctive use
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning

Possible Funding Sources

- Local funding (i.e. joint funding from water districts' general funds, user fees or surcharges)
- State and Federal grants (DWR, USBR, EPA, SWRCB/RWQCB)

5.2.5 Groundwater Management

Description

In Ventura County, groundwater management is conducted using a wide variety of mechanisms. Essentially all the major groundwater basins in the county are actively managed. The various forms of management include:

- Special-act Groundwater Management Agencies – Fox Canyon Groundwater Management Agency (Las Posas, Oxnard Plain Forebay, Oxnard Plain, Pleasant Valley, Santa Rosa basins, East Las Posas, West Las Posas, Mugu Forebay and South Las Posas) and Ojai Basin Groundwater Management Agency (Ojai basin).
- AB 3030 Groundwater Management Plan (Piru and Fillmore basins).
- Court Adjudication (Santa Paula basin).
- Memorandums of Understanding (Las Posas basin, basins on both sides of County line with Los Angeles County water purveyors).
- County Ordinances (e.g., well drilling and destruction requirements).
- Groundwater cleanup authority (agreement between Los Angeles Regional Water Quality Control Board and Ventura County Environmental Health Department.
- TMDL requirements (LA Regional Board for Calleguas Creek and Santa Clara River watersheds).
- Enforcement Actions (eg. Oxnard Forebay – removal of septic systems)

The Groundwater management agencies and the AB 3030 basins have groundwater management plans that are being updated regularly. Most recently, Basin Management Objectives have been added to the plans so that the health of the basins can be evaluated against numeric targets. These plans also evaluate specific future management strategies and projects. For the Oxnard Plain and associated basins, there are extensive facilities that have been constructed to further groundwater management goals (see accompanying section on Conjunctive Use). A copy of the new draft management plan for the Fox Canyon Groundwater Management Agency has been included with the grant application package.

Existing Efforts

The FCGMA was initially created to manage the groundwater in both overdrafted and potentially seawater-intruded areas within Ventura County. The prime objectives and purposes of the FCGMA are to preserve groundwater resources for agricultural, municipal, and industrial uses in the best interests of the public and for the common benefit of all water users. Protection of water quality and quantity along with maintenance of long-term water supply are included in those goals and objectives. The goals of the Ojai Basin Groundwater Management Agency (OBGMA) and UWCD are very similar, but cover somewhat different geographic areas. Less than one-third of Ventura County, however, is managed by any formal water management agency or plan.

Prior to the creation of the FCGMA in 1983, the State Water Resources Control Board (SWRCB), as a condition to a State grant for the Seawater Intrusion Abatement Project, ordered the UWCD and Ventura County as grantees, to develop a Groundwater Management Plan for the purpose of controlling extractions and balancing water supply and demand in both the Upper and Lower Aquifer Systems. In response to this order, the Fox Canyon Groundwater Management Agency

Act was submitted to the California State Legislature, which enacted and passed State Assembly Bill 2995 on September 13, 1982 creating the FCGMA. The FCGMA began operations on January 1, 1983, and the enabling legislation is now contained in the California State Water Code Appendix, Chapter 121.

Initial goals of the FCGMA included balancing water supply and demand in the Upper Aquifer System by the year 2000 and in the Lower Aquifer System by year 2010. These goals and the FCGMA's basic purpose remain relatively unchanged today.

The original Groundwater Management Plan for the Fox Canyon Groundwater Management Agency was prepared in 1985. This original document is currently being updated. Through focused monitoring programs, studies, and modeling, we now have a better understanding of the aquifers beneath the Calleguas Creek and Santa Clara River drainage basins. There has also been a sufficient period of time to observe how existing water management policies and water conservation facilities have improved groundwater conditions.

The goals of the revised FCGMA, the current UWCD, and the adopted OBGMA Management Plans are primarily to set specific, measurable management objectives for each basin, identify strategies to reach these goals, and set future policy to help implement these strategies. The FCGMA and OBGMA are not authorized to build and operate conservation facilities, so the focus of most Plans is on strategies and policies that can assist conservation projects implemented by other agencies like the UWCD. Thus, the FCGMA and OBGMA tend to act more as partners with other water agencies and cities in improving aquifer conditions.

A main focus of both the UWCD and FCGMA previous management activities was to contain seawater intrusion beneath the Oxnard Plain. The combination of several FCGMA management policies and new UWCD surface water diversion facilities and utilization of existing UWCD recharge ponds, has served to alter seawater intrusion in at least a portion of the aquifers. Monitoring wells indicate that seawater intrusion has retreated, with groundwater in one well near the City of Port Hueneme improving from near-seawater quality back to drinking water quality.

The containment of saline waters is not complete however. In the Lower Aquifer System of the Pleasant Valley and southern Oxnard Plain Pressure basins, saline waters both from the ocean and from adjacent fine-grained sediments have expanded the area of saline intrusion since 1985. This increase occurred primarily in the Upper Aquifer System near Point Mugu and the Lower Aquifer System in the Port Hueneme and Point Mugu areas. Thus, continuation of current strategies and the implementation of additional strategies are required to fully contain saline intrusion.

Existing water management strategies include:

- Increase recharge in the Oxnard Plain Forebay Groundwater Basin
- Prevent export of groundwater from FCGMA boundaries
- Shift pumping to the more easily replenished Upper Aquifer System
- Expand imports of State Project Water to replenish groundwater basins or offset demands
- Continue to utilize diversions from Calleguas Creek and the Santa Clara River
- Allow injection of pretreated surface or recycled water into overdrafted basins
- Continue destruction of abandoned or leaking wells
- Institute additional water conservation measures

- Consider further reductions in annual pumping allocations
- Pursue plans to meet additional monitoring needs

Benefits of Implementation

Groundwater is the largest single source of water used in Ventura County. It provides about 65 percent of the water utilized in Ventura County. Agricultural demand accounts for 80 percent of the total demand for groundwater in Ventura County. Many purveyors either wholesale water to other purveyors or make deliveries directly to individual users.

As of year-end 2005, there were 180 licensed water purveyors in Ventura County. This includes 6 city-owned and operated systems, 22 special water districts, 25 public water purveyors, 5 Public Utility Commission (PUC) regulated water companies, 63 mutual water companies and 59 other privately owned systems of varying sizes. In addition to the 500 or so water wells owned or operated by the retail and wholesale water providers, it is estimated there are about 2500 additional individual well owners within the county who obtain their own water directly from groundwater sources. Of the groundwater pumped in Ventura County, less than one-third is delivered by an organized water system. Individual well owners do most of the groundwater pumping in Ventura County and use it mostly for irrigation.

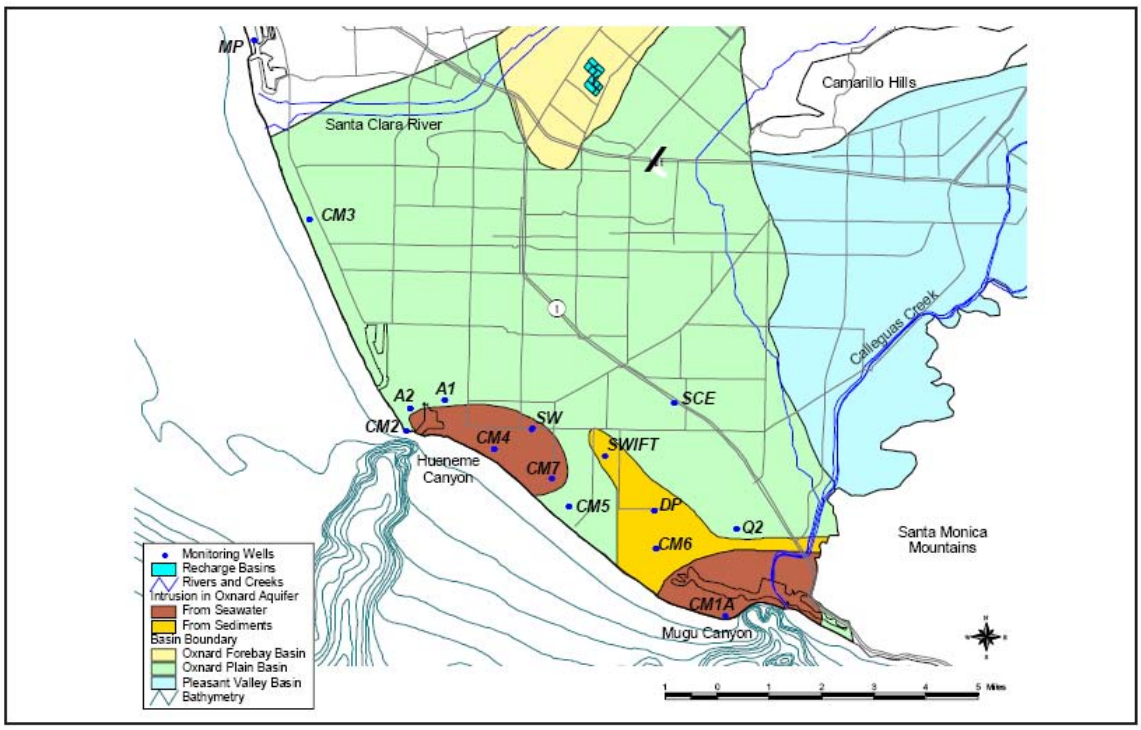


Figure 5-1
Areas of saline intrusion (indicated in brown and gold) beneath the Oxnard Plain, 2005.

Beneath the Oxnard Plain where the majority of the groundwater pumping takes place, overdraft of the Oxnard aquifer has been largely eliminated in recent years through effective management

practices and constant recharge activities. However, even with targeted improvements, some areas still remain impacted by saline waters previously drawn into the aquifer. The lower aquifers in the southern Oxnard Plain Pressure and Pleasant Valley groundwater basins are still seriously overdrafted and the intrusion of saline water continues. The United Water Conservation District (UWCD) has implemented several measures to help combat the seawater intrusion problem in these overdrafted areas. The Fox Canyon Groundwater Management Agency (FCGMA) has also tightened restrictions and instituted strict management procedures on all groundwater extractions and well operators located on parcels above the Fox Canyon aquifer.

Most farmers obtain water from their own wells, and water demand from the agricultural sector is decreasing, primarily due to water conservation and land conversion to urban uses. This trend is expected to continue. Countywide demand for agricultural water is forecasted to decline by the year 2010. Within the boundaries of the FCGMA, a 15 percent reduction in groundwater extractions has been implemented for all well owners.

Constraints to Implementation

In addition to saline intrusion near the coast, new threats to the aquifers have been recognized. These include salts introduced into the aquifers during historically high groundwater levels in the East and West Las Posas Basins and the northeastern portion of the Pleasant Valley Basin, increasing salinity in the Santa Clara River as it flows westward to the Pacific Ocean from Los Angeles County, and seasonally high nitrates in the Oxnard Plain Forebay and Arroyo Santa Rosa Basins. In addition it has been suggested that surrounding sediments may be increasing salinity levels in the groundwater in inland areas. Recommended strategies to deal with these issues include:

- Pumping and treatment of brackish shallow groundwater in the South Las Posas Basin
- Development of shallow brackish groundwater in the Pleasant Valley Basin
- Land use limitations on nitrate sources in portions of the Oxnard Plain Pressure and Forebay Basins and aquifer recharge zones
- Development of additional in-lieu recharge to the Oxnard Plain Pressure Basin

State Project Water -Calleguas Municipal Water District is currently in the final stages of constructing the Las Posas Aquifer Storage and Recovery (ASR) Project. The project is jointly funded by Calleguas and Metropolitan and will include 30 dual-purpose extraction and injection wells in three fields within the East Las Posas Groundwater Basin. The ASR project will have the capacity to eventually store up to 300,000 acre feet of imported State water for use during peak periods, droughts, scheduled shutdowns or emergencies. The ASR project will have a maximum replenishment rate of 80 cubic feet per second (cfs) and maximum extraction rate of 100 cfs. The project also includes several miles of large diameter pipelines to connect the wells to the Calleguas transmission system, a new pump station in the City of Moorpark to convey water to the Lake Bard Water Treatment Plant, and rehabilitation of the Conejo Pumping Station to deliver ASR water to upper elevation zones east of the Moorpark sewage treatment plant during an emergency.

RECHARGE SOURCES: Another potential threat to the Ventura County aquifers is the potential loss of a portion of the recharge waters that currently replenish the aquifers. These potential losses include decreased diversions from the Santa Clara River and the Ventura River for required fishery habitat flows, and changed operations of Santa Felicia Dam and the Robles Diversion mandated by Federal regulators. In order to preserve these important sources of recharge, water

management plans should emphasize the importance of this recharge in protecting the health of the natural water supplies within Ventura County.

Related Documents and Websites

Web Resources:

1. *The Fox Canyon GMA homepage at* *http://publicworks.countyofventura.org/fcgma/index.htm*

2. *The UWCD homepage at* *http://www.unitedwater.org*

3. *The Calleguas Municipal Water District homepage at* *http://www.calleguas.com/index.html*

4. *The Watersheds Coalition of Ventura County homepage at* *http://watershedscoalition.org*

Recently completed or updated water management plans or five-year plans developed by the following entities should be consulted for specific detailed strategies or actions;

5. California Regional Water Quality Control Board, Los Angeles Region – *Watershed Management Initiative*, October 2004 (addresses groundwater topics)

6. California Regional Water Quality Control Board, Los Angeles Region – *Water Quality Control Plan for the Los Angeles Region*. November 17, 1994 (includes groundwater issues)

7. Calleguas Creek Watershed Management Plan Committee – *Calleguas Creek Watershed Management Plan, A Cooperative Strategy for Resource Management and Protection and Integrated Regional Water Management Plan*. June 2005 (contains groundwater component)

8. Calleguas Municipal Water District – *Final Urban Water Management Plan*, December 2005 (groundwater management issues are addressed in conjunction with the overall plan)

9. Camrosa Water District – *Final Urban Water Management Plan*, December 2005 (groundwater management issues are addressed in conjunction with the overall plan)

10. Casitas Municipal Water District – *Urban Water Management Plan*, 2005 (groundwater management issues are addressed in conjunction with the overall plan)

11. City of Camarillo – *Urban Water Management Plan*, 2000 (contains groundwater components)

12. City of Oxnard Groundwater Recovery Enhancement and Treatment (GREAT) Program – *Final Program Environmental Impact Report,* Prepared by CH2M HILL, May 2004.

13. City of Oxnard – *Urban Water Management Plan*, 2005 (contains groundwater components)

14. City of San Buenaventura Department of Public Works – *Urban Water Management Plan*, December 2005 (contains groundwater components)

15. County of Ventura Waterworks District No. 1 (Moorpark) – *Urban Water Management Plan,* December 2005 (mentions groundwater needs, plans, and issues as critical components of plan)

16. County of Ventura Resource Management Agency and Public Works Agency – *Ventura County Water Management Plan, Volume I Goals, Policies and Programs*, and *Volume II Technical Appendix*, November 1994 (groundwater management issues are addressed in conjunction with the overall plan)

17. Fox Canyon Groundwater Management Agency – *Groundwater Management Plan Draft Update*, June 2006 (updates previous 1985 report with final 2006 version due by December 2006)

18. Ojai Basin Groundwater Management Agency – *Groundwater Management Plan, Section 701.1,* 1994.

19. United Water Conservation District. *Urban Water Management Plan for the Oxnard-Hueneme District*, February 2005 (contains vital groundwater components)

20. United Water Conservation District, City of Fillmore, et al. *AB 3030 Groundwater Management Plan for the Piru and Fillmore Basins,* 1996

21. County of Ventura – *Regional Water Quality Control Board 208 Areawide Water Quality Management Plan,* 1979-1980 *(the precursor to many Ventura County Groundwater and Urban Water Mgmt. Plans)*

Recommended Future Projects or Actions

Fox Canyon Aquifer System

The Calleguas Aquifer Storage and Recovery (ASR) project presents several advantages for the management of water supply and demand. By purchasing additional State Project Water (originating near the Sacramento Bay-Delta area) when such water is plentiful during winter months, the price is more reasonable. Injection and storage of this water underground in aquifers several hundred feet beneath the surface of the ground requires no construction of surface reservoirs, the land use is not disrupted, evaporation is not a factor, and costs are substantially less. Imported water is of similar quality to the existing native groundwater and thus a change in water chemistry is within an acceptable range.

When needed during summer months, during times of drought or emergencies, these stored underground supplies can be easily tapped by reversing the direction of the pump motors on the ASR injection-extraction wells. Several retail water purveyors with groundwater pumping capacity have reduced their groundwater extractions in lieu of using or directly purchasing Calleguas/Metropolitan water, and in return, have transferred previously earned Fox Canyon Groundwater Management Agency (FCGMA) conservation credits to Calleguas for use in the East Las Posas Basin to support the ASR project.

The Port Hueneme Water Agency (PHWA) has a long-term lease for 1850 acre feet of UWCD's annual State Water Project entitlement of 5,000 AF. PHWA obtains this entitlement indirectly from Calleguas via the City of Oxnard pipeline connection to Calleguas. UWCD periodically calls for all or part of its remaining 3150 AF from the State Department of Water Resources, which then delivers water from Pyramid Lake via Piru Creek to UWCD's Lake Piru Reservoir. PHWA and UWCD are the only two county agencies that have utilized the 20,000 AF annual State Water option secured by the Ventura County Watershed Protection District several decades ago. Future water deliveries from this source may not be entirely reliable; however, due to typical over-allocations of State Water Project supplies to other delivery points in California. The Department of Water Resources has historically delivered only 40 to 80 percent of any agency's full entitlement in a given year, and Ventura County should expect shortages even if the full 20,000 AF could be obtained.

When groundwater is pumped at a rate greater than water is recharged to the basin, an overdraft situation is created. The most severe local overdraft tends to occur in areas of heavy agricultural usage. Beneath the Oxnard Plain, the Oxnard and Mugu aquifers are currently still being overdrafted, but at a rate much less than in previous years. This improved overdraft situation has resulted in a reduction from the more than 22 square miles of the Oxnard Plain being intruded by seawater, to a refined figure of only about 12.8 square miles of actual onshore seawater contamination. If the present improvement of overdraft trends continues, it is estimated that the Upper Aquifer System will recover from seawater intrusion by the FCGMA target year of 2010 if recovery continues at its current rate of about 0.25 to 0.50 square miles per year.

This recovery is attributed to the Seawater Intrusion Abatement Program established by the County Water Quality Management (208) Plan. This program involved construction of the Vern Freeman Diversion Structure by UWCD, which spans the Santa Clara River in the vicinity of Saticoy and diverts surface flow into the associated Pumping Trough Pipeline and expanded

Springville Reservoir east of Camarillo Airport forcing back the seawater.

Unlike the Oxnard and Mugu aquifers, there is very little natural or artificial recharge to the Hueneme, Fox Canyon, and Grimes Canyon aquifers; therefore, any amount of use has the potential to result in overdraft. Groundwater supplies in outlying portions of both the East and West Las Posas Basins are expected to be exhausted within the next 30 to 50 years unless artificial recharge efforts to mitigate the situation are continued long-term. Overdraft in these outlying portions has been reduced from a rate of about 10,000 AFY to a more manageable 5,000 AFY, primarily through the management efforts of the FCGMA and the injected or in-lieu imported water delivered by Calleguas.

Total groundwater overdraft countywide has been estimated anywhere between 30,000 AFY and 65,000 AFY depending upon annual rainfall, water management practices and implementation, and efficiency of use (includes crop trends and watering methods).

General Discussion

LAND USE IMPLICATIONS: The areas of the County outside major water district boundaries primarily rely upon groundwater as their water source. There is a real possibility that sufficient water supplies may not be available to serve potential developments that would otherwise by allowed by the General Plan in these areas. The Santa Monica Mountains for example, relies entirely upon groundwater. This groundwater is generally contained only within the few and limited fractures hidden in the underlying bedrock rather than the classic sand/silt/gravel type aquifers, and reserves in this area have never been quantified. Sufficient and sustained long-term water supplies may not be available to serve the maximum level of development that would be allowed by the County General Plan in this area.

Throughout most of the north half of the County, limited water supplies pose a constraint to development. In the Lockwood Valley, sufficient water may not be available to serve the level of development that would otherwise be allowed on existing lots, depending on the amount consumed for irrigation. The General Plan, however, restricts further land divisions in that particular area. In the Cuyama Valley, the issue is more one of sufficient quality of water rather than quantity, so development constraints should be considered in this area as well.

Integration with Other Strategies

When the United States Geological Survey (USGS) began work in Ventura County in the late 1980s at the request of local agencies (UWCD, FCGMA, Calleguas), they proposed several possible groundwater management strategies or options based on findings from their Regional Aquifer System Analysis or RASA study in 1997. The main portion of the RASA report detailed various groundwater management scenarios under computer modeling simulations. The study concluded that the 25 percent scheduled cutbacks in groundwater extractions implemented by the FCGMA was one of many actions needed to help restore groundwater resources and to bring local groundwater basins and aquifers into safe yield situations. The responsibility for groundwater planning, managing pumping allocations, and developing management policies related to groundwater extractions and recharge is shared primarily between the FCGMA and UWCD, with coverage in the Ojai Basin handled by the Ojai Basin Groundwater Management Agency (OBGMA).

There were also some initial findings that chloride concentrations previously measured in some of the producing wells on the Oxnard Plain were simply detecting high chloride waters flowing downward from failed well casings. To ensure monitoring results were accurately depicting saline intrusion, a series of monitoring wells were drilled along the coastal portions of the Oxnard Plain. These multiple-completion wells consist of a single well bore containing several smaller diameter PVC wells completed at varying aquifer depths. These clustered monitoring wells continue to provide discreet depth-dependent data from several aquifers, and form the basis of many of the current monitoring programs.

The development of a specific groundwater management plan by the FCGMA was a direct result of seawater intrusion problems, and since 1987 this plan has helped to set goals and guide FCGMA policies. Several agencies are now responsible for managing water resources in Ventura County. The responsibility for groundwater planning, managing pumping allocations, and developing management policies related to groundwater extractions and recharge is shared primarily between the FCGMA and UWCD.

Most of the major basins within Ventura County are covered by groundwater and surface water monitoring, construction, and water conservation conditions. Although groundwater management and planning functions overlap between the FCGMA and UWCD, the FCGMA focuses on extractions and policy, while UWCD focuses on planning and implementing projects. Calleguas Municipal Water District is responsible for providing State Water to portions of Ventura County and for providing water management strategies to ensure a reliable source of water for its customers. The Ventura County Watershed Protection District is responsible for flood control functions, groundwater/surface water monitoring, and water well permitting. There has been a remarkable amount of cooperation among these agencies in addressing groundwater issues over the last 20-plus years.

In practice, groundwater management functions are performed in some of the following ways:

1) Groundwater levels and groundwater quality sampling and analysis are conducted by UWCD and the Ventura County Watershed Protection District.

2) Groundwater extraction records are collected by FCGMA, OBGMA and UWCD, with each agency maintaining records on extraction allocations and UWCD reporting annually to the State DWR.

3) An annual report on groundwater conditions is prepared by UWCD for areas within UWCD boundaries, and Calleguas prepares reports on groundwater conditions within the West, East, and South Las Posas basins. The Ventura County Watershed Protection District is responsible for all other areas in the county, and reports on various water subjects are generated as needed, or when time, staff availability, and funding permit.

4) The Ventura County Watershed Protection District and FCGMA evaluate various groundwater use plans to help control and enforce basin management objectives, strategies, and policies.

5) UWCD constructs and operates water conservation facilities.

6) The Ventura County Watershed Protection District oversees all well drilling, well destruction, and monitoring well requirements and permitting.

Current groundwater management strategies typically evaluate three main areas of importance for effectiveness: 1) currently implemented management strategies; 2) strategies under development where some action has already been taken to design and implement those strategies; and 3) potential future management strategies. Current strategies were evaluated by measuring their effect on changing groundwater levels and improving groundwater quality. Proposed and future strategies are increasingly being evaluated using the computer modeling techniques such as the Ventura County Regional Groundwater Model (an empirical computer simulation of groundwater flow developed by the UWCD Groundwater Department with USGS Modflow software).

Several management strategies that have been or could be implemented include:

A) Limitation on groundwater extractions
B) Encourage more wastewater reclamation and water conservation
C) Construction/modification restrictions on upper aquifer system water wells
D) A cooperative groundwater monitoring program
E) Individual basin pumping restrictions
F) Implementation of drilling and pumping restrictions
G) Countywide metering of all groundwater extractions
H) Establishment of buffer zones surrounding aquifer outcrop areas
I) Expansion of ASR direct injection projects into new areas
J) Import full allotment of State Water
K) Additional groundwater monitoring
L) Calibration of groundwater extraction meters for accuracy
M) Institute scheduled pumping reductions as needed
N) Expansion of groundwater recharge ponds
O) Pump and treat unused shallow brackish groundwater
P) Shift groundwater pumping to areas of surplus supply
Q) Place limitations of sources of nitrate and other groundwater contaminants
R) Force developers to replace increased water demands as condition of project approval
S) Institute additional conservation measures to save available water
Permanent protection of existing and restoration/creation of additional natural wetlands and floodplain areas to benefit groundwater recharge

The following other water management strategies in this IRWMP that might benefit from implementing groundwater management strategies include:

- Ecosystem restoration
- Environmental and habitat protection and improvement
- Water supply reliability
- Flood management
- Recreation and public access
- Stormwater capture and management
- Water conservation
- Water quality protection and improvement
- Water recycling
- Wetlands enhancement and creation
- Conjunctive use

- Desalination
- Imported water
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Possible Funding Sources

- Local funding (current management strategies are partially funded through joint funding from water districts' general funds, property taxes, groundwater pump charges, customers rate base, and user fees)
- Current projects that are the results of groundwater management planning have been partially funded through a combination of Federal funds (Bureau of Reclamation, special legislation) and State funds (State Water Resources Control Board, Department of Water Resources (Prop 13 grant)).

5.2.6 Imported Water

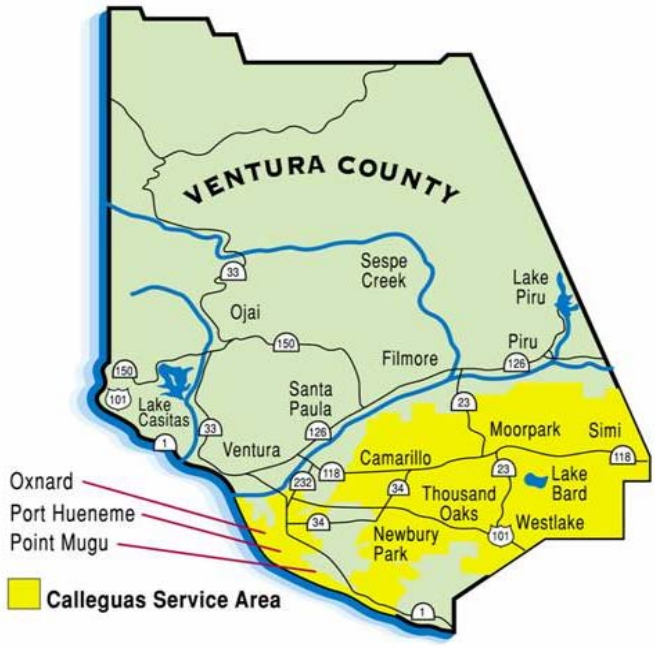
Description

One strategy employed in many parts of California to meet water needs is to bring in, or import, water from other areas. This is commonly referred to as "imported water." The largest source of imported water in California is the State Water Project. For the purposes of the IWRMP, this strategy is being interpreted in two ways. The first is reducing dependence on imported water. The second is increasing use of imported water from new or existing sources or using imported water more efficiently.

Calleguas Municipal Water District

History

A growing population, recurring drought, and overdrafted groundwater basins with poor water quality prompted water officials from east Ventura County to secure supplies elsewhere. In 1953, area residents voted to form the Calleguas Municipal Water District (Calleguas). Calleguas is a public agency established under State law, and was named for the local Watershed within its 350 square mile service area, Calleguas Creek. A map of the Calleguas service area is shown in figure below in.



Seven years later, local voters approved another ballot measure that authorized Calleguas to join the Metropolitan Water District of Southern California (Metropolitan) to gain access to supplies from the Colorado River. Calleguas built the necessary facilities to connect to Metropolitan's

system in Los Angeles County, which included pipelines, a tunnel through the Santa Susana Mountains, and a pump station. Imported water deliveries from the Colorado River began in 1962.

In 1965, Calleguas completed Lake Bard, a surface water reservoir, to store excess water for use to meet peak and emergency demands. Over the years, Calleguas has constructed over 150 miles of large diameter pipeline for wholesale delivery to local cities and water agencies, and ultimately, area residents.

Existing Efforts – Local and Statewide

Calleguas Retail Agencies

Calleguas member purveyors together form a diverse group of water interests, including agriculture, commercial, and residential water users. Some have the ability to utilize local groundwater basins, while others are totally dependent on imported water. They all operate and maintain complex retail water systems. A list of Calleguas' purveyors is shown below.

Calleguas Municipal Water District Purveyors by Region

Region	Purveyors
Conejo Valley	California-American Water Company California Water Service City of Thousand Oaks Newbury Park Academy Water Company Lake Sherwood CSD
Camarillo Area	City of Camarillo Capehart Housing (U.S. Navy) Crestview Mutual Water Company Pleasant Valley Mutual Water Company Camrosa Water District
Moorpark Area	Berylwood Heights Mutual Water Company Butler Ranch Mutual Water Company Ventura County Waterworks District No. 1 Ventura County Waterworks District No. 19 Solano Verde Mutual Water Company Zone Mutual Water Company
Simi Valley Area	Brandeis Mutual Water Company Golden State Water Company City of Simi Valley (Ventura County Waterworks District No. 8)
Oak Park	Oak Park Water Service
Oxnard	City of Oxnard
Port Hueneme and Navy Base	Port Hueneme Water Agency

State Project Water

Following completion of the State Water Project in the early 1970s, Calleguas began to serve water from Northern California to its east County service area. Imported water drawn from Castaic Lake is treated utilizing state-of-art technology by Metropolitan at its Jensen Treatment Facility in Granada Hills (see Figure 5-2 below). As a member agency of Metropolitan, Calleguas utilizes State Water Project entitlements held by Metropolitan.

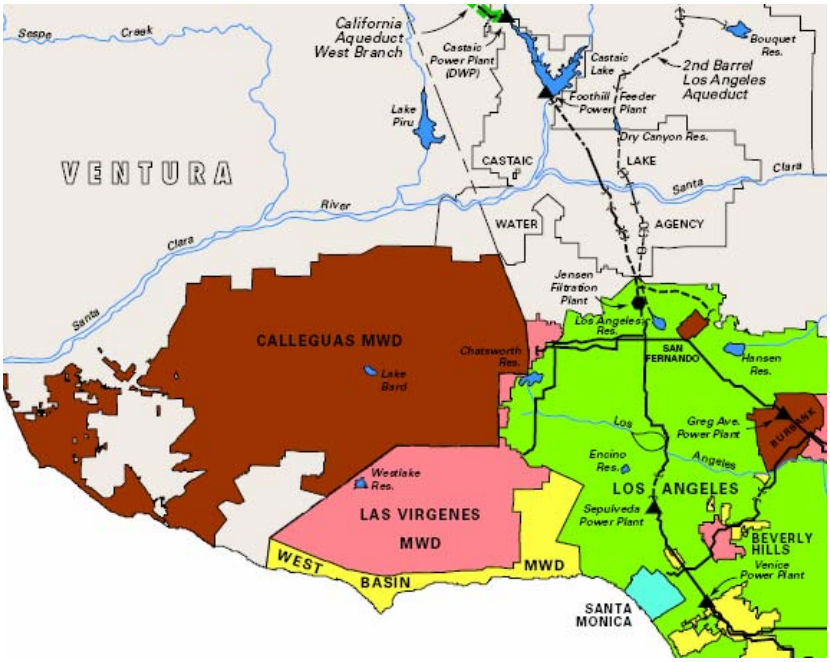


Figure 5-2
Areas Utilizing Treated Water from Jensen Filtration Plant

Western Ventura County Entitlement to State Water (SWP)

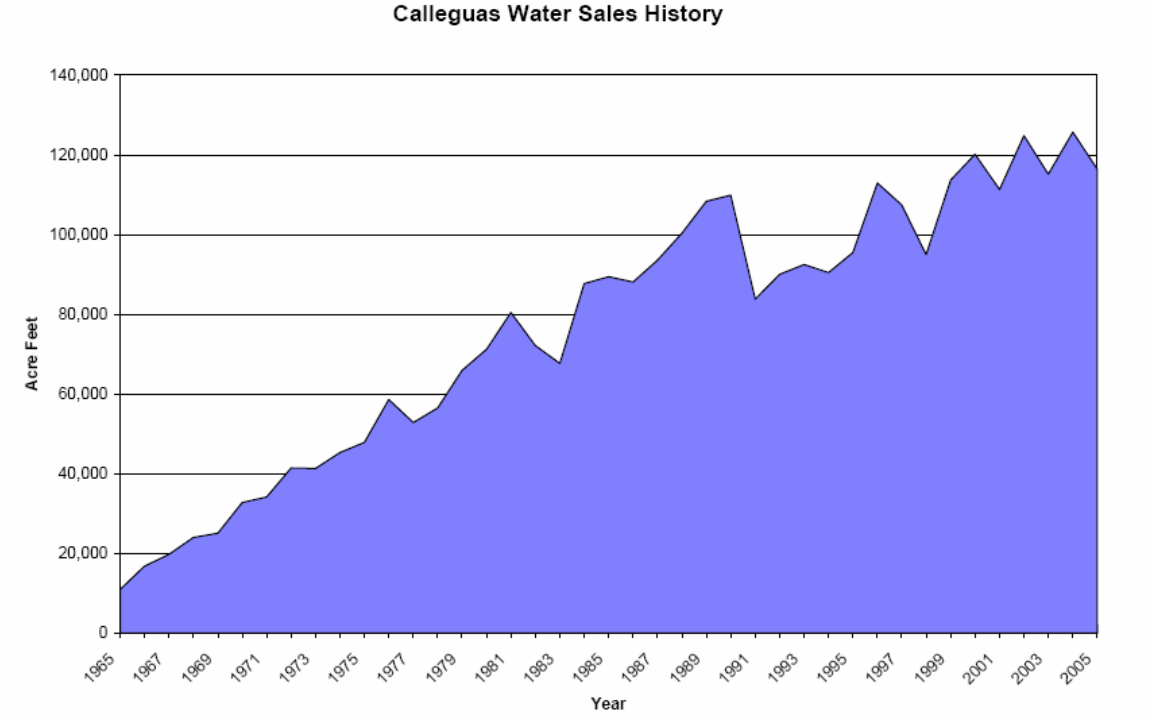
In 1964, Ventura County Flood Control District contracted with the State of California for future delivery of up to 20,000 AFY of SWP water to provide for residents in the western portion of Ventura County. It later transferred that entitlement to United Water Conservation District (5000 afy), Casitas Municipal Water District (5000 afy), and the City of Ventura (10,000 afy). This obligation extends to the year 2038. With no viable infrastructure in place to convey State Project Water to the City of Ventura and Casitas MWD, they have not received delivery of their portions of the allotment. It is not certain if or when facilities will be constructed to transport SWP water to these agencies.

United WCD is the only agency of the three that has received any of its SWP water. To deliver SWP water to United WCD, the California Department of Water Resources releases the water from Pyramid Lake, where it flows down Piru Creek into Lake Piru. The water can then be released downstream as part of the annual water conservation release from Lake Piru. Some of that water will arrive at the Freeman Diversion, where it can be recharged into the Oxnard Plain aquifers,

contributing to the Oxnard/Hueneme supply. In 2004 United WCD purchased some of the City of Ventura's annual entitlement to SWP water, at which time approximately 2000 AF was delivered into Lake Piru. Purchase of SWP is used for the benefit of the aquifer system, on behalf of all pumpers.

The City, Casitas, and United (referred to as the Joint Agencies) pay annual entitlement fees to the State which cover construction costs for SWP facilities and administration to deliver allotments of water throughout the State.

The graph below shows the Region's demands for imported water. Through its retail purveyors, Calleguas now supplies water to 550,000 people, four times the service area's initial population. Three-quarters of Ventura County's residents now depend on imported water for all or part of their water supply.



Wastewater Effluent Dominated Watersheds

Prior to the introduction of imported water to Ventura County, flows in most of the creeks, streams, arroyos and the Santa Clara River were intermittent, and dominated by storm events. The local waterscape has changed tremendously. Today, those flows are continuous and largely effluent dominated from wastewater treatment plants. In the eastern part of Ventura County, the effluent originates from imported water. While this effluent is generally better quality than local groundwater and provides dilution in impaired surface waters, imported water has introduced more salt to the region causing a new water quality concern. Regulatory compliance for salts and other constituents is a significant challenge for wastewater dischargers, local water purveyors, and agriculture as the Region seeks to balance its water supply and quality goals.

In the western portion of the county, in the Ventura River system, the tertiary treated effluent significantly contributes to the spawning and rearing habitat of the southern California steelhead trout and other species of special concern.

Imported Water Quality

Water supplies from the State Water Project are of high quality and generally superior to groundwater from most basins in the Region. The main constituents of concern in Ventura County are Nitrates, Total Dissolved Solids (TDS), and Chloride. Nitrates are virtually non-existent in imported water. The Figure below shows a history of TDS and Chloride in imported water conveyed to Ventura County.

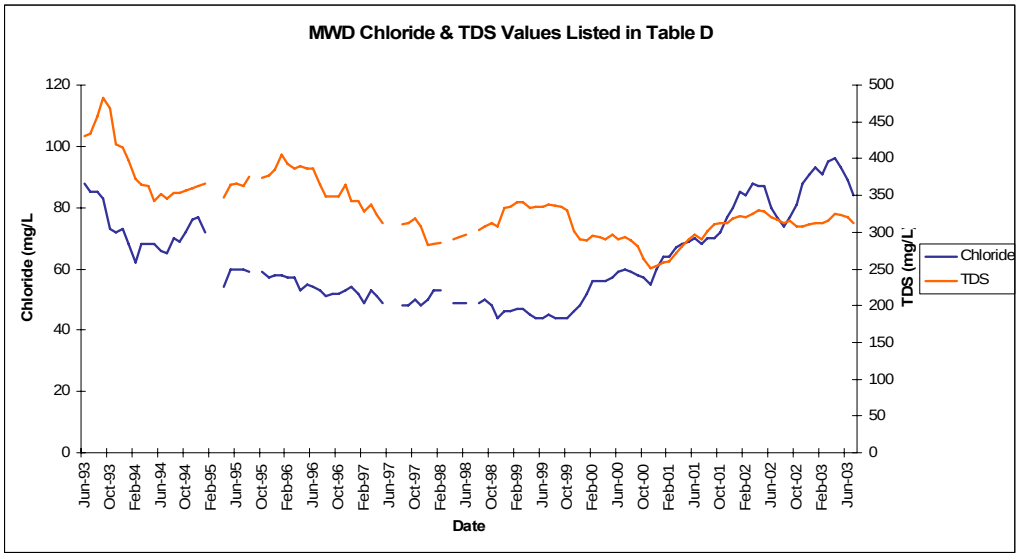


Figure 5-3 – History of Chloride Levels in Sate Project Water

Chloride levels in State Project Water are well below drinking water standards; however, increasing Chloride levels have posed a problem for growers in the Region that farm certain salt-sensitive crops, such as strawberries and avocados.

Regulatory Compliance

Regulators are considering establishing Chloride limits for wastewater dischargers at levels between 100 and 150 milligrams per liter (mg/l). While imported water has been below those levels, it should be kept in mind, once this water is served to residents and businesses within the region, wastewater effluent will actually exceed those levels. Methods to control Chloride and other salt levels range in cost and complexity from moderate to prohibitively expensive. However, source water protection programs that reduce Chlorides and other salts in the imported water supply are the best way to solve this problem.

Benefits of Implementation

Imported State Water has helped local water agencies meet growing demands for water, and also improve water quality in the Region.

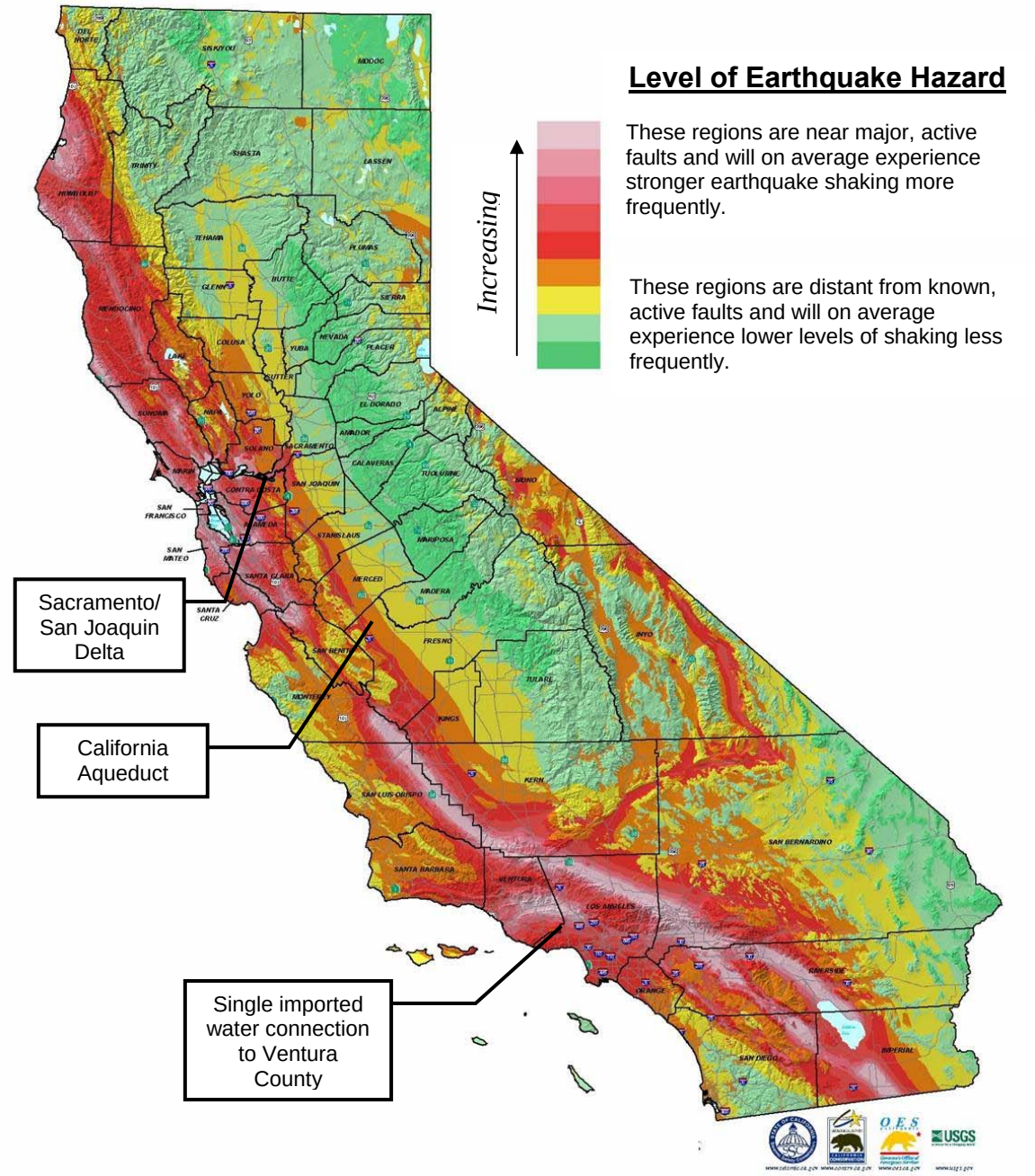
Constraints to Implementation

The primary constraints on the ability to import additional supplies are the limits of the contract with the State Water Project which define the maximum amount of water available, and the limits of the State Water Project itself, which is over-subscribed. In the western portion of the County, importation of the entitlement to 20,000 AFY is constrained by the cost of constructing facilities. Studies have shown that the cost of a pipeline to import the water would be approximately $150 million.

Imported Water Supply Vulnerability

Ventura County's imported water supply is at risk of interruption not only from prolonged droughts but also from seismic events. Moderate earthquakes will cause significant damage to conveyance infrastructure. As shown in the map below, seismic risk is not confined to Southern California.

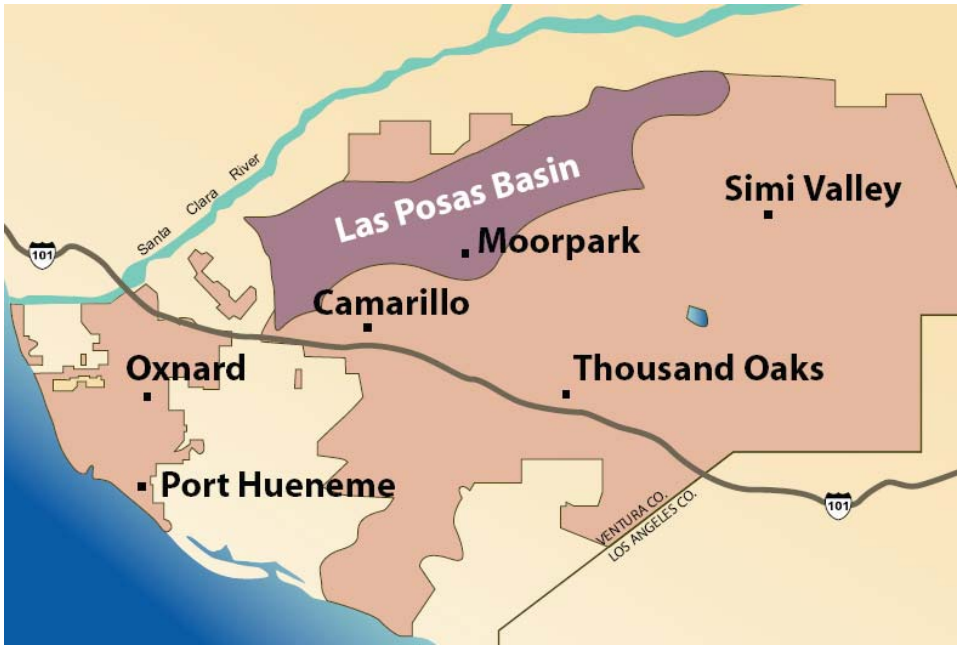
Earthquake Shaking Potential for California
Spring, 2003



The pipelines, aqueducts and pump stations supplying imported water to Ventura County are in some of the most active earthquake areas in the State. The Region will face serious water shortages if an earthquake occurs near the Sacramento/San Joaquin Delta causing levee failure. Winter storms in 2005 already caused breaches in the delicate levee system. An earthquake in Central California will threaten the California aqueduct. An earthquake in Los Angeles County will also cut off supplies of imported water, as was experienced in the Northridge earthquake of 1994.

Imported Water Storage

Lake Bard holds roughly 10,000 AF of water, enough to provide 30 days of emergency supply but not enough to withstand an extended emergency such as a major earthquake, particularly during summer months when the lake helps to supply peak demands. In order to minimize this risk, Calleguas began to develop a large scale groundwater Aquifer Storage and Recovery (ASR) project in 1989. In 1992, the Fox Canyon Groundwater Management Agency formally approved a program which allowed for storage and recovery of up to 300,000 AF of water in the Las Posas groundwater basin near the City of Moorpark (shown below). Major facilities were completed in 2004. To date, over 60,000 acre feet of water has been stored underground for emergencies. The Las Posas project also allows for greater conjunctive use of imported and groundwater supplies, by storing water in the winter months when it is available, so that it can then be produced during the dry summer months when supplies are limited.



Imported Water Storage: Las Posas Basin

Conjunctive use as an effective water management strategy will be discussed in a later chapter. Development of the local water supply enhancement projects included in this Plan will enable

Ventura County to reduce its dependence on imported deliveries from Northern California. This will also obviate the need for additional imported water infrastructure.

Related Documents and Websites

- California Dept. of Water Resources. *State Water Project Reliability Report,* November 2005
- Information regarding urban water management plans:

  http://www.owue.water.ca.gov/urbanplan/index.cfm
- Metropolitan Water District of Southern California's IRP:
  http://www.mwdh2o.com/mwdh2o/pages/yourwater/irp/integrated01.html
- Metropolitan Water District of Southern California's Regional UWMP:
  http://www.mwdh2o.com/mwdh2o/pages/pdf/ywater/rump_2005.pdf
- California Bay-Delta Program, Record of Decision:
  http://calwater.ca.gov/Archives/GeneralArchive/RecordOfDecision2000.shtml
- Calleguas Municipal Water District: Urban Water Management Plan
  http://www.calleguas.com
- California Water Plan Update 2005 http://www.waterplan.water.ca.gov/
- Flood and Earthquake Risk Information for State Water Project:

  http://www.dfm.water.ca.gov/

Recommendations for Future Projects or Action

Calleguas MWD

A priority of the Calleguas Municipal Water District is to minimize capital facilities projects related to importation of State Water in favor of local reliability projects (i.e. brackish groundwater treatment, recycling, conservation, etc.).

A central feature of the Adopted Calleguas Creek Watershed Management Plan is a regional salinity management project that will facilitate the development of local water supplies by removing salts from groundwater and conveying them through a regional Brine Line to other areas of the Watershed. The pipeline will also enable water recycling projects in the Watershed, ultimately producing more than 50,000 acre feet of new water annually -- nearly half the quantity of Calleguas' annual imports.

Each of these types of projects (recycling, conservation, brackish water treatment) are discussed in more detail in the remainder of this Section 5. Individual projects to be implemented are discussed in Section 6.

Entitlement Held in Western Portion of County

A priority of the United WCD is to maximize the amount of SWP that is imported into the Santa Clara River Watershed, using Piru Creek and Lake Piru as a conduit. A portion of the City of Ventura's and the Casitas MWD's SWP entitlements could be purchased to provide additional supplies.

Integration with Other Strategies

- Water supply reliability
- Groundwater management
- Recreation and public access
- Water quality protection and improvement
- Water recycling
- Conjunctive use
- Desalination
- Land use planning
- Surface storage
- Watershed planning
- Water transfers

Possible Funding Sources

Funding sources for projects which reduce the dependence of local agencies on State Water are discussed in relation to other water management strategies covered in this Section.

5.2.7 Land Use Planning

Description

Land Use: Land Use regulations and policies such as general plans, zoning ordinances, California Environmental Quality Act (CEQA) compliance, and permit conditions can be valuable policy and implementation tools for effective water management. Land use practices can either discourage or exacerbate water supply and quality problems or can proactively promote effective and sustainable water management practices. Severe droughts and water shortages in the past resulted in water saving measures adopted by most California jurisdictions. Some examples include a change in the building code to require 1.6 gallon low-flow toilets, standards for gray water use, and water efficient landscape requirements for discretionary projects. Land use measures can also aid water quality, flood control, habitat protection and other resource management strategies if incorporated into the land use planning process.

Strategy: Land use planning as a strategy for the purposes of this IRWM plan refers to actions which can be taken by agencies with land use decision-making authority (i.e. Cities, the County) to further the objectives set out in the Plan to better manage and protect local water and related environmental resources. Land use strategies can include long-range planning goals, objectives, general plan policies, ordinances, regulations, mitigation measures/funds, project conditions of development, guidelines, community and project design, incentives, penalties, and education/outreach programs which result in positive impacts to local water resources, water quality, habitats and ecosystems.

Traditionally, Cities and Counties have the responsibility for land use planning, and some local jurisdictions have employed effective land use tools/programs described above. Other jurisdictions have considered these tools and are in a position to implement them.

Cities and Counties have the authority to issue some form of approval or entitlement for most development projects, be they private projects or public facilities. Most jurisdictions require the project developers to meet or address conditions of approval, design guidelines, resource use limitations, or some combination of the above. As projects are reviewed, water management strategies may be employed to assist in an overall positive impact on water resources. Through implementation of this IRWMP and other local planning efforts, local planning agencies will be provided with a menu of possible tools and programs for their use in reviewing projects and minimizing the impact of development on local water and environmental resources.

Benefits of Implementation

The primary benefit of employing land use planning as a strategy is to better manage and protect local water supplies, Programs are available to: assist in conserving water supplies, be they imported, surface, ground, or recycled water; improve water quality; reduce flooding; restore habitats and ecosystems; and provide recreational, educational, and access opportunities to the public. In short, land use planning strategies can assist in achieving all overall Plan objectives, and many of the specific tasks and strategies associated with the objectives.

Existing Efforts

Aside from the land use planning authority conferred to Cities and Counties via police power and State Government Code and Resources Code requirements, many jurisdictions have created tools within their authority to positively affect water management.

The County Planning Department will develop an inventory of local land use policies related to water resources currently employed in the County. This project will be coordinated through the City/County Planning Association which meets regularly and will include input from all of the planning directors of the cities and the County. Additional land use policies/practices will be gathered from other jurisdictions across the State as well. Once complete, the information will be disseminated to all planning jurisdictions in the region to help guide implementation of policies that provide water management benefits.

Local Land Use Tools: As a starting point for developing the menu of choices for available land use policies, the following examples have or are being employed in the Ventura County Region: (This is a very narrow set of examples from a wide number and variety of tools/programs available.)

- General Plan Policies applicable to development projects:
  - *"New [water] wells in the Oxnard Plain Pressure Basin shall not be allowed if they would increase seawater intrusion…"*
  - *"The City shall continue and enhance its voluntary water conservation program, including the mandatory installation of ultra low-flush toilets and reduced-flow shower heads and faucets in new development."*
  - *"Landscape Plans for discretionary development shall incorporate water conservation measures…"*
  - *"Discretionary development shall be conditioned to incorporate water conservation techniques and the use of drought-resistant native plants…"*
  - *"The California Department of Fish and Game, the U.S. Fish and Wildlife Service, National Audubon Society and the California Native Plant Society shall be consulted when discretionary development may affect significant biological resources. …"*
  - *"Buffer barrancas and creeks that retain natural soil slopes from development with a minimum of 50 feet of natural existing or restored vegetation."*
  - *"Prohibit placement of material in watercourses other than native plants and required flood control structures, and remove debris periodically."*

- Development-Related Guidelines
  - *Water-Efficient Model Home Requirements*
    - *"Each model home in the complex, including the low-water use models, shall be equipped with a water meter to generate records on how much water the landscape uses …"*
  - *Landscape Approval/Installation Verification*
    - *"Maintenance Program: Landscapes of residential common areas and commercial and industrial projects shall be carefully and competently maintained to ensure water efficiency and high quality appearance."*
- Other Plan Policies
  - Ventura County Water Management Plan

        - *"Encourage tiered rate structures and water allocations to limit water use by providing an economic incentive to use water efficiently."*
        - *"Defer installation of required landscape during drought conditions."*
    - Flood Mitigation plan
        - *"Maintain flood control and storm drains, in accordance with habitat preservation policies, through periodic dredging, repair, de-silting, and clearing to prevent any loss in their effective use."*
- CEQA Review Requirements
    - Groundwater Quantity
        - *"Any land use that will directly or indirectly decrease, either individually or cumulatively, the net quantity of groundwater in a basin that is overdrafted, shall be considered to have a potentially significant impact."*
    - Surface Water Quality
        - *"For proposed land uses where the resulting surface water quality impacts are known by previous data at other sites or on-site data, they should be compared with the objectives for groundwaters contained in the most recently adopted 4A, 3 or 5D Plans."*

Constraints to Implementation

There is no foreseen constraint to implementation of an overall land use planning approach. However, implementation of some specific land use policies or programs (e.g. Watercourse set-back requirements in new developments along waterways) by individual jurisdictions may present challenges for political, technical, or budgetary reasons. This will vary from one community to another depending on the vision of the land use planning agency, the elected officials and its community members.

Related Documents and Websites

Resources which discuss the wide variety of land use policies related to water management are numerous and diverse. The listing provided is primarily focuses on documents, as websites listings are limited.

Websites:

- Watersheds | Water | US EPA - www.epa.gov/OWOW/watershed/index.html
- US EPA Office of Wastewater Management - www.epa.gov/owm/
- Northern California Water Association - www.norcalwater.org/watermgmt/
- ListWaterQualityMonitoringProgramx www.sfei.org/camp/servlet/ListPgms?which=byOrg

Documents:

- Cities'/County General Plans/CEQA Review Documents/Zoning Ordinances/Landscape and Irrigation Guidelines
- Urban Water Management Plans
- 1994 Water Management Plan
- California Water Plan – Bulletin 160-05
- Initial Study Assessment Guidelines (Environmental Review)
- Flood Mitigation Plan for Ventura County

Recommended Future Projects or Actions

As mentioned above, effective land use planning tools and strategies can have a positive role in water management. The following list of potential recommended projects/actions has been derived from a matrix of types of projects and programs (See Table 6-1 in Section 6) .

Interagency and Land Use Planning Programs

- Updates and modifications to land use policies (i.e. general plan, specific plans)
- Watercourse setback ordinances or policies (for urban and agricultural uses)
- Riparian corridor buffers
- Reduce impervious surface areas in new development
- Floodplain development restrictions
- Sensitive biological areas overlay zones
- Evaluation of water-related impacts during development review
- Evaluate process for reconstruction following emergencies (floods, landslides)
- Create incentives and/or eliminate disincentives for land owners to protect and restore habitats and ecosystems on their property

Relationship to Plan Objectives

Implementation of the tools listed above have the potential to impact the following objectives in the IRWMP (See Section 4):

1. Reduce dependence on imported water and protect, conserve and augment water supplies

√ Better understand local watersheds by gathering more data and information regarding water supply (capacity, safe yield, flows) and water demand.
√ Ensure secure water supplies by helping local water purveying districts address the impacts of future droughts and other water shortages.
√ Document and update the efforts being made by local water districts, environmental interest groups and other agencies to improve the management of local water supplies, and to identify ways to build on these efforts for greater future success.
√ Development of watershed management plans, where applicable, to enhance understanding of watershed characteristics and appropriate actions.

2. Protect and improve water quality

√ Identify and evaluate the opportunities to improve water quality and to implement appropriate projects or take appropriate actions to realize those opportunities. Such projects and actions could include increased water quality improvement, land use controls, construction of facilities and other water management techniques.

3. Protect people, property and the environment from adverse flooding impacts

√ Document and update the efforts being made by local water districts, environmental interest groups and other agencies to prevent and/or mitigate flooding and identify ways to build on these efforts for greater future success.

√ Develop and implement land use measures that will help mitigate the impacts of new development in floodplains.

4. Protect and restore habitat and ecosystems in watersheds

√ Integrate and coordinate current and future efforts of a diverse number of agencies engaged in water management and ecosystem restoration through a joint process of setting goals, evaluating data and developing future actions/projects.

5. Provide water-related recreational, public access and educational opportunities

√ Enhance the public's knowledge and awareness of water issues and involve them in the integrated regional water management process.
√ Identify opportunities to provide public access and recreation when implementing new projects and programs.

Integration with Other Strategies

Properly implemented land use planning tools and programs, including review of new development projects and long-range planning documents, can positively affect virtually any of the other Water Management Strategies contained in this Plan. They are listed below:

- Ecosystem Restoration
- Environmental and Habitat Protection and Improvement
- Water Supply Reliability
- Flood Management
- Groundwater Management
- Recreation and Public Access
- Stormwater Capture and Management
- Water Quality Protection and Improvement
- Water Recycling
- Wetlands Enhancement and Creation
- Conjunctive Use
- Desalination
- Imported Water
- NPS Pollution Control
- Surface Storage
- Watershed Planning
- Water Conservation
- Water and Wastewater Treatment
- Water Transfers

Possible Funding Sources

- Local funding (e.g., joint funding from water districts' general funds, user fees or surcharges, City/County General Fund via Budget Request)
- State and Federal grants (DWR, USBR, EPA, SWRCB/RWQCB)

- Upcoming Proposition 84 Planning Grant, if passed by the voters in November 2006

5.2.8 Nonpoint Source Pollution Control

Description

Nonpoint source pollution (NPS) is defined as anything that is not categorized as a point source in the Federal Clean Water Act. Point sources are defined as discharges from "any discernible, confined, and discrete conveyance," such as a pipe, but "does not include return flows from agriculture or agricultural stormwater runoff."(CFR 122.2) Primarily, NPS pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into groundwater. The runoff can pick up both naturally-occurring and human-deposited pollutants and transport them to waterbodies. Additionally, NPS pollution can occur from sources directly leaching or discharged into ground and surface waters and from groundwaters transporting pollutants to surface waters. NPS pollution contributes to many water quality problems and is challenging to control because of its dispersed nature, numerous sources, and transport of naturally occurring pollutants to waterbodies. NPS pollution is widespread because it can occur any time activities disturb the land or water.

Agriculture, forestry, grazing, septic systems, recreational boating, groundwater discharges and undeveloped land are all potential sources of NPS pollution. NPS pollution also includes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems causing physical changes to stream channels and habitat degradation.

Nonpoint source pollution has been identified as a source contributing to surface water impairments for nutrients, pesticides, metals, bacteria, and salts throughout Ventura County (303d list). In Ventura County, agriculture and undeveloped land comprise over 50 percent of the land area. Consequently, pollutants discharged from these areas as non-point pollution can be a significant source to local waterbodies. Additionally, seawater intrusion, individual sewage disposal systems (septic tanks), forestry and naturally occurring contaminants may be sources of non-point pollution in Ventura County.

Excerpt from the California Water Plan Update 2005:

Pollution prevention is the most effective mechanism for addressing NPS pollution. Pollution prevention can improve water quality for all beneficial uses by protecting water at its source, reducing the need and cost for other water management and treatment options. By preventing pollution throughout a watershed, water supplies can be used, and re-used, for a broader number and type of downstream water uses. Improving water quality by protecting source water is consistent with a watershed management approach to water resources problems. In addition, the legal doctrine of "public trust" demands that the State protect certain natural resources for the benefit of the public, including uses such as fishing, protection of fish and wildlife, and commerce, all of which are affected by pollution. (Source: California Water Plan Update 2005).

Nonpoint Source Pollution Sources

Agriculture

Agricultural practices can result in significant discharge of both human-deposited and natural pollutants. In Ventura County, agriculture has been identified as a significant source of nutrients and pesticides to surface waters and a contributing source of salts, metals, and bacteria during the development of Total Maximum Daily Loads (TMDLs) for the Calleguas Creek and Santa Clara River watersheds. Fertilizers and pesticides applied to crops can be transported to surface and ground waters by irrigation and precipitation runoff from fields and orchards. These discharges can contribute to toxicity in surface waters and impairment of water supplies in groundwaters. In addition, livestock (eg. cattle, horses) waste is a significant source of nutrients in the Ventura River Watershed.

Forestry

Sources of NPS pollution associated with forestry activities include removal of streamside vegetation, fire management, road construction and use, and mechanical preparation for the planting of trees. Road construction and road use are the primary sources of NPS pollution on forested lands, contributing up to 90 percent of the total sediment from forestry operations.

Harvesting trees in the area beside a stream can affect water quality by reducing the streambank shading that regulates water temperature and by removing vegetation that stabilizes the streambanks. These changes can harm aquatic life by limiting sources of food, shade, and shelter.

Hydromodification

Hydromodification is the alteration of stream and river channels, installation of dams and water impoundments, and streambank and shoreline erosion. Channelization and channel modification activities diminish the quality of aquatic habitats and streamside habitats. It can result in changes to water temperatures and sediment transport patterns, as well as the rate of erosion. Hardening of the banks with shoreline protection or armor can accelerate the movement of surface water and pollutants from upstream, causing degraded water quality.

Dams can adversely impact the hydrology and surface water quality and riparian habitat in rivers and streams where they are located. Impacts to surface water quality and riparian habitats can result from the silting, construction and operation of dams. Dams can reduce downstream flows affecting water quality and habitat. Dam construction can remove vegetation and cause increased sedimentation and turbidity. Increased erosion can occur after installation of a dam, creating increased sediment loads and impacting aquatic habitats.

Streambank and shoreline erosion is a natural process that can be both beneficial and detrimental. Some erosion is necessary to provide sediment for beach replenishment, to provide point bars and channel deposits in rivers, and for substrate in tidal flats in wetlands. However, excessively high erosion can cause sediment to smother aquatic vegetation, cover shellfish beds and tidal flats, fill in riffle pools, and contribute to increased turbidity and nutrient loading.

Marinas and Recreational Boating

Because marinas are located at the water's edge, pollutants generated by marinas and boats are less likely to be buffered or filtered by natural processes. When boating and related activities are poorly planned or managed, they may threaten the health of aquatic systems and pose other environmental hazards. USEPA (1993) identified the following sources of pollution associated with marinas and boating activities:

- Poorly flushed waterways
- Pollutants discharged from boats
- Pollutants carried in stormwater runoff
- Physical alteration of wetlands and of shellfish and other benthic communities during construction of marinas, ramps and related facilities
- Pollutants generated from boat maintenance activities on land and in the water

Benefits of Implementation

The overall goal of NPS Control is the prevention or control of NPS pollution such that none of the beneficial uses of water is impaired by that pollution. The restoration of native fish populations and the aquatic systems that support them would provide substantial environmental, cultural and economic benefits.

Successful implementation of a NPS Program largely depends on two factors: the ability of Federal, State and local agencies to use their administrative authorities and limited resources in creative and efficient ways, and the willingness of dischargers to implement Best Management Practices (BMPs) and other strategies that effectively prevent or control NPS discharges.

Existing Efforts

Legal Framework

The Porter-Cologne Act is the principal law governing water quality control in California. It establishes a comprehensive program to protect water quality and the beneficial uses of waters of the State. The Porter-Cologne Act applies broadly to all State waters, including surface waters, wetlands, and groundwater; it covers waste discharges to land as well as to surface and groundwater, and applies to both point and nonpoint sources of pollution. California's legal framework for implementing the Nonpoint Source Program is based on two chief Federal laws – the Clean Water Act (CWA) and Coastal Zone Management Act (CZMA), and State and local law.

The U.S. Environmental Protection Agency (USEPA), California State Water Resources Control Board (SWRCB), California Coastal Commission (CCC) and other State agencies have identified measures to address NPS pollution of State waters. The following measures are being implemented in various ways throughout Ventura County:

Development of Watershed Management Plans

The resource inventory and information analysis component provides the basis for a watershed management plan, which is a comprehensive approach to addressing the needs of a watershed, including land use, urban runoff control practices, pollutant reduction strategies and pollution

prevention techniques. For a watershed management plan to be effective it should include measurable goals, describe desired outcomes and methods for achieving identified goals.

Recommendations:

Continue to promote the development and implementation of Watershed Management Plans including:

- Ventura River Watershed Protection Project
- Santa Clara River Watershed Management Plan
- Calleguas Creek Watershed Management Plan – ongoing updates to existing CCWMP

Agriculture

Regional Water Quality Control Board Agricultural Waiver Program

Water quality data indicate water quality problems in irrigated agricultural areas throughout the Region. Many of the Region's impaired water bodies (with subsequent Total Maximum Daily Loads determinations) are for waterbodies running through agricultural lands. In addition, many groundwater basins underlying agricultural areas show levels of nitrate that exceed drinking water standards. In response the State Legislature amended California Water Code section 13269, causing all waivers of Waste Discharge Requirements that existed on January 1, 2000, to expire on January 1, 2003.

On November 3, 2005 the Los Angeles Regional Water Quality Control Board adopted a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands within the Los Angeles Region (Order No. R4-2005-0080). The intent of this program is to attain water quality objectives in waters of the State by regulating discharges from irrigated lands in the Los Angeles region (i.e. the coastal watershed of Ventura and Los Angeles counties). Owners and operators of irrigated lands that drain into the waters of the State must be covered by the conditional waiver, or submit a report of waste discharge and apply for a discharge permit. Dischargers are allowed to either form groups, or apply individually for coverage under the waiver. In order to comply with the conditions of the waiver, dischargers were required to submit a Notice of Intent, Monitoring and Reporting Program Plan and a Quality Assurance Project Plan to the Los Angeles Regional Water Quality Control Board by August 3, 2006. All farmers are expected to complete a certain amount of farm water quality education.

On August 3, 2006, a Notice of Intent (NOI) was submitted to the Los Angeles Regional Water Quality Control Board for an agricultural group that represents approximately 70 percent of the irrigated agriculture in Ventura County. The NOI included a comprehensive monitoring and reporting program to identify areas in Ventura County where agricultural discharges are causing or contributing to exceedances of water quality objectives. In areas where water quality objectives are exceeded or TMDL implementation requires them, farm water quality management plans will be developed to address the pollutant of concern.

The Conditional Waiver will be the mechanism through which TMDLs and Best Management Practices (BMPs) for agriculture will be implemented. The BMPs developed under this program will provide an integrated approach to addressing pesticide use and management, water conservation and efficiency, pollutant runoff reduction, and sediment transport from agricultural fields.

Recommendations:

- Implement the VCAILG discharger group's programs
- Continue to support the Countywide Water Conservation Program efforts to educate the agricultural sector of the County through current programs, and new programs should be encouraged
- Continue to support the University of California Cooperative Extension Program and Resource Conservation District efforts to educate agricultural water users countywide
- Support the development of the agricultural education programs required under the Conditional Waiver.
- Support research to identify and evaluate effective BMPs for agriculture and encourage IPM and pesticide use reduction programs.
- Support irrigation and water efficiency programs including:
    - Nature Conservancy nonpoint source pollution agriculture runoff management
    - Casitas Water District – Agricultural Assistance Project
    - Promote Best Management Practices (BMPs) for water conservation and improved agricultural practices; the County should investigate methods of ensuring that such BMPs are implemented.
- Support programs that promote good grazing and range land management practices including:
    - Education and outreach to landowners
    - Encourage and promote the enhancement of activities conducted by the Resource Conservation District's Soil Conservation Service Division.

Land and/or Development Rights Acquisition

One effective means to preserve land necessary for the protection of the environmental integrity of an area is to acquire it outright or to limit development rights. Land conservation includes more than simply preserving land in its current state. It also requires taking responsibility for restoration of areas of the property that might already be impacted by Nonpoint source pollution. Stewardship activities for land conservation may involve: resource monitoring; general maintenance; control of exotic species; and installation of structural runoff management practices. Additionally, land conservation can be used as an effective means of creating a "buffer" between potential Nonpoint sources of pollution and the surface water that can trap and treat pollutants before they reach the stream.

Recommendations:

Support the efforts of local land conservancies to either purchase or establish conservation easements and/or acquire land for the purpose of improving water quality

Individual Sewage Disposal Systems/Septic Tank Maintenance Program

Simple septic tank on-site wastewater treatment is not always appropriate. Groundwater and sensitive surface water habitats can be impacted by inadequately treated effluent. Generally, simple septic treatment doesn't remove nutrients and in some cases may not remove pathogens. In areas where groundwater provides the local drinking water source, the use of individual sewage disposal systems (septics) have become a groundwater quality issue.

Recommendations:

- Update County sewer policy and ordinances, to include Assembly Bill 885 and any new Onsite Wastewater regulations that result from that legislation
- Treatment Systems regulations promulgated by the State Water Resources Control Board, including minimum distance to groundwater, septic tank inspections and monitoring
- Identify new and continuing areas of concern where septic systems directly or indirectly contribute to groundwater contamination.
- Installation of all new on site septic system shall meet all applicable State and County regulations, including new AB 885 regulations
- Continue to monitor areas where septic system problems exist and encourage public sewering wherever feasible
- Do not permit inadequate individual disposal systems. Require the appropriate on-site treatment for the area/situation. And require the appropriate level of maintenance selected from the US Environmental Protection Agency's *Voluntary Management Guidelines and Management Handbook for Decentralized Systems* and California regulations.
- Adjust lot size and shape dependant on the capabilities of the on-site collection and treatment system to remove nutrients, provide irrigation water, and achieve economy of scale for tight clusters of homes surrounded by areas of un-fenced open space

Marinas and Recreational Boating

The primary focus of this program has been to educate the public about NPS pollution management measures and the importance of using environmentally sound practices when conducting in-water hull cleaning activities. The goals of this project are to: 1) raise awareness among the hull cleaners and marina operators regarding the effects that certain boating activities have on water quality; 2) promote the implementation of boat-related best management practices (BMPs) and less-toxic products; and 3) promote to the boating community "green" businesses which use BMPs.

Recommendations:

Support the implementation of boat-related and boat cleaning BMPs, including:

- The In-Water Hull Cleaners Certification Program

Hydro-modification

(See Stormwater Capture and Management sub-section)

Constraints to Implementation

Factors affecting the implementation of countywide urban, agricultural and business/industrial programs include funding, difficulty in reaching the non-English speaking population, resistance to change, and the inability to accurately measure program effectiveness.

Limited Funding

Limited funding and therefore, limited staff, prohibits these programs from realizing their full potential. Demands on the existing programs have increased dramatically, due to increasingly stringent regulatory requirements for dischargers Staff has been able to respond to demands and implement programs but could create additional programs to assist in water awareness education if additional funding were available.

Language Barriers

Language barriers might be an obstacle that should be evaluated in implementing an effective public education program to the non-English speaking population of the Region. Since 1990 several water brochures have been printed in Spanish and distributed to various communities throughout Ventura County. Education of the general non-English speaking population is not believed to be a significant problem. However, due to the high turnover rate of the large, Spanish speaking farmworker population, education of farmworkers has become a concern. Presentations to growers are effective; however, information may be lost in the translation from grower to farmworker due to language and cultural barriers.

Public Education/Resistance to Change

BMP implementation can be accomplished through simple behavioral changes. Public education and outreach through various programs has the ability to change perceptions, practices and behaviors.

Recommended Future Projects or Actions

- Ventura Streams Baseline Assessment and Habitat Enhancement Evaluation
- Nutrient Management projects in the Ventura River
- Nature Conservancy Watershed Conservation Study
- Ventura Coastal Watershed Acquisition
- Nature Conservancy Watershed Conservation Study
- Casitas Municipal Water District – Interpretive Center
- City of Camarillo Urban Pesticide Education & Buyback Program
- Ormond Beach Wetlands Restoration Plan
- Ojai Valley Land Conservancy
- Watershed Protection District Study of Impacts to Ventura River & Santa Clara River Estuaries
- Formation of a Ventura River Watershed Council
- Additional monitoring stations on the Santa Clara River
- Database/GIS link
- Database export features for standardized reporting
- Additional water quality monitoring of Matilija Creek
- Ventura River Watershed Characterization Model and Plan
- Arundo Removal Water Supply and Habitat Restoration Project
- Ojai Basin Groundwater Monitoring
- Matilija Dam Arundo Removal, Water Supply, and Habitat Restoration Project
- Matilija Dam Ecosystem Restoration Project
- Ventura River Watershed Protection Data Gap Analysis
- Resident Species Study, Santa Clara Estuary

Wetlands are vital to the survival of aquatic and terrestrial wildlife and plants. They play an important role in filtering out pollutants, preventing soil erosion, providing flow control, surface and groundwater storage, aquatic and semi-aquatic habitat, biological diversity, and recreation. In California, only 10 percent of the wetlands that existed prior to European settlement remain intact, and only 5 percent of the coastal wetlands remain intact. Changes in hydrology, geochemistry,

substrate, or species composition can impair wetland and riparian areas and reduce their ability to filter out pollutants in runoff, which can degrade water quality in receiving waters.

Related Documents And Websites

State Water Resources Control Board, 1988. Nonpoint Source Management Plan. State Water Resources Control Board, Division of Water Quality, Sacramento, CA. November 1988.

State Water Resources Control Board, 1999. Plan for California's Nonpoint Source Pollution Control Program. Division of Water Quality, Sacramento, CA. December 1999.

State Water Resources Control Board, 2002. Water Quality Enforcement Policy. Office of Statewide Initiatives, Sacramento, CA. February 2002.

United States Environmental Protection Agency, 1993. Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters. January 1993.

California Regional Water Quality Control Board- Los Angeles Region. State of the Watershed- Report on Surface Water Quality of the Ventura River Watershed. May 2002.

California Regional Water Quality Control Board- Los Angeles Region. Watershed Management Initiative, October 2004.

California Regional Water Quality Control Board, Los Angeles Region. Water Quality Control Plan for the Los Angeles Region. November 17, 1994.

http://www.waterboards.ca.gov/nps/protecting.html.

"In Hull Certification Program" Information

California Nonpoint Source Encyclopedia
http://www.swrcb.ca.gov/nps/encyclopedia.html

Nonpoint Source Pollution Prevention Newsletter
http://www.swrcb.ca.gov/nps/docs/runoffrundown2006spring.pdf

NPS Guidance In your Area
http://www.swrcb.ca.gov/nps/guidance.html

Nonpoint Source 319 (h) Projects
http://www.swrcb.ca.gov/nps/current_proj.html

Managing Nonpoint Source Pollution from Households
http://www.epa.gov/owow/nps/facts/point10.htm

Cleanwater Act Section 319 and Nonpoint Source Control
http://www.epa.gov/owow/nps/cwact.html

Integration with Other Strategies

Implementation of NPS programs can benefit the following other water management strategies:

- Ecosystem Restoration
- Environmental and habitat protection and improvement
- Water Supply Reliability
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Wetlands enhancement and creation
- Conjunctive use
- Land use planning
- Surface storage
- Watershed planning
- Water and wastewater treatment

Possible Funding Sources

State Water Resources Control Board – 2005-2006 Consolidated Grants Program:

- Proposition 40 - Nonpoint Source Pollution Control Program
- Proposition 50 - Coastal Nonpoint Source Pollution Control Program
- Federal Clean Water Act Section 319 (h) - Nonpoint Source Implementation Program
- Propositions 40 and 50 - Agricultural Water Quality Grant Program
- Proposition 40 - Urban Storm Water Program
- Proposition 40 - Integrated Watershed Management Program
- Pesticides Research and Identification of Source, and Mitigation (PRISM) Grants
- Sustainable Communities Grant and Loan Program – the California Pollution Control Financing
- Citizen Monitoring Program & Related Funding Sources - The State Water Resources Control Board
- Department of Water Resources - The California Department of Water Resources (DWR)
- Rural Utilities Service - Water and Environmental Programs (WEP)
- US Department of Agriculture - Rural Development
- US Fish and Wildlife Service - Grants
- Environmental Grantmaking Foundations

5.2.9 Recreation and Public Access

Description

With Excerpts from the California Water Plan Update 2005

Water-dependent recreation includes a wide variety of outdoor activities that can be divided into two categories. The first category includes fishing, boating, swimming and rafting, which occur on lakes, reservoirs, and rivers. The second category includes recreation that is enhanced by water features but does not require actual use of the water, such as wildlife viewing, picnicking, camping and hiking.

Water-dependent recreation is included among the water management strategies because recreation is an important consideration for water managers. Water management, and water infrastructure, can have significant effects on recreation. By considering recreation during the planning process, water managers can take advantage of opportunities to enhance recreation and can guard against actions that would limit recreation.

Benefits of Implementation

Water-dependent recreation provides a wide range of health, social and economic benefits to California residents and visitors, while improving the quality of life. It encourages physical activity, such as swimming and paddling, as well as walking and bicycling along attractive waterside trails, and can be a strong attraction for – and integrated with – educational programs regarding water-related resources. Water-dependent recreation positively influences tourism, business and residential choices. It increases expenditures in the community for travel, food and accommodations. In 2001, California had 28 million out-of-state tourists spending an average of $76 a day and staying an average of four days. In addition, 196 million resident tourists spent an average of $70 a day. Sales of sportfishing licenses and stamps generated more than $49 million in annual revenue for the Department of Fish and Game in 2001 and 2002. Water-dependent recreation prompts long term investments while creating jobs in concessions, hotels, restaurants, and retail stores.

Existing Efforts

Ventura County is fortunate to have two local reservoirs that provide recreation and public access – Casitas Reservoir and Piru Reservoir. Piru Reservoir, operated by the United Water Conservation District, is available for boating, fishing, water skiing and swimming, while Casitas Reservoir, operated by the Casitas Municipal Water District offers boating and fishing (no body contact).

There are also natural rivers and estuaries that provide recreational experiences. The Ventura River Trail is a bikepath that runs from Ojai to Ventura along the Ventura River which provides excellent habitat viewing along the upper portion of the trail, and is linked to the Omer Rains Trail and Surfer's Point in Ventura as well as to the California Coastal Trail.

Several organizations are working to create or enhance trails, parkways and parks along local rivers and in local watersheds. These organizations include the Ojai Valley Land Conservancy, the Nature Conservancy, the Trust for Public Land, the Ventura Hillsides Conservancy, and others.

A primary source of recreation and tourism is the region's coastline and beaches. Connected by a network of local, State and Federal parks, Ventura County's beaches offer both passive and active water-related recreation opportunities that are highly dependent on the activities in the watersheds and the river and creek systems that drain to the ocean. Shoreline water quality is directly related to adjacent and upstream land use activities, which can have a dramatic influence over the marine environment effecting fishing and swimming, as well as habitat in the ocean and coastal wetlands.

Constraints to Implementation

Funding for developing water-dependent recreation usually comes from different sources than that which is used for construction of water-related infrastructure. Recreation funding for ongoing operation and maintenance may also be difficult to obtain. As well, the organizations that provide for recreational facilities, especially those that are non-income generating, are often different than the water-purveyance and sanitation agencies initiating a given infrastructure project. Therefore, when the integration of recreational aspects does not take place very early in the planning cycle of a water project, and with the full involvement of those government agencies and non-governmental organizations (NGOs) that are able to access recreation-related funding and planning resources, recreation often is left out of the project entirely.

Related Documents and Websites

Web Resources

Casitas Municipal Water District/Lake Casitas:
http://www.lakecasitas.info/

United Water Conservation District/Lake Piru:
http://www.lake-piru.org/

Ventura County Parks Department/Local Parks Information:
http://gsa.countyofventura.org/parks/parkinfo.htm

The Nature Conservancy – Ventura Area Project:
http://www.nature.org/wherewework/northamerica/states/california/preserves/art6332.html

The Trust for Public Land Programs:
http://www.tpl.org/tier2_pa.cfm?folder_id=1885

• Department of Fish and Game, License and Revenue Branch, www.dfg.ca.gov

• American Sportfishing Association, www.asafi shing.org

• California Department of Tourism,
www.gocalif.ca.gov

California Department of Parks and Recreation,
"Public Opinions and Attitudes on Outdoor Recreation
in California 2002," www.parks.ca.gov/planning

California Department of Parks and Recreation,
"California Outdoor Recreation Plan 2002,"
www.parks.ca.gov/planning

Public Research Institute, "Survey of Boat Owners
in California" www.waterplan.water.ca.gov/docs/cwpu2005/vol2/v2ch24.pdf

State Board of Forestry, California Department of Forestry
and Fire Protection, "The California Fire Plan," www.fire.ca.gov

Recommended Future Projects or Actions

The Group has agreed that recreation and public access are important aspects of water-related projects in the Region. While we have significant recreational opportunities in the Region, more is needed, because of the recognized significant benefits to quality of life that recreation provides, because of its contribution to the local tourism economy, and because of the strong potential link between water-related recreation and public education. Therefore, the Group makes the following specific recommendations:

1.) Evaluate the potential for the integration of recreational facilities into water-related projects very early in the planning cycle, and with the full involvement of those government agencies and non-governmental organizations (NGOs) that would be able to access recreation-related funding and planning resources.
2.) Develop an inventory of existing water-related recreational opportunities in the County, and develop a needs assessment for future opportunities.
3.) Foster specific project proposals that have been or are bring developed for river parkways along the Santa Clara and Ventura Rivers through regular review of long term water project plans in appropriate forums, such as watershed councils. This can be done through land acquisition and partnerships between private and public land owners. Properly designed river parkways can offer multiple benefits such as recreational enhancement, flood management, habitat protection and water quality improvement and are just one example of how recreational benefits can be provided.

Additionally, the following list of suggestions is excerpted from the California Water Plan Update, 2005

1. In developing water-dependent recreation opportunities, jurisdictions should consider public needs as identified in the California Outdoor Recreation Plan.

2. Use existing data and new surveys to determine recreational needs that might be met by incorporating recreation more fully into new State and regional water project planning.

3. Develop closer working relationships among appropriate State and local agencies that recreation planning is incorporated appropriately into program planning.

4. Conduct, and periodically re-examine, scientifically valid studies of the carrying capacity of proposed and existing sites for water-dependent recreation to help prevent degradation of water quality and wildlife habitat. Use data collected by other agencies, such as the U.S. Bureau of Reclamation, U.S. Army Corps of Engineers and for the Federal Energy Regulatory Commission.

5. Collect data on visitation rates vs. reservoir water levels and downstream flow rates, and use this data to help optimize the timing of water that is released or held for recreation.

6. Develop partnerships with universities to coordinate the monitoring of public recreation use, equipment and emerging outdoor and water-dependent recreation trends. Create partnerships with education providers to educate youth about preserving and protecting natural resources.

7. Promote and establish effective partnerships between Federal agencies, State and local governments, and the private sector for operation, maintenance and law enforcement of water recreation sites.

8. Coordinate with the Department of Fish and Game in exploring the use of funding from the Bay-Delta Sport Fishing Enhancement Stamp to integrate new and improved
public angling opportunities.

Integration with Other Strategies

When developing or enhancing recreational or public access opportunities or projects, the following other water management strategies can benefit:

- Environmental and habitat protection and improvement
- Water supply reliability
- Flood management
- Groundwater management
- Stormwater capture and management
- Water quality protection and improvement
- Water recycling
- Wetlands enhancement and creation
- Imported water
- Land use planning
- Surface storage
- Watershed planning

Possible Funding Sources

- State and Federal grants
- Local user fees or taxes
- Developer fees

5.2.10 Stormwater Capture And Management

Description

Stormwater runoff is a natural part of our planet's hydrologic process. However, human activities such as urbanization and agriculture can alter natural drainage patterns and add unwanted pollution to our streams, rivers, lakes and ocean. In fact, for many years efforts to control the discharge of stormwater focused strictly on *water quantity* issues such as drainage and flood control, and overlooked *water quality* issues resulting in a reduction of available non-polluted aquatic resources. Therefore, water quality capture and management strategies in California have recently been enhanced by both State and Federally mandated regulations and water quality protection programs. Collectively, these programs provide for a coordinated approach to water quality management in Ventura County.

Impervious Surfaces and Urban Runoff

By increasing the amount of impervious area due to urbanization, we significantly alter the hydrological and natural stormwater process, inadvertently creating an urban runoff problem. Urban runoff is water from rain, landscape irrigation, or from other sources that flows over the land surface. Pollutants present in urban runoff are generated from both on-site and off-site sources. These pollutants, which can be harmful to humans and aquatic ecosystems, may be deposited on impervious surfaces such as paved roadways, parking areas, walkways, patios and roofs. The pollutants can then flow into local creeks either directly or indirectly through the county's storm drains (also referred to as the "municipal separate storm sewer system" or "MS4") during rainstorms or other activities that generate the flow of water, thus creating polluted urban runoff. Polluted runoff to local creeks may result in impairment of both the creeks and downstream water bodies, including rivers, lakes, and ultimately, the ocean.

Runoff from Construction Related Activities

New development may increase the amount of impervious surface area within a watershed. In addition to conveying pollutants, impervious surfaces may also affect local waterways by increasing the volume and intensity of runoff. Flooding, excessive bank erosion, and channel modification may occur as a result of increases in runoff flows.

Common sources of pollutants from construction sites include: sediments from soil erosion; construction materials and waste (e.g., paint, solvents, concrete, and drywall); landscaping runoff containing fertilizers and pesticides; and spilled oil, fuel, and other fluids from construction vehicles and heavy equipment.

Runoff from Industrial Related Activities

Federal stormwater regulations require a broad range of industrial facilities to be permitted. They include manufacturing facilities, plating shops, mining operations, disposal sites, recycling yards, transportation facilities, and others.
Activities that take place at industrial facilities (material handling and storage for example) are often exposed to the weather.

As runoff from rain or snowmelt comes into contact with these materials, it picks up various pollutants and transports them to the storm sewer systems, rivers, lakes, or coastal waters. As a

result, stormwater pollution from industrial facilities is a significant source of water quality problems throughout the nation.

Hydromodification

Hydromodification is the alteration away from a natural state of stream flows or the beds or banks of rivers, streams, or creeks, including ephemeral washes, which result in hydrogeomorphic changes. Activities that alter natural stream flows may include increasing the amount of impervious land area within the watershed, altering patterns of surface runoff and infiltration, and channelizing natural watercourses.

Benefits of Implementation

Future stormwater quality improvement projects would enable us to further identify and assess priority problems, encouraging a high level of stakeholder/local resident involvement, and measure program success through water quality monitoring and other data gathering. This would allow for the further development of comprehensive solutions to stormwater pollution within the Ventura County.

In addition, stormwater capture and management projects would result in an increase in groundwater supplies as well as a reduction in flood and erosion impacts and pollutant loading.

Existing Efforts

NPDES Permits

Point-source discharges are controlled and regulated through the Federal Clean Water Act (CWA). Recognizing that urban stormwater runoff had increasingly become a water quality concern, Congress added section 402(p) of the CWA, which established a comprehensive approach to stormwater control using the already existing National Pollutant Discharge Elimination System (NPDES) of permitting. Under this NPDES permit system, for the purposes of stormwater quality capture, regulation and management, stormwater discharges are divided into the following three categories: (1) Municipal Separate Storm Sewer Systems (MS4) discharges, (2) Construction related discharges, and (3) Industrial related discharges.

MS4 Discharges - The Stormwater Quality Management Program

The Ventura Countywide Stormwater Quality Management Program (Program) was established pursuant to Section 402(p) of the Federal Clean Water Act, which requires all point source discharges of pollutants into waters of the United States, including discharges from municipal separate sewer storm drain systems (MS4s), to be regulated by a National Pollutant Discharge Elimination System (NPDES) permit. On August 22, 1994 the California Regional Water Quality Control Board, Los Angeles Region (RWQCB), issued a NPDES permit to the Ventura County Flood Control District (now known as the Ventura County Watershed Protection District), the County of Ventura, and the cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, San Buenaventura, Santa Paula, Simi Valley, and Thousand Oaks as Co-permittees, for discharges of stormwater and urban runoff from MS4s into the receiving waters of the Santa Clara River, Ventura River, Calleguas Creek, Malibu Creek and other coastal watersheds within Ventura County.

During the first permit term, a comprehensive Stormwater Quality Management Plan and a Stormwater Quality Monitoring Plan were developed and became the framework for protection and a better understanding of stormwater quality in the permitted area. Implementation began immediately, with some elements phased in throughout the permit term. During implementation, the plans were reviewed regularly and refined to reflect experience gained during implementation. Six annual program reports were prepared during the first term permit and document the specific accomplishments of the Program.

On July 27, 2000, approximately one year after expiration of the first term permit (which was extended by order of the RQWCB), the second term NPDES Permit No. CAS004002 (Permit) was issued to the Ventura County Co-permittees. The Stormwater Monitoring Program submitted as part of the Report of Waste Discharge (ROWD) was revised in January 2001 to reflect the requirements of the Permit. The revised Stormwater Monitoring Program describes Program details, the schedule for implementation, and performance goals. The schedule and tasks are projected over the 5-year Permit period (July 27, 2000 through July 27, 2005). The Permit and the SMP are specifically designed to develop, achieve, and implement a timely, comprehensive, and cost-effective stormwater pollution control program.

The ultimate goal of the program is to reduce pollutants in Ventura County stormwater discharges to the Maximum Extent Practicable (MEP).
The SMP translates the Permit requirements into program elements consistent with municipal agency operations. The Implementation chapter of the Ventura County SMP consists of the following elements:

1. Program management
2. Programs for residents
3. Programs for industrial/commercial businesses
4. Programs for land development
5. Programs for construction sites
6. Programs for Co-permittee facility maintenance, and
7. Programs for illicit discharge control

Controlling Pollution from New Development

As urbanization continues to degrade our rivers and coastal waters, Low Impact Development (LID) is increasingly being used to reverse this trend, resulting in cleaner bodies of water, greener urban neighborhoods, and better quality of life. LID offers a strong alternative to the use of centralized stormwater treatment. It aims to work within the developed and developing environment to find opportunities to reduce runoff and prevent pollution. LID controls stormwater runoff at the lot level, using a series of integrated strategies that mimic and rely on natural processes. By working to keep rainwater on site, slowly releasing it, and allowing for natural physical, chemical and biological process to do their job, LID avoids environmental impacts and expensive treatment systems later.

LID is grounded in a core set of principles based on the paradigm that stormwater management should not be seen as stormwater disposal and that numerous opportunities exist within the developed landscape to control stormwater runoff close to the source. Underlying these principles is an understanding of natural systems and a commitment to work within their limits whenever possible. Doing so creates an opportunity for development to occur with decreased environmental impact.

Recommendations:

Support the development and implementation of LID Guidance Manual and policies including:

- Integration of stormwater management early in site-planning activities
- Use of natural hydrologic functions as the integrating framework
- Focus on prevention rather than mitigation
- Emphasize simple, nonstructural, low-tech, and low-cost methods
- Manage stormwater runoff as close to the source as possible
- Distribute small-scale practices throughout the landscape
- Rely on natural features and processes
- Create a multifunctional landscape
- Education and outreach

SQUIMP

Stormwater Quality Urban Impact Mitigation Plan (SQUIMP) was developed as part of the municipal stormwater program to address stormwater pollution from new development and redevelopment by the private sector. The application of SQUIMP requirements reduces stormwater pollutants from new development by employing on-site control measures for commercial, industrial, multi-family, and single-family residential land uses. *Source Control Measures* and *Treatment Control Measures* required by SQUIMP refer to best management practices (BMPs) and features incorporated in the design of a land development or redevelopment project which prevent and/or reduce pollutants in stormwater runoff from the project.

Source Control Measures limit the exposure of materials and activities so that potential sources of pollutants are prevented from contacting storm runoff. Treatment Control Measures are reasonable, engineered systems that provide a reduction of pollutants in runoff to be consistent with the MEP standards imposed by the Federal Clean Water Act on the City and County. The Technical Guidance Manual for Stormwater Quality Control Measures was developed in July 2002, to assist developers in applying SQUIMP requirements to their projects.

Recommendations:

Continued support of the Stormwater Quality Urban Mitigation Plan (SQUIMP) including:

- Stormwater Quality Urban Impact – BMPs
- Source Control and treatment measures

Industrial/Commercial Businesses

In order to minimize the impact of stormwater discharges from industrial facilities, the NPDES program includes an industrial permitting component. Operators of specific industrial facilities are required to obtain permit coverage under an NPDES Industrial General Permit.

The permit process includes filing for a Notice of Intent (NOI), submitting a site map, and paying the appropriate fee to the State Water Board. In addition, industrial facilities are required to develop an extensive Stormwater Pollution Prevention Plan (SWPPP) and implement both structural and non-structural Best Management Practices (BMPs) to limit exposure of pollutants.

These BMPs are required to achieve the performance standard of Best Available Technology (BAT) and Best Conventional Control Technology (BCT). Stormwater sampling/monitoring is required as well as the submittal of an annual report, due July 1 each year, that indicates compliance levels.

Recommendations:

Continue implementation of the practices as outlined in the SWPPP including:

- BMPs to limit the exposure of pollutants
- Best Available Technology (BAT) procedures
- BEST Conventional Control Technology (BCT) procedures

Construction Sites

Construction activity that will disturb one to five acres (or more) requires coverage under the General Construction Activity Storm Water Permit (General Construction Permit) issued by the State Water Resources Control Board (SWRCB). Prior to construction, a Notice of Intent (NOI), and the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) must be approved by the SWRCB. The SWPPP must list Best Management Practices (BMPs) that the discharger will consider to reduce the amount of sediment and other pollutants from running off site. In addition, the SWPPP must contain a sampling/monitoring program to deal with non-visible pollutants if a particular BMP fails or is breached.

Development projects disturbing less than one acre of land are not required to file an NOI or prepare a SWPPP. However, they must comply with the conditions of MS4/NPDES Permit. In addition, they must include construction BMPs to control erosion and the discharge of stormwater pollutants associated with construction activities. Prior to the issuance of a grading permit, the applicant may be required to submit an Erosion Control Plan/SWPCP to the satisfaction of the Land Development/Grading Section. Construction sites that perform de-watering operations are also required to apply for applicable WDR/NPDES permits issued through the State Water Board.

Construction sites are inspected once during the wet season and an inspection checklist is completed. Follow-up inspections are conducted to ensure that BMPs are being implemented.

Recommendations:

Continue implementation of the practices as outlined in the SWPPP including:

- BMPs to control erosion and discharge of stormwater pollutants associated with construction activities

Hydromodification - (Also refer to Nonpoint Source Section)

Hydromodification impairs beneficial uses such as warm and cold water habitat, spawning habitat, wetland habitat, and wildlife habitat in a variety of ways. Modifications to stream flow and the stream channel may alter aquatic and riparian habitat and affect the tendency of aquatic and riparian organisms to inhabit the stream channel and riparian zone. As a result of these hydromodifications, the biological community (aquatic life beneficial uses) may be significantly altered, compared to the type of community that would inhabit an unaltered, natural stream. Modifications, such as channelization, may impair beneficial uses by disturbing vegetative cover,

removing habitat; modifying or eliminating instream and riparian habitat; degrading or eliminating benthic communities; increasing scour and erosion as a result of increased velocities, and increasing water temperature when riparian vegetation is removed.

Recommendations:

Continue implementation of the practices as outlined in the SWPPP including:

- Minimize or eliminate modifications to the natural stream channel wherever possible and support efforts to return watercourses to a natural flow regime wherever feasible.

Erosion and Sediment Control

Recommendations:

Continue to support and implement practices that protect or rehabilitate eroded streambanks including:

- Structural practices that provide stream stability

- Direct methods including stone riprap revetments, erosion control fabrics and mats, revegetation, burlap sacks, cellular concrete blocks, and bulkheads
- Indirect methods including dikes, wire or board fences, gabions and stone longitudinal dikes

Streambank and Shoreline Erosion Protection

Recommendations:

- Use of vegetative cover to protect or rehabilitate eroded streambanks. Streambank protection using vegetation is probably the most commonly used practice, particularly in small tributaries. Vegetative cover, also used in combination with other structural practices, is relatively easy to establish and maintain, is visually attractive and is the only streambank stabilization method that can repair itself when damaged.
- Use of structural, vegetative or bioengineered practices to control instream sediment loading. Streambank protection and channel stabilization practices, including various types of revetments, grade control structures and flow restrictors have been effective in controlling sediment production caused by streambank erosion.

Stormwater Capture , Recharge and Reuse

A number of potential opportunities exist for stormwater runoff capture and recharge and reuse. Collection of open space runoff for groundwater recharge provides an alternative to the use of potable water and increases the use of water from existing aquifers. Urban stormwater can be collected and used for landscape irrigation in lieu of the use of groundwater. The capture and management of stormwater runoff increases water storage capacity, reduces flood and erosion impacts, and decreases pollutant loading.

Recommendations:

Continue to implement practices that maximize stormwater recovery including:

- Stormwater capture, storage, treatment, and re-use management projects
- Assessment of Opportunities to recover Stormwater Runoff – Calleguas Creek
- Stormwater Runoff for Groundwater Recharge – Calleguas Creek

Water Quality Monitoring Activities

The Ventura Countywide Stormwater Monitoring Program enables the Watershed Protection District and the Co-permittees to reduce urban runoff as well as comply with Federal and State stormwater requirements of the National Pollutant Discharge Elimination System (NPDES) Permit. Future water quality endeavors, aided by Proposition 50 funding, will greatly benefit the community and increase public awareness for clean water. The Stormwater Monitoring Program is conducted with the following four major objectives as its focus:

- Characterizing stormwater discharges from monitoring sites representative of different land uses: industrial, agricultural, and residential
- Establishing the impact of stormwater discharges on receiving waters by conducting receiving water quality, mass emission, and bioassessment monitoring
- Identifying pollutant sources based on analysis of monitoring data, inspection of businesses, and investigation of illicit discharges
- Defining stormwater program effectiveness using data collected before and after implementation of pollution prevention programs

The Stormwater Monitoring Program includes both stormwater management and scientific elements. The collection and analysis of stormwater samples across Ventura County and the analysis and interpretation of the resulting data are the central activities of the Stormwater Monitoring Program. Analytical results are stored in the Water Quality Database and are easily accessible to enable the interpretation of data. The database also performs functions to ensure that water quality objectives are met and that the data evaluation process is successful. Data can be accessed at any time for the purposes of compliance reporting, trend identification, identifying pollutants of concern, or data sharing activities.

The current monitoring program consists of three mass emission sites, two urban use discharge characterization sites, one agricultural land use site, and two receiving water monitoring sites.

Land Use Site Monitoring

Land Use Site monitoring is designed to capture stormwater discharge from a specific type of land use. In the Stormwater Management Plan, sites are chosen to represent three land use types: agricultural, industrial, and residential. Land use monitoring is designed to characterize stormwater discharges from these specific land uses.

Receiving Water (Tributaries) Monitoring

Receiving water monitoring is designed to characterize the quality of receiving waters rather than discharges to the receiving waters. This type of monitoring evaluates the water quality of smaller

waterbodies tributary to main river systems. Monitoring smaller tributaries allows the Stormwater Monitoring Program to focus on smaller sub-basins of the watershed that are not impacted by discharges from wastewater treatment facilities.

Mass Emission Monitoring

The purpose of mass emission monitoring is to identify pollutant loads to the ocean and identify long-term trends in pollutant concentrations. Mass emission sites are located in the lower reaches of major watersheds. Through water quality monitoring at these sites, the Stormwater Monitoring Program can evaluate the cumulative effects of stormwater and other surface water discharges on beneficial uses in the watershed prior to discharge to the ocean. Mass emission monitoring stations allow for the measurement of water quality parameter concentrations resulting from discharges throughout an entire watershed. The Mass emission drainage areas are much larger than the drainage areas associated with receiving water sites, and include other sources of discharge, such as wastewater treatment plants, nonpoint sources, and groundwater discharges.

Bioassessment Monitoring

The Ventura County Stormwater Monitoring Program also includes the Bioassessment Monitoring Program. Biological assessments of water resources integrate the effects of water quality over time and are capable of simultaneously evaluating multiple aspects of water and habitat quality. When integrated with physical and chemical assessments, bioassessments help to further define the effects of point and Nonpoint source discharges of pollutants and provide a more appropriate means for evaluating impacts of non-chemical substances, such as sedimentation and habitat alteration.

Aquatic Pesticides Monitoring

Aquatic Pesticides monitoring is performed for the purpose of characterization of representative aquatic pesticide during application projects.

Recommendations:

Support of the Ventura Countywide Stormwater Monitoring Program including:

- Increase water quality monitoring stations to better identify sources of point source pollution
- Expand data sharing/ data reporting capabilities through the Surface Water Ambient Monitoring Program (SWAMP)
- Water quality database/GIS based interactive website link

Constraints to Implementation

Factors affecting the implementation of countywide urban, agricultural and business/industrial programs include funding, difficulty in reaching the non-English speaking population, resistance to change, and the inability to accurately measure program effectiveness.

Limited Funding

Limited funding and therefore, limited staff, prohibits these programs from realizing their full potential. Demands on the programs have increased dramatically. Staff has been able to respond to

demands and implement programs but could create additional programs to assist in water awareness education if additional funding were available.

Language Barriers

Language barriers can be an obstacle in educating the non-English speaking population of the County. Since 1990 several water brochures have been printed in Spanish and distributed to various communities throughout the county. Education of the general non-English speaking population is not believed to be a significant problem. However, due to the high turnover rate of the large, Spanish speaking farmworker population, education of farmworkers has become a concern. Presentations to growers are effective; however, information may be lost in the translation from grower to farmworker due to language and cultural barriers. This concern also applies to the landscape industry which has a significant population of Spanish speaking workers responsible for maintaining urban landscape and irrigation systems.

Related Documents and Websites

- www.ventura.org/vcpwa/fc/stormwater/index.htm
- www.swrcb.ca.gov
- www.swrcb.ca.gov/~rwqcb4
- www.ieca.org
- www.forester.net/ec.html
- www.forester.net/sw.html
- www.vcstormwater.org

Stormwater Management & Research Library
http://www.stormwatercenter.net/

Using Smart Growth Techniques as Stormwater Best Management Practices, EPA
www.epa.gov/smartgrowth

Recommended Future Projects or Actions

- Implement best management practices such as regular channel cleaning and improvement projects
- Adopt ordinances and policies in regard to new development within 100 feet of watercourses
- Construct and maintain debris basins
- Remove hazards or facilities from water courses to eliminate damage due to flooding/high flows

Integration with Other Strategies

Stormwater capture and management programs and projects can provide benefits to the following other water management strategies.

- Ecosystem Restoration
- Environmental and habitat protection and improvement
- Water Supply Reliability
- Flood management
- Groundwater management
- Water quality protection and improvement

- Water recycling
- Wetlands enhancement and creation
- Conjunctive use
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment

Possible Funding Sources

- State Water Resources Control Board – 2005-2006 Consolidate Grants Program:

  Propositions 40 and 50 – Agricultural Water Quality Grant Program
  Proposition 40 – Urban Storm Water Program
  Proposition 40 – Integrated Watershed Management Program

- Pesticides Research and Identification of Source, and Mitigation (PRISM) Grants
- Sustainable Communities Grant and Loan Program – the California Pollution Control Financing
- Citizen Monitoring Program & Related Funding Sources – The State Water Resources Control Board
- Department of Water Resources – The California Department of Water Resources (DWR)
- Rural Utilities Service – Water and Environmental Programs (WEP)
- US Department of Agriculture – Rural Development
- US Fish and Wildlife Service – Grants
- Environmental Grant-making Foundations

5.2.11 Surface Storage

Description

With Excerpts from the California Water Plan Update 2005

Surface storage is the use of reservoirs to collect water for later release and use. Surface storage has played an important role in California where the pattern and timing of water use does not always match the natural runoff pattern. Most California water agencies rely on surface storage as a part of their water systems. Similarly, surface storage is often necessary for, or can increase, benefits from other water management activities such as water transfers, conjunctive management and conveyance improvements. Some reservoirs contribute to water deliveries across several regions and some only contribute to water deliveries within the same watershed. Surface reservoirs can be formed by building dams across active streams or by building off-stream reservoirs where the majority of the water is diverted into storage from a nearby water source.

Surface storage capacity can also be developed by enlarging, re-operating or modifying outlets on existing reservoirs. Smaller reservoirs typically store water in one season for use in another season, while larger reservoirs can do the same or store water for use
over several years.

For the purposes of this IRWMP, surface storage refers to surface reservoirs or storage tanks used to store water for longer periods of time for later use, as opposed to spreading or percolation ponds which are used for the purposes of recharging groundwater aquifers.

Benefits of Implementation

Many of California's reservoirs were originally built for the primary purposes of hydropower, flood control, and consumptive water use. Although the allocation of benefits for proposed surface storage can affect the occurrence and magnitude of different types of benefits, they generally can include the following:

- Water quality management
- System operational flexibility
- Power generation
- Flood management
- Ecosystem management
- Sediment transport management
- Recreation
- Water supply augmentation
- Emergency water supply

The presence of new surface storage could allow ecosystem and water managers the flexibility to take actions and make real-time decisions that would not be possible without the storage. Water transfers between regions could be easier if water can be released from upstream storage at appropriate times and the receiving regions have reservoirs to store the transferred water. Surface storage can improve the effectiveness of conjunctive water management strategies by more effectively capturing runoff that can ultimately be stored in groundwater basins.

Storage projects can facilitate the movement of water when needed to improve source water quality directly or facilitate blending of water from different sources to optimize system water quality.

New surface storage can also help reduce the risk associated with potential future climate change by mitigating the effects of a relatively smaller seasonal snow pack storage capacity as well as increased or more sustained peak flood flows.

Existing Efforts

Several reservoirs have been constructed in Ventura County for water supply, flood management and recreation purposes (Lake Casitas and Lake Piru). Bard Reservoir provides storage for imported State Water, but does not provide public access or recreation. See Section 2, Region Description for more information about local surface reservoirs.

Constraints to Implementation

Most of the best reservoir sites have already been used, and the new standards of environmental regulations are significant constraints to development of surface storage in the mountains. The range of surface storage development options for smaller local agencies is more limited than for the State and Federal governments. Local agencies have limited ability to use State or Federal funds, and do not have the ability to work as closely with their corresponding resource regulatory agencies such as the State and Federal agencies do as part of CALFED. Additionally, there are physical limitations on storage options in some parts of California. In some areas, off-stream storage is not feasible. These circumstances severely constrain the ability of local governments and agencies to finance and implement the projects necessary to sustain the local economy and serve increasing populations.

Recommended Future Projects or Actions

There are currently no plans in Ventura County to augment or develop open water reservoirs. Due to the cost, environmental impacts and time to construct, this is one of the most expensive and difficult means to develop new water supplies in the Region.

In fact, the local Matilija Dam is in the process of being evaluated for removal in order to restore habitat along the Matilija Creek and Ventura River. The Dam, constructed in 1947 by the Ventura County Watershed Protection District, was intended to provide a local water supply, while offering flood protection for downstream communities. During the 60 years of its life, the build-up of sediment behind the dam has undermined both of those original functions. The initial storage capacity of the reservoir was 7,018 acre feet, but today it holds less than 500 acre feet of water. Over time, it has become clear that the presence of the dam has adversely impacted the ecosystems of Matilija Creek and the Ventura River. Not only does the dam prevent the natural flow of sand and sediment from the mountains to the beaches, it also blocks the endangered steelhead trout from swimming upstream from the ocean to the place of their ancestral spawning and rearing. Steelhead depend on the cool, year-round waters found in the upper reaches of the Watershed for breeding. Today, over half the original steelhead spawning habitat lies locked behind Matilija Dam.

General Recommendations From California Water Plan Update 2005

1. Local agencies seeking to implement storage projects should develop a comprehensive methodology for analyzing all benefits and full costs of projects. DWR should provide technical expertise and assistance to the local agencies if asked.

2. Reservoir operators and stakeholders should continue to adaptively manage operations of existing facilities in response to increased understanding of system complexities and demands as well as changes in natural and human considerations such as social values, hydrology, and climate change.

3. DWR and other local, State and Federal resource management agencies should continue studies, research and dialogue focused on a common set of tools that would
help determine the full range of benefits and impacts as well as the costs and complexities of surface storage projects.

4. Water resources scientists, engineers and planners, including DWR should recognize the potential long development time for new surface storage in securing funding needed for continuity of planning, environmental studies, permitting, design, construction, and operation and maintenance.

Integration with Other Strategies

Implementation of surface storage can benefit the following other strategies:

- Ecosystem Restoration
- Environmental and habitat protection and improvement
- Water Supply Reliability
- Flood management
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Wetlands enhancement and creation
- Conjunctive use
- Imported water
- Watershed planning
- Water transfers

Possible Funding Sources

Construction usually requires a lot of money in a short time – perhaps $1 billion or more over five years for larger projects. Included in the long-term capital outlay are planning costs such as administrative, engineering, legal, financing, permitting and mitigation, which can also require significant investments. Some new storage options such as raising existing reservoirs, re-operating or modifying outlets on existing reservoirs, or the construction of small local reservoirs may require significantly less capital, but may require local funding through revenue or general obligation bonds. Even these less costly projects could face financial challenges.

5.2.12 Water Quality Protection and Improvement

Description

Water quality is one of the many key issues facing the Region. Water quality issues are addressed in the IRWMP Objectives as follows:

Protect and improve water quality

- Identify and evaluate the opportunities to improve water quality and to implement appropriate projects or take appropriate actions to realize those opportunities. Such projects and actions could include increased water quality improvement, land use controls, construction of facilities, and other water management techniques.
- Meet State and Federal water quality standards.
- Manage and remove salts in the watersheds and comply with TMDL requirements.

Water quality protection and improvement is one of the most important strategies being implemented in the Region, and is linked with most other strategies being implemented.

Benefits of Implementation

For the vast majority of contaminants, it is generally accepted that a pollution prevention approach to water quality is more cost-effective than end-of-the-pipe treatment of wastes or advanced domestic water treatment for drinking water. Pollution prevention measures are usually more cost-effective because they have lower initial capital costs, as well as less ongoing operations and maintenance costs, than traditional engineered treatment systems. However, because of the nature and sources of some contaminants, like bromide (introduced by seawater) and organic carbon (natural runoff from the watershed), a pollution prevention approach may not be possible, cost-effective, or even desirable in some instances. Small water systems, which generally lack technical and financial capacities, may be more reliant upon pollution prevention measures than other options available to larger systems, such as advanced treatment. High-quality, near-shore coastal waters provide multiple benefits or uses by providing recreational opportunities, as well as serving as a water source for desalination plants and habitat for wildlife (2005 California Water Plan).

Pollution prevention can improve water quality for all beneficial uses by protecting water at its source, reducing the need and cost for other water management and treatment options. By preventing pollution throughout a watershed, water supplies can be used, and re-used, for a broader number and types of downstream water uses. Improving water quality by protecting source water is consistent with a watershed management approach to water resources problems. In addition, the legal doctrine of "public trust" demands that the State protect certain natural resources for the benefit of the public, including uses such as fishing, protection of fish and wildlife, and commerce, all of which are affected by pollution (2005 California Water Plan).

Matching water quality to water use is a management strategy that recognizes that not all water uses require the same quality water. One common measure of water quality is its suitability for an intended use, and a water quality constituent is often only considered a contaminant when that constituent adversely affects the intended use of the water. High quality water sources can be used for drinking and industrial purposes that benefit from higher quality water, and lesser quality water can be adequate for some uses, such as riparian streams with plant materials benefiting fish.

Further, some new water supplies, such as recycled water, can be treated to a wide range of purities that can be matched to different uses. The use of other water sources, again, like recycled water, can serve as a new source of water that substitutes for uses not requiring potable water quality (California Water Plan 2005).

Existing Efforts

There are many efforts underway to protect and improve water quality in the Region. These projects and programs are implemented at the local level by wholesale and retail water agencies, Cities and other agencies. State and Federal projects and programs are also implemented within the Region to help address water quality problems. Current and future planned efforts to improve water quality are described in detail in the Adopted Calleguas Creek Watershed Management Plan, locally adopted Urban Water Management Plans, and other related water management plans (see Related Documents and Websites below), as well as in other sections of this IRWMP (i.e. Groundwater Management).

Constraints to Implementation

Potential Costs - According to the 2000 USEPA Clean Water Needs Survey, California has more than $14 billion of needs to prevent both point source and nonpoint source pollution. This survey, though, emphasized point source discharges, which represented more than $13 billion of the needs and likely underestimated the cost of measures to adequately prevent nonpoint source pollution. In terms of drinking water quality, investments in pollution prevention measures may entail more risk and uncertainty in improving water quality relative to advanced domestic water treatment options (2005 California Water Plan).

Related Documents And Websites

1. California Water Plan 2005 (Department of Water Resources)

2. California's Groundwater, Bulletin 118, Update 2003

3. California Regional Water Quality Control Board, Los Angeles Region. *Water Quality Control Plan for the Los Angeles Region, November 17, 1994*

4. California Regional Water Quality Control Board- Los Angeles Region. *State of the Watershed- Report on Surface Water Quality of the Ventura River Watershed, October 2004 Version*

5. California Regional Water Quality Control Board- Los Angeles Region. *State of the Watershed- Report on Surface Water Quality of the Santa Clara River, October 2004 Version*

6. California Regional Water Quality Control Board- Los Angeles Region. *State of the Watershed- Report on Surface Water Quality of the Calleguas Creek Watershed, October 2004 Version*

7. California Regional Water Quality Control Board- Los Angeles Region. *State of the Watershed- Report on Surface Water Quality of the Miscellaneous Coastal Watersheds, October 2004 Version*

8. California Regional Water Quality Control Board – Los Angeles Region, 2004 *Watershed Management Initiative Chapter*http://www.waterboards.ca.gov/losangeles/html/programs/regional_programs.html - Watershed

9. Ventura County Groundwater Quality Assessment Draft Report, 2005, Watershed Protection District's Groundwater Resources Section

10. Draft Management Plan, Fox Canyon Groundwater Management Agency, July 2006

11. California Department of Water Resources, 1993. Investigation of Water Quality and Beneficial Uses – Upper Santa Clara River Hydrologic Area.

12. Southern California Wetlands Recovery Project Information Station website http://www.wrpinfo.scc.ca.gov/watersheds/sc/sc_subprofiles.html

13. United Water Conservation District http://www.unitedwater.org/

14. US Geological Survey with United Water Conservation District, 1999. Evaluation Of Surface Water/Ground Water Interactions in the Santa Clara River Valley, Ventura County, California

15. California Regional Water Quality Control Board – Los Angeles Region, 1999. *Staff Report. Proposed Amendment to the Water Quality Control Plan for the Los Angeles Region for a Prohibition of Septic System Discharges in the Oxnard Forebay*

16. Los Angeles County Department of Public Works, Ventura County Watershed Protection District and SCREMP Project Steering Committee, Public Review Draft. Santa Clara River Enhancement and Management Plan. Prepared by AMEC Earth & Environmental.

17. State of California, Department of Health Services Drinking Water Source Assessment and Protection (DWSAP) Program, Source Water Protection Programs http://www.epa.gov/OGWDW/whpnp.html

18. City of Oxnard Water Division's Reports - *Advanced Planning Study of the City of Oxnard's (City) Groundwater Recovery Enhancement And Treatment Program GREAT Program)*

19. http://www.oxnardwater.org/documents/studies/greataps.asp

20. California Regional Water Quality Control Board - Central Valley Region, *Staff Report on Salinity Issues in the Central Valley, January 2006.* http://www.waterboards.ca.gov/salinity/index.html

21. California Regional Water Quality Control Board – Central Coast Region, *Staff Report on Regional Board Vision for Central Coast, Regional Board Conservation Program, and "Other" Water Quality Issues, including Attachment No. 1 March 2005*

22. Algalita Marine Research Foundation (AMRF) - Non-profit organization with a intentioned purpose to communicate scientific research to the general populace (http://www.algalita.org/links.html

23. Study published in Environmental Science & Technology showing PCBs and DDE adsorbed onto plastics and can potentially accumulate these endocrine disrupting hydrophobic pollutants up to 1 million times those in the surrounding seawater: http://www.findarticles.com/p/articles/mi_m1200/is_5_159/ai_71352472

24. The National Resources Conservation Service provides substantial information on the research associated with water quality riparian buffer zones. This information can be found at: http://www.lnrcs.usda.gov/features/buffers/

25. Regulation of plastics can be found at the California Integrated Waste Management Board website: http://www.ciwmb.ca.gov/BuyRecycled/TrashBags/LegReport/

26. Heal the Bay's 16th Annual Report Card 2005-2006, Ventura County. Monitoring results are at posted at http://www.ventura.org/env_hlth/ocean.htm.

Recommended Future Projects or Actions

General Recommendations (from 2005 California Water Plan):

- The State should adopt a strategy that integrates improvements in pollution prevention, water quality matching, and drinking water, treatment and distribution. The strategy would focus in particular on the prevention of nitrate pollution Statewide.
- The State should adequately fund Regional Board Basin plan triennial review and Basin Plan updates.
- State agencies with a regulatory, management, or scientific role in the California's water quality should take the lead in establishing an Interagency Water Quality Program to coordinate and integrate all Federal, State, and local water quality monitoring and assessment programs for surface water and groundwater. This program would include a focus on emerging, unregulated contaminants in order to provide an early warning system of future water quality problems, as well as identify trends in water quality. Such a program would also seek to standardize methods, regularly monitor the quality of all waters of the State, and provide compatible data management that is accessible to a wide range of users.
- Regional, tribal, and local governments and agencies should establish drinking water source and wellhead protection programs to shield drinking water sources and groundwater recharge areas from contamination. These source protection programs should then be incorporated into local land use plans and policies. Such programs would encourage or regulate land-use activities that are protective of water quality, or, alternatively, discourage or restrict land uses or activities that threaten surface and groundwater quality.
- The State should prioritize grant funding for source water protection activities, including building institutional capacity for watershed planning.

SURFACE WATER QUALITY PROTECTION STRATEGIES

Sanitary Sewer Line Breaks

Sewage spills due to storm damage line breaks result in lost use of the watershed and beaches for recreation and in curtailment of water operation from rivers or streams until the waters have been confirmed to be clear of contamination.

Recommendation:

Assist in the relocation or protection of vulnerable sanitary sewer pipelines and associated facilities.

Wastewater Treatment Plant Effluent

The majority of wastewater treatment plants currently comply with effluent discharge requirements of National Pollutant Discharge Elimination System (NPDES) permits. However, with the opportunity to reclaim/recycle more wastewater, there will be a need for more advanced treatment.

Recommendation:

Assist where feasible plant modifications to improve discharge effluent quality to ensure wastewater treatment plants comply with discharge requirements. Encourage, and assist where feasible, the improvement of wastewater treatment facilities to tertiary or advanced tertiary level treatment.

Replacement of Existing Septic Systems

Failing existing septic systems are contributing to public health and safety problems.

Recommendation:

Encourage the use or expansion of sewer systems or package treatment plants to replace existing septic systems where failing septic systems are contaminating water supplies. All proposed package plants shall be consistent with the goals and policies of the County General Plan. Package plants should be sized and explicitly restricted to serve only the single-purpose site.

Waste Trash and Plastic in Watersheds, Beaches and Oceans

Waste plastics have been observed accumulating in the ocean and are more concentrated in a section of the Pacific Ocean between California and Hawaii (due to the Pacific Gyre). Plastics are not biodegradable, but do break down into smaller pieces that become edible by many species of marine taxa. According to the Algalita Marine Research Foundation (AMRF), waste plastics (including “plastic nurdles” which are pre-production plastic beads used as the material for plastic molds and products) are accumulating in the marine water column to the extent that they can outweigh plankton by a six to one margin in some areas. Toxic chemicals also accumulate on the surface of waste plastics.

Municipalities could use screens or grates on stormwater inlets as a direct method to control the discharge of plastics into the environment. The screens trap debris, and the debris then traps smaller particles such as plastic nodules. Municipalities would have to remove the accumulated trash in front of the screens. The solution to the waste plastics issue will likely come from legislation that requires fundamental changes in the plastics industry.

Recommendations:

- Initiation investigation in the magnitude of trash and plastics making their way into the County's inland waterways and to the Pacific Ocean
- Develop and promote policies that promote source control for trash and plastics
- Install screens and grates on storm drain inlets were feasible
- Develop and promote policies and legislation (Federal and State) that change the way plastics are produced and handled.

Urban Runoff/Stormwater Program (See Stormwater Management and Capture Section for Management Strategies including Low Impact Development).

Recommendations:

See Recommendations under the Stormwater Management and Capture Section.

Power Plants and Once-Through Cooling Impacts

The withdrawal of cooling water removes billions of aquatic organisms from waters of the U.S. each year, including fish, fish larvae and eggs, crustaceans, shellfish, sea turtles, marine mammals, and many other forms of aquatic life. Section 316(b) of the Clean Water Act (CWA) requires USEPA to ensure that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. On July 9, 2004, the United States Environmental Protection Agency (USEPA), under a consent decree, published the revised, Phase II Rule, aimed to minimize the environmental impacts from impingement and entrainment from existing coastal power plants cooling water intake structure (CWIS). The State Water Board is in the process of developing a Statewide policy to implement Federal 316(b) requirements (SWRCB website). Ventura County has two power plants that could be significantly impacted by these new regulations, and their ability to continue to use coastal ocean water for once-through cooling. Impacts to ocean aquatic life are unknown.

Recommendation:

Support the investigation of marine impacts from the use of once-through cooling at the two power plants within Ventura County. If impacts are identified through scientifically defensible studies, participate in discussions of ways to mitigate these impacts.

Salinity Management (Both Surface and Groundwater)

The salinity impairment of surface and groundwater is a problem shared by most of California, other arid western states, and much of the developed world. As surface and groundwater supplies

become scarcer, and as wastewater streams become more concentrated, salinity impairments are occurring with greater frequency and magnitude.

All natural waters contain salt and the process of using the water results in waste discharges with elevated salt concentrations. Human waste contains both inorganic salt and organic material some of which breaks down to salt, so salinity in municipal wastewater systems is higher than the water supply. Industrial processes often add or concentrate salt that in turn is disposed of through municipal or individual disposal systems. Salt in water used for irrigation and wetlands is concentrated through evaporation and transpiration.

Sources of salt can be categorized according to the *type* of entity discharging the salt; e.g. from agricultural, municipal, industrial, or natural discharges. Source can also be categorized according to its origin: 1) evapoconcentrate from supply water; 2) addition through dissolution of naturally occurring salts; 3) addition via fertilizers or in food processing, or 4) water treatment processes such as disinfection or softening. Most discharges are likely a mix of all three. For example, an agricultural discharge may contain evapoconcentrated salts from supply water, plus naturally occurring salts from soils from irrigation water is applied and nutrient salts added as fertilizer. In addition, the source of salt may result from a mix of surface and groundwater.

Within Ventura County, management of salinity impairment depends upon development and successful implementation of effective land use, water supply, and water quality policies, in conjunction with the removal of institutional barriers. Salt or salinity is typically used interchangeably with total dissolved solids (TDS) or electrical conductivity (EC). TDS is the dissolved portion of solids in water, including colloidal and small, suspended particles. The major ionic substances in water are calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, and nitrate.

Salt can impact a number of beneficial uses. Agricultural water supplies with elevated concentrations of total salts reduce yield and quality of crops. Individual salts such as boron and sodium can also harm crops. A secondary Maximum Contaminant Level (MCL) has been set for electrical conductivity to protect drinking water supplies and industrial users often have to treat water supplies to protect processes that are sensitive to total salinity and/or individual ions. Elevated salt levels also shorten the useful life of water heaters, pipes, and other water supply systems.

The mix of surface and groundwater interactions, in conjunction with the peculiar geography of California must be considered along with the political, legal, and administrative constraints when determining a long-term solution to the salt problem. The salinity problem is complicated by the presence of an extensive institutional bureaucracy that applies mostly to surface water. In contrast, it is a lack of institutional mechanisms to manage groundwater resources that further complicates the salinity management.

In the Calleguas Creek Watershed, the RWQCB developed pioneering analysis on the subject on salinity impairments that was adapted as the basis for the EPA's chloride TMDL. One of the key findings was that the long-term critical condition for surface water impairment was post-drought maximum non-storm flow. The EPA analysis reasoned that dry weather cycles would subject groundwater basins to enhanced concentration of salts with reduced dilution from rainfall. Subsequent surface water discharge of higher concentrated groundwater following basin replenishment during wet weather cycles would help create high surface water salts concentrations.

The U.S. EPA Region 9 adopted a TMDL for Chloride on March 22, 2002 based largely on the RWQCB's analysis. Because of the unique relationship between wastewater discharges and the broader hydrologic and salts balance in the watershed, the public agencies on the watershed petitioned the SWRCB for a temporary stay in implementing the chloride effluent limits to allow time to work with the RWQCB to "constructively address chloride regulation in the Calleguas Creek watershed and to amicably resolve issues." (SWRCB Stipulation for Further Order Issuing Stay, October 2003, p. 2).

The RWQCB's generalized analysis was extended with additional data to refine the characterization of the mass loadings and surface/groundwater interactions. These investigations are documented in the *Progress Report on Efforts to Address Salts on the Calleguas Creek Watershed* (prepared for the Calleguas Creek Watershed Management Plan, Larry Walker Associates, June 30, 2004). Consistent with the EPA/RWQCB's analysis, the investigation found that salts accumulate in the watershed, but not just under drought conditions. Even during average to slightly above average rainfall years, more salts enter the watershed on an average daily basis through imported water supplies, than are transported off the watershed in surface waters. The *Progress Report* calculated that given the mass balance of the source waters and the recirculation of irrigation waters only about 10 percent of the watershed dry weather average daily salts load entering the watershed leaves via surface water drainage to the ocean. The remaining 90 percent of the salts accumulate until sustained heavy rainfall washes out the accumulated salts.

While wet and dry weather patterns follow a generally cyclical pattern, there can be significant variation in the length of dry weather patterns. The accumulation of salts during these relatively dry periods and the subsequent release during wet weather cycles complicates the instantaneous management of chlorides and salts on the watershed by stockpiling a store of salts that once in solution would exceed the assimilative capacity of other contributing sources to the surface waters. The Camrosa Water District, Camarillo Sanitary District, and City of Thousand Oaks have developed a joint project to address this problem for the southern reaches of the Calleguas Creek Watershed. The project provides for the managed transport of salts through the watershed such that the average daily import of salts is matched by a corresponding export of salts. Over time, this managed transport of the imported salt loading will work in concert with natural processes of rainwater recharge to improve groundwater and surface water quality. The City of Simi Valley, the Calleguas Municipal Water District and Ventura County Waterworks Districts Nos. 1 and 19 are developing a similar salts balance plan for the northern reaches of the Calleguas Creek watershed. The RWQCB is developing a Salts TMDL for the Calleguas Creek watershed based on this conceptual model of working toward a salts balance. The RWQCB expects to adopt the salts TMDL in 2007.

Recommendations:

- Establish groundwater basin salt management objectives
- Support legislation and ordinance that facilitate the removal and/or prohibition of on-site water softening devices
- Support Calleguas Municipal Water District's Brine Line Project
- Support wellhead desalting projects
- Development of local salt management plans/source reduction control programs
- Explore opportunities for a Santa Clara River Watershed brine line

<u>TMDL Development and Implementation</u>

TMDLs are currently required for all waters and pollutants on the 303(d) list. TMDLs must consider and include allocations to both point sources and nonpoint sources of listed pollutants.

Recommendations:

- Participate in various TMDL stakeholders processes and meetings
- Assist in the collection, analysis and assessment of data used in developing TMDLs
- Participate in the development of TMDL implementation plan(s)

Nonpoint Source (See Nonpoint Source for Management Strategies, including Nutrient Management).

Recommendations: See various recommendations under the NPS Section.

Riparian Corridor Buffers (Also see Ecosystem Section for Management Strategies).

Riparian buffer zones are one of the most effective tools available for protecting critical habitat and water quality. The National Resources Conservation Service provides substantial information on the research associated with water quality riparian buffer zones. A standard rule of thumb is that water quality buffer zones should be 30 to 90 feet wide, varying directly with slope. Buffer zones slow water runoff, trap sediment, and enhance infiltration within the buffer zone. Buffers also trap fertilizers, pesticides, pathogens, heavy metals and reduce wind erosion. If properly installed and maintained, they have the capacity to:

- Remove up to 50 percent or more of nutrients and pesticides
- Remove up to 60 percent or more of certain pathogens
- Remove up to 75 percent or more of sediment

Buffers help stabilize a stream and reduce its water temperature. Buffers also have the side benefit of providing a food source, nesting cover, corridors and shelter for wildlife, and a setback distance from agricultural chemical use.

Recommendation:

Support the efforts of various land conservancies, municipalities and landowners in establishing riparian corridor buffers to improve water quality.

Open Space Acquisition/Source Protection (See Ecosystem Section for Management Strategies).

In addition to the protection of riparian corridor buffers, the protection of natural lands at important locations in the watershed through land acquisitions or conservation easements can benefit water quality significantly. Often known as *source protection*, the conservation of smaller feeder streams, meadows, and other upland areas provides additional pollution filtering functions, additional runoff and sediment flow reduction, and creates a mechanism for controlling problematic agricultural runoff through agricultural easement restrictions or outright purchase and retirement of polluting properties.

Recommendation:

Support the efforts of various land conservancies with either the purchase/establishment of conservation easements and/or land acquisitions that improve water quality.

GROUNDWATER QUALITY PROTECTION STRATEGIES

Abandoned Groundwater Wells

Abandoned wells can act as conduits for surface and subsurface pollutants. A successful well abandonment (destruction) project in the Fox Canyon Groundwater Management Area was completed in 2002. However, there are many more wells in need of proper destruction. The County Environmental Health Department, Watershed Protection District and local Cities and water agencies work together to manage water wells and assure proper abandonment.

Recommendations:

Evaluate existing well ordinance No. 3991 to explore whether to strengthen the County's policing authority to enforce the timely destruction of abandoned well is warranted. The revised ordinance should include the following elements:

- Provide the authority to require well destruction or rehabilitation as a condition upon sale of property or change of ownership or change of use.
- Process new well applications only after the applicant has demonstrated that all existing wells on all property they own are not in violation of the well ordinance. Continue to assess penalties if compliance with the ordinance is not met within a reasonable time frame, and assess property liens if compliance with ordinance is not met within a reasonable time frame.
- Working with the Fox Canyon Groundwater Management Agency, the County should prioritize wells for destruction based on degree of potential for groundwater degradation.

Seawater Intrusion/ Hydraulic Injection Barrier Wells Along the South Oxnard Plain

Seawater barrier wells are used extensively in Los Angeles and Orange Counties as a means of controlling seawater intrusion. A barrier project injects water along a series of wells creating a mound of recharge water as protection against seawater moving inland. Barrier wells are both expensive and complex; the costs of maintaining a barrier are higher than for typical facilities in Ventura County such as the Freeman Diversion, spreading ponds, and distribution pipelines. In Los Angeles and Orange Counties, there is a significant component of recycled water in the injected water. Thus, special health regulations govern this type of injection and are a necessary component of plans and facilities. In Ventura County, in the Port Hueneme area, an attempt to construct a seawater barrier in the late 1970s and 1980s by the Department of Water Resources had limited success. Since then, barrier wells have not been considered because lower-cost options were identified and installed. Regional efforts have focused on lower-cost strategies and facilities, such as the Freeman Diversion, the expansion of UWCD's recharge basins, the Pumping Trough Pipeline System, and the Pleasant Valley Pipeline System.

Unfortunately, the lower aquifer system of the south Oxnard Plain and the Pleasant Valley basins have been largely unaffected by spreading operations in the Oxnard Plain Forebay basin. Partially in response to this the City of Oxnard prepared an Advanced Planning Study for the City's Groundwater Recovery Enhancement and Treatment Program (GREAT Program). The Study evaluated barrier wells in the south Oxnard Plain as a method of delivering recycled water during winter months when agricultural irrigation demand is low and as a way to combat seawater intrusion. The City, in partnership with UWCD and the FCGMA, is moving forward with the design

permitting, and construction of the first phase of a recycled water treatment facility, conveyance pipelines, and pilot injection wells system.

Recommendations:

- Support and encourage projects that increase recharge to and/or decrease extractions from intruded aquifers, including the City of Oxnard's GREAT Program.
- Explore the possibility of using treated river water and injecting it into overdrafted basins.
- Support the Fox Canyon Groundwater Management Agency adopted groundwater management plan and GMA Ordinance Code Section 5.3.

Wellhead Protection Program (WHPP)

A Wellhead Protection Program(WHPP) is a pollution prevention and management program used to protect underground sources of drinking water. A national WHPP was established in 1986 by the Federal Safe Drinking Water Act. The law specified that certain program activities, such as delineation, contaminant source inventory, and source management, be incorporated into State WHPPs, and approved by USEPA prior to implementation. In California, the Department of Health Services administers the State's Wellhead Protection/Source Water Assessment Program.

Without adopting any new ordinances or regulations, a WHPP can be successful in protecting water supplies by employing these non-regulatory measures:

- Good housekeeping practices at water sources and at industries, businesses, and homes
- Public education
- Land management to minimize release or runoff of contaminants
- Purchase of land, development rights, or easements
- Man-made systems and devices to prevent release of contaminants
- Emergency response planning

Source Water Protection (SWP) measures are practices to prevent contamination of groundwater and surface water that are used or potentially used as sources of drinking water. These include non-regulatory measures, such as Best Management Practices (BMPs) and regulatory methods.

BMPs are standard operating procedures that can reduce the threats that activities at homes, businesses, agriculture, and industry can pose to water supplies. BMPs, besides protecting water supplies, can sometimes increase the aesthetic beauty and value of residential and commercial properties.

Regulatory measures are appropriate when non-regulatory methods don't work, when the contamination threat is particularly significant, or when Federal, State, or regional regulations aren't strong enough for local issues. Regulatory measures include:

- Land use controls
- Subdivision growth controls
- Zoning
- Land use prohibitions

- Regulations and permits
- Construction and operating standards
- Permit requirements
- Public health regulations

Recommendation:

Develop and Implement a Countywide or Regional Groundwater Wellhead Protection Program. Integrate a strategy into the WHPP to protect, and where feasible, enhance aquifer recharge areas. The Program shall promote smart land use practices, including prohibiting new industrial, commercial and residential development in areas of sensitive groundwater recharge.

Aggregate Resource Management

The mining of aggregate resources from riverbeds can degrade groundwater quality and cause water losses.

Recommendations:

- Strengthen conditions and monitoring capabilities and, if deemed necessary, further restrict the depth to which aggregate can be mined.
- Prohibit certain subsequent land uses and practices of reclaimed recharge areas that would be inconsistent with the protection of groundwater and surface water quality and recharge capabilities.
- Consider revision of the "red line" to reflect the historic high water table (not just the average) and prohibit mining below this line.
- Enhance monitoring and conditional use permit compliance .
- Identify alternative upland mining sites to be developed where feasible, to reduce sand and gravel activities in riverbeds and recharge areas.
- Promote sand gravel mining operations that would enhance recharge, retention for later surface use and as a tool to enhance conservation of river flows when available.
- Promote rock and gravel removal to promote channel “training” to protect banks and to allow flow capacity for future storm flows.

Naturally Occurring Contaminations

Naturally occurring contamination from minerals can render some groundwater basins unusable due to high TDS and nitrate levels. Arsenic, asbestos, radon, minerals, and sometimes microbes and sediment are examples of naturally occurring contaminants for which a pollution prevention approach is obviously infeasible. Furthermore, some contaminants that are concerns specifically for drinking water, such as organic carbon from watershed runoff and bromide — a component of ocean salinity, are a result of natural processes for which a pollution prevention approach may not be possible, effective, or even appropriate (California Water Plan 2005).

Recommendations:

- Identify sources, and develop projects to blend highly mineralized groundwater (if not overdrafted) with existing good quality sources of water to create additional higher quality useable water supplies

- Identify and develop, where practical, desalination or other treatment methods to reduce the mineral content of currently unusable groundwater to improve available water supplies

Salt Management (See above discussion under Surface Water Protection Strategies)

Brownfield Remediation

The California Environmental Protection Agency (Cal/EPA) is active in developing successful brownfields programs that incorporate tools that can be used to assist in or address the three primary concerns of potential developers: legal liability, regulatory compliance, and the financial burden of investigation and cleanup. However, with an estimated 90,000 properties in California that remain idle or underutilized because of real or perceived environmental contamination, it is clear that sufficient public resources could never be allocated to accomplish this goal. California's Brownfields will not be restored to productive use without significant participation by the private sector. Discovering mutually beneficial ways to involve investors in the future of these polluted properties is crucial.

Cal/EPA, and its constituent boards and departments, are developing partnerships with local governmental agencies and actively developing tools and resources that can be used separately and in concert to encourage capital investment in sites to return them to productive use.

Recommendation:

Support efforts to facilitate the remediation of brownfield sites Regionwide including streamlining permitting when possible.

Sewer Collection System Maintenance

As California's wastewater collection system infrastructure begins to age, the need to proactively manage this valuable asset becomes increasingly important. Collection systems consist of pipelines and their appurtenances, which are intended to transport untreated wastewater to both publicly owned and private wastewater treatment facilities. While wastewater treatment facilities are owned by a wide variety of public and private entities, public agencies (State and Federal agencies, Cities, Counties, and special districts) own the vast majority of this infrastructure. Collection systems that transport wastewater to Publicly Owned Treatment Works (POTWs) could be grouped into four different categories:

1. Publicly owned treatment works – pipelines and appurtenances that are owned by a public agency that also owns a wastewater treatment facility.
2. Publicly owned satellites – pipelines and appurtenances that are owned by a public agency that does not own a wastewater treatment facility.
3. Private laterals - pipelines and appurtenances that are not owned by a public agency, but rather discharge into one of the above types of facilities.
4. Privately owned treatment works – pipelines and appurtenances that are owned by a private entity, which also owns a wastewater treatment facility (often a septic tank and leach field).

Collection systems discharging into POTWs represent, by far, the greatest amount of collection system infrastructure within California.

In 2006, the State Water Resources Control Board (State Water Board) adopted Resolution 2006-0003 creating General Waste Discharge Requirements (WDRs) as a regulatory mechanism to provide a consistent Statewide approach for reducing Sanitary Sewer Overflows (SSOs). The General WDRs resulted from a collaborative attempt to create a robust and rigorous program, which will serve as the basis for consistent and appropriate management and operation of sanitary sewer systems.

Data supports the conclusion that virtually all collection systems have SSOs and that implementation of this regulatory measure requiring SSO reporting and collection system management, along with required measures to limit SSOs, will greatly benefit California water quality. Implementation of these requirements will also greatly benefit and prolong the useful life of the sanitary sewer system, one of California's most valuable infrastructure items.

Recommendation:

- Support the development of SSO Management Plans to comply with General SWRCB WDR Order No. 2006-003
- Support the funding of sewer collection system replacement capital improvement programs

Groundwater Monitoring - Groundwater Ambient Monitoring and Assessment (GAMA)

California's political leaders at the local, State and Federal level, as well as private citizens, have become increasingly concerned about groundwater quality and public supply well closures due to the detection of chemicals, such as the gasoline additive MTBE, solvents from industrial sources, and more recently perchlorate. To address these concerns, the Supplemental Report of the 1999 Budget Act and later the Groundwater Quality Monitoring Act of 2001 (AB 599 – Statutes of 2001) required the SWRCB to develop a comprehensive ambient groundwater monitoring plan.

The primary objective of the Groundwater Ambient Monitoring and Assessment (GAMA) Program is to comprehensively assess Statewide groundwater quality and gain an understanding about contamination risk to specific groundwater resources.

The GAMA Program monitors groundwater for a broad suite of chemicals at very low detection limits, including exotic chemicals such as wastewater chemicals and pharmaceuticals. Monitoring and assessments for priority groundwater basins are to be completed every ten years, with trend monitoring every three years.

Recommendation:

Continued support and funding for the GAMA Program, and regional Groundwater Monitoring Programs.

Pollutant/Contaminant removal – Pump and treat local Groundwater

Water in some local basins is contaminated and cannot be used for many beneficial uses. Pumping contaminated water from affected wells and subsequent treatment of that water can augment local water supplies.

Recommendation:

Identify opportunities within each of the Region's groundwater basins and/or aquifers where pump and treat technologies can be utilized to remove pollutant/contaminants, improving water quality and enhancing local water supplies.

Integration with Other Strategies

Water quality improvement efforts can provide benefits to or are related to the following other water management strategies:

- Ecosystem restoration
- Environmental and habitat protection and improvement
- Water supply reliability
- Flood management
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Water recycling
- Wetlands enhancement and creation
- Conjunctive use
- Desalination
- Imported water
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Possible Funding Sources

Wellhead Protection Program

(weblink: http://www.dhs.ca.gov/ps/ddwem/dwsap/protection.htm)

- Department of Health Services (DHS) Drinking Water State Revolving Fund Program
- DHS Drinking Water Proposition 50 SWP Grants
- CALFED Bay-Delta Program — Watershed Program
- Cyber-Sierra's Conservation District Resource Center — See "Find Funding"
- Department of Water Resources — various funding opportunities
- Great Valley Center — See LEGACI Grants
- State Water Resources Control Board — various funding opportunities
- University of California Sustainable Agriculture Research and Education Program Grants
- US EPA's Catalog of Federal Funding Sources for Watershed Protection Second Edition

- US EPA's SWP Financial Assistance Tools
- US EPA Region 9 Funding Opportunities

Brownfield Remediation:

Financial/Incentive Programs (weblink: http://www.calepa.ca.gov/Brownfields/)

- CLEAN (Cleanup Loans and Environmental Assistance to Neighborhoods)
- FAIR (Financial Assurances and Insurance for Redevelopment)
- Targeted Site Investigation Program
- Underground Storage Tank Cleanup Fund

5.2.13 Water Recycling

Description

Water recycling, also known as reclamation or reuse, is a term which encompasses the process of treating wastewater, storing, distributing, and using the recycled water. Recycled water is defined in the California Water Code to mean "water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur." Reuse can occur on-site or be transferred to other uses off-site following treatment. The uses to which recycled water can be applied (e.g., landscape and agricultural irrigation, cooling, etc.) depend upon the quality of the treated water and the quality required for subsequent uses.

The treatment and use of municipal wastewater for golf course irrigation is an example of water recycling. Higher levels of treatment can make municipal wastewater reusable for school yards, residential landscape and park irrigation, industrial uses or even uses within office and institutional buildings for toilet flushing.

Benefits of Implementation

The primary benefit of water recycling is augmenting water supply. Using recycled water for irrigation can spare high quality potable water for drinking, reducing the overall demand for treated potable water, and thereby conserving water in the Region and the State Given the wide range of local conditions that can affect costs, the majority of applications would cost between $300 and $1300 per acre foot of recycled water.

Costs outside this range are plausible depending on local conditions. Uses that require higher water quality and have higher public health concerns will have higher costs.

When looking at California's overall water supply, recycling provides new water for the State only in areas where wastewater is discharged to the ocean or to salt sink. Recycling in other areas may provide new water for the water agency but does not necessarily add to the State's water supplies. In these locations, discharged wastewater in interior California mixes with other water and becomes source water for downstream water users.

For many communities, an investment in recycled water could also provide other benefits:

1. Provide more reliable local sources of water, nutrients, and organic matter for agricultural soil conditioning and reduction in fertilizer use.
2. Reduce the discharge of pollutants to water bodies, beyond levels prescribed by regulations, and allow more natural treatment by land application.
3. Provide a more secure water supply during drought periods.
4. Provide economic benefits resulting from a more reliable water supply.
5. Improve groundwater and surface water quality and contribute to wetland and marsh enhancement.
6. Provide energy savings; the use of recycled water as a local source offsets the need for energy-intensive imported water.
7. Provide for the necessary aquatic habitat for numerous endangered species in the riverine and esturarine systems.

Existing Efforts

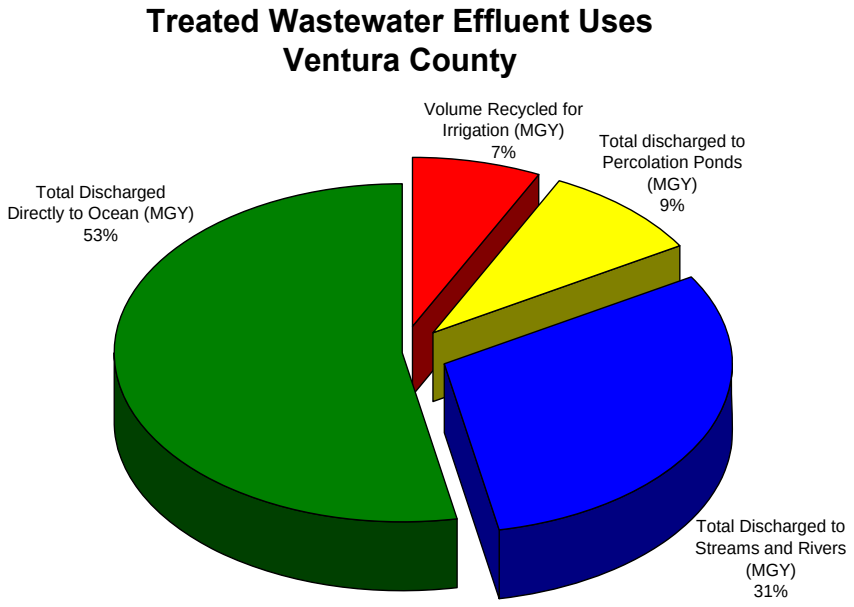
Recycled water in Ventura County holds great potential as an alternative water source and a means to improve water supply reliability. The following discussion of recycled water focuses on treated municipal wastewater. This is wastewater of domestic origin, but includes wastewater of commercial, industrial and governmental origins if such wastewater is mixed with domestic wastewater before treatment. Many industries recycle and reuse their own wastewater.

In the 1980s a feasibility study was conducted to determine the possible distribution of treated effluent from the Simi Valley and Hill Canyon Wastewater Treatment plants for agricultural irrigation on the Oxnard Plain. The finding of this study was that the water was too costly for agricultural customers (at the time) and that there were significant concerns regarding public acceptability of using recycled water to irrigate crops. The local and Statewide drought at the end of the 1980's prompted a re-evaluation of the value of reclaiming this water. As described below, the City of Thousand Oaks Hill Canyon Wastewater Treatment Plant's water is being recycled by Camrosa Water District through the Conejo Creek Diversion.

In the 1990s recycled water provided approximately .5 percent of the Region's water supply. Please see Table 5-1 for information about all wastewater treatment facilities and current recycling efforts. Four of the 16 sewage treatment plants in Ventura County currently reclaim a portion of their effluent. These include the Camarillo Sanitary District Wastewater Reclamation Plant, Camrosa Water Treatment Facility, Moorpark Wastewater Treatment Plant, and the Ventura Water Reclamation Facility. In addition to the facilities located in Ventura County, recycled water is delivered via pipeline from a Los Angeles County treatment plant to Ventura County. Over a third of the Camarillo Sanitary District's effluent is being used for agricultural irrigation. The City of Ventura recycles about 325 million gallons of water per year for landscape irrigation. A joint venture between the Triunfo County Sanitation District of Ventura County allows for recycled water deliveries to Ventura County from the Los Angeles County Tapia Treatment Plant. This recycled water is currently providing irrigation of the Lake Sherwood Golf Course in the Thousand Oaks area. The City of Simi Valley Sanitation District treatment plant continue to seek potential buyers for recycled water.

Pursuant to a SWRCB water right permit granted to the City of Thousand Oaks; and a series of inter-related agreements among the City of Thousand Oaks, the Calleguas Municipal Water District, the Pleasant Valley County Water District, and the Camrosa Water District; Camrosa reclaims the City of Thousand Oaks Hill Canyon Treatment Plant wastewater through operation of the Conejo Creek Diversion immediately south of U.S. Highway 101. In 2005, Camrosa recycled 7862 acre feet or 2561 million gallons per year. In addition, Camrosa recycles all of its treated wastewater from the Camrosa Water Reclamation Facility. This typically amounts to 1650 acre feet per year or 538 million gallons per year. Camrosa has developed an extensive dual distribution system to deliver non-potable recycled supplies while safeguarding its potable water system. Currently, recycled waters account for 42 percent of the water resources available to Camrosa. In addition, Camrosa and the Camarillo Sanitary District have entered into an agreement for Camrosa to purchase and distribute the portion of Camarillo Sanitary District's recycled water not currently served to agriculture. Camrosa uses these recycled water sources to supply agricultural and landscape irrigation demands within its service area. Surplus supplies are delivered to customers outside the District as supplemental water supplies The Moorpark Wastewater Treatment Plant has upgraded to tertiary treatment and is distributing recycled water for golf course irrigation of approximately 100 MGY (million of gallons per year).

Figure 5-4



* Based on 2004 Data

Table 5-1

Ventura County – Tertiary Treatment Plant Information 2006				
Wastewater Treatment Facility	**Total Plant Design Capacity (mgd)**	**Tertiary Design Capacity (mgd)**	**Tertiary Effluent Uses**	**Future Recycled Water Goals**
Moorpark (Dist 1)	3.0	1.5	Irrigation of Moorpark Country Club and percolation pond disposal	Provide tertiary treatment for all wastewater; increase total capacity to 5.0 mgd. Expand infrastructure and provide tertiary water for agricultural and other irrigation uses in lieu of potable water.
Piru (Dist 16)	0.26	--	--	--
Todd Road WWTP	0.06	--	--	--
Santa Paula	2.55	--	--	Currently in process of designing a 4.2 mgd tertiary recycled water plant
Camrosa Water District	1.5	1.5	Irrigation, landscape, CSUCI campus. Leftover released to Calleguas Creek.	Sell all tertiary effluent to customers and discharge in Conejo Creek only during peak wet season; buy additional supplies from Camarillo SD and Hill Canyon WTP
Simi Valley	12.5	0.93	Irrigation, washwater, and dust abatement	Recycled water is delivered to Simi Valley Landfill via Calleguas MWD (0 to 0.5 mgd) Investment in a regional recycled water distribution system including new pipelines and 2 new reservoirs.
Camarillo	6.75	6.75	Irrigation	Increase irrigation usage
City of Ventura	14.0	14.0	~90% discharge into the Santa Clara River Estuary, ~10% to golf course and other uses	--
Montalvo Municipal Improvement District	1.1	--	--	--
Saticoy Sanitary Dist.	0.25	--	--	--
Fillmore	1.33	--	--	Plans for a new 1.8 mgd water recycled water plant in 2009
Oxnard	31.7	--	--	Provide tertiary recycled water to Oxnard and Port Hueneme Water Agency for agricultural use and

				against salt water intrusion (6.0 mgd in 2010; 25 mgd ultimate); receive groundwater recharge credits and build distribution system.
Thousand Oaks / Hill Canyon	14.0	14.0	Irrigation, wetlands, and discharge to Conejo Creek	--

Constraints to Implementation

Major Issues Facing Recycled Water Use Affordability

The cost of recycled water, relative to other water sources, influences how much recycled water is produced for each region. The costs are dependent on the availability of treatable water, demand for treated water, the quality of the source as well as the product water, the type of the intended beneficial use, and the proximity of recycled water facilities to the end users. In addition, the need for disposal brine lines is considered a major issue for some inland agencies. The lack of adequate local funding to plan feasible recycled water projects can slow the construction of new projects. Public funding as well as incentive measures can help advance water recycling for irrigation, making more potable water supply available. Statewide there is a potential of about 0.9 million to 1.4 million acre feet annually of additional water supply from recycled water expected by the year 2030.

Major Issues Facing Recycled Water Quality

Salinity of domestic wastewater is always incrementally higher than that of the potable supply received by system customers as a result of ordinary use. In areas with higher mineral concentrations in the potable supply, which is common in many areas of Ventura County, wastewater salinity is further increased by the use of softeners and other point-of-use treatment. Both general increases in mineral concentrations and increases in specific mineral constituents such as Chloride, Sodium and Boron, can make recycled wastewater unsuitable for direct reuse for many purposes without further treatment. These advanced treatments generally result in higher costs and the need for management of brine concentrates as noted above.

Major Issues Facing Competing Uses for Recycled Water

In many cases, notably for the Ojai Valley Sanitary District and the City of Ventura, in-stream uses of wastewater effluents for habitat maintenance may limit the availability of recycled water. Expansion of recycled water use must carefully consider the potential environmental impacts of removal of flow from current receiving waters. The City of Ventura and the Ojai Valley Sanitary District are also conducting feasibility studies of the potential for recycling of portions of the effluent from the Ojai Valley Sanitary District Plant in the Ventura River Watershed.

Related Documents and Websites

California Department of Water Resources, Recycling Programs and Information
http://www.owue.water.ca.gov/recycle/

Local Urban Water Management Plans

Water Recycling 2030, California Recycled Water Task Force
Report, 2003.

SWRCB, California Municipal Wastewater Reclamation
Survey, 2003.

Water Recycling 2000, California's Plan for the Future.

State Water Conservation Coalition, Reclamation/Reuse Task Force and the Bay Delta Reclamation Sub-Work Group, 1991.

Southern California Comprehensive Water Reclamation and Reuse Study, Phase II. Final Report (Draft), 2000.

Other reports such as DWR Water Recycling Survey, 1993; California Water Plan Update 1998.

Recommended Future Projects or Actions

Many local agencies currently treat wastewater so that it can be recycled for non-potable uses such as irrigation of golf courses, street medians, school athletic fields, and dust abatement. There are a number of issues that local agencies must consider when developing recycled water projects. These include economic, financial, institutional, regulatory considerations, water quality, seasonal demands, and public acceptance. Implementation of recycled water projects helps improve water supply reliability and frees up potable water for other uses. Much more can be done, both locally and at the State level, to increase the use of recycled water.

The California Water Plan Update 2005 includes the following recommendations for increasing water recycling on a Statewide level:

1. State and local agencies and various stakeholders should actively follow up with the implementation of the Recycled Water Task Force recommendations as they constitute a culmination of intensive study and consultation by a Statewide panel of experts drawing upon the experience of many agencies. Such recommendations provide advice that can be used as a toolbox for communities to improve their planning of recycled water projects. (Implementing parties: State and local agencies and various stakeholders)

2. Funding should be increased beyond Proposition 50 and other sources toward sustainable technical assistance and outreach, advanced research on recycled water issues, and adequate water reuse/recycling infrastructure and facilities. (Implementing parties: Federal, State, and local agencies)

3. The State should encourage an academic program on one or more campuses for water reuse research and education; develop education curricula for public schools; and encourage institutions of higher education to incorporate recycled water education into their curricula. (Implementing parties: State and academic institutions)

4. Agencies should engage the public in an active dialogue and participation using a community value-based decision making model (determining what a community values, then making decisions based on that information) in planning water recycling projects. (Implementing parties: State and local agencies)

5. State should create uniform interpretation of State standards in State and local regulatory programs and clarify regulations pertaining to water recycling including: health regulations, permitting procedures, cross-connection control and dual plumbed systems. (Implementing parties: State agencies)

Future Water Recycling Plans - Local

At the local level, a variety of recycled water projects are in the planning stages and awaiting funding. Funding for some of these projects has been identified.

The City of Simi Valley/Ventura County Waterworks District No. 8 is currently updating the Simi Valley County Sanitation District Reclamation Facilities Plan (Engineering Science, 1992). The Plan will further describe recycled water opportunities.

The City of Oxnard is implementing its Groundwater Recovery Enhancement and Treatment (GREAT) program. The City of Oxnard's GREAT Program includes the construction of the Advanced Water Purification Facility (AWPF), a recycled water membrane treatment facility, that will provide high-quality recycled water for industrial processes, landscape irrigation, agricultural irrigation, and for groundwater injection, as a seawater intrusion barrier. The use of recycled water for industrial processes or landscape irrigation will directly offset the use of blended potable water that the City would have had to produce or purchase. The use of the recycled water for agricultural irrigation, with corresponding pumping cutbacks by farmers receiving the recycled water, or groundwater injection will result in FCGMA credits to the City. The City will then be able to pump groundwater from wells less vulnerable to seawater intrusion or purchase groundwater from UWCD.

The GREAT Program also involves one or more desalter facilities, that will remove dissolved minerals from the pumped groundwater, in order to maintain blended water quality. Brine concentrates from the desalters will be initially conveyed through the City's wastewater collection system to the City's Wastewater Treatment Plant, and will be discharged to the ocean, via the plant's ocean outfall, along with the normal plant effluent. Eventually, the GREAT Program involves the construction of a separate brine concentrate conveyance system. The GREAT Program's AWPF Project involves the creation of a demonstration scale treatment wetlands to remove contaminants from the brine concentrate produced by the membrane treatment process. If successful, the City may seek regulatory approval to provide the wetlands-treated brine concentrate to the Coastal Conservancy for use in reestablishing the adjacent Ormond Beach Wetlands. The Blending Station No. 1 Desalter is currently under construction. The AWPF Project, Phase I, which will produce 6.25 mgd of recycled water, is in final design, and is expected to be completed in early 2010.

Desalination concentrates will be conveyed through the Brine Line to enhance wetlands in the Ormond Beach area. The M&I projected yield from the first phase of this project is approximately 1250 acre feet per year by the year 2010.

VCWWD No. 1, the City of Thousand Oaks, the Camarillo Sanitary District, and the Camrosa Water District plan on recycling all of their wastewater, while the Triunfo Sanitary District plans to continue to reclaim a portion of their treated effluent.

The City of Ventura operates the Ventura Water Reclamation Facility (VWRF) which provides recycled water for irrigation on City and private landscaping, and also to several local golf courses. The remaining treated effluent is discharged into the Santa Clara River Estuary. The City plans to expand use of recycled water for landscape irrigation from 871 acre feet per year in 2005, to 3971 acre feet per year by the year 2025 (Urban Water Management Plan Update 2005). Over 7000 acre feet per year is currently discharged into the Estuary for wetland enhancement.

The City of Ventura and the Ojai Valley Sanitary District are also conducting feasibility studies of the potential for reclamation of portions of the effluent from the Ojai Valley Sanitary District plant in the Ventura River Watershed.

Integration with Other Strategies

Implementation of water recycling projects has the potential to benefit the following other water management strategies:

- Ecosystem restoration
- Environmental and habitat protection and improvement
- Water supply reliability
- Groundwater management
- Recreation and public access
- Water conservation
- Water quality protection and improvement
- Wetlands enhancement and creation
- Conjunctive use
- Imported water
- Land use planning
- Surface storage
- Watershed planning
- Water and wastewater treatment

Possible Funding Sources

- State and Federal grants
- Local funding

5.2.14 Water Supply Reliability

Description

A primary mission of a water agency is to assure a reliable supply of water to local water users (customers). In general, reliability means that, under any circumstance, including prolonged droughts or emergencies, the supply of water will be adequate to meet the needs of customers. In order to determine whether a region's water supply is reliable, local agencies must evaluate the current and projected safe annual yield of all water sources, determine the current and projected annual demand of all users, and establish an approach that conjunctively manages supplies, monitors and protects water quality and develops new supplies when shortfalls are projected. In order to maintain or improve a region's reliability, its management portfolio must be diverse, including a broad range of water supply options, and water management actions and strategies.

The Urban Water Management Planning Act (Act) contained in California Water Code Sections 10610 through 10650, requires that "every urban water supplier shall prepare and adopt an Urban Water Management Plan". Urban water supplier is defined as "a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre feet of water annually". Water supply reliability is an important element of these plans. All the urban water agencies in Ventura County that fall under this provision, have prepared and adopted such plans, which are updated every five years.
In addition, several water agencies in Ventura County participated in an Integrated Resource Plan (IRP) developed by the Metropolitan Water District of Southern California in 1996 (updated in 2003). Through the IRP process, regional targets were established for the development of water resources including water conservation, water recycling, desalination, Colorado River deliveries, State Water Project (SWP) deliveries, water transfers, and storage in groundwater basins and surface reservoirs. That effort complements this IRWMP process, whereby local programs and projects are identified to implement water resource strategies thereby maintaining and/or improving water supply reliability in Ventura County, and indeed, in Southern California.

See Bibliography for additional information on these plans.

Background and Existing Efforts – Local and Statewide

Each water supply source (i.e., imported water, local groundwater, etc.) has its own reliability characteristics. In any given year, the variability in weather patterns around the State may affect the availability of supplies. Many agencies throughout California rely on groundwater during extended dry periods, when surface or imported water sources are less available, and rely more on imported State Water supplies during periods when Northern California has wetter conditions. Over the years, many areas have contracted with the State to deliver imported water from the SWP, which supplements local surface and groundwater supplies and improves reliability of water service to customers. This pattern of "conjunctive use" has been common practice in many parts of the State. However, natural variability in SWP supplies affects the ability of those agencies that lack sufficient storage or local supplies to meet water demands for their service areas. The reliability of Ventura County's main sources of supply, imported water and local groundwater, is discussed in greater detail below.

Imported State Water Supplies

Ventura County's local water resources are not of sufficient supply or quality to meet existing water demands. As such, imported water from the State Water Project is conveyed over 500 miles from Northern to Southern California through an elaborate system of reservoirs, aqueducts, and pump stations. Water is filtered and disinfected at Metropolitan's Joseph Jensen Filtration Facility in Granada Hills. The Calleguas Municipal Water District (Calleguas) receives the treated water from Metropolitan Water District (Metropolitan) and either stores the water in Lake Bard to be treated later, or distributes it among 23 retail purveyors throughout Ventura County. Imported water accounts for 25 percent of the water utilized in Ventura County. But because local agencies blend imported water with groundwater in order to meet water quality standards, imported water is received by over 75 percent of the population (550,000 people), including businesses, and some agriculture. In addition, the United Water Conservation District (UWCD), Casitas Municipal Water District (Casitas MWD) and the City of Ventura hold entitlements to a total of 20,000 AFY of additional SWP supplies. Such imports are only arranged by UWCD when conditions are appropriate to facilitate storage and aid in basin management (i.e., preventing the spread of groundwater contaminants).

State Water Project deliveries vary annually with contractor demands and projected water supplies from tributary sources to the Delta, which are based on snow pack in the Sierra Nevada, reservoir storage, operational constraints, and demands of other water users. Historically, the SWP has been able to meet all contractor requests for water except during the drought years (such as1977, 1991-92, and 1994). In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1,396,000 AF in calendar year 1990 prior to the drought of the early 1990s.

DWR reports in its 2005 SWP Delivery Reliability Report that existing SWP contractors will on average receive 69 percent of their full contracted (Table A) amount for 2005 demand conditions and 77 percent of their full Table A amount for 2025 demand conditions. Table A amount (formerly referred to as "entitlement") is named for "Table A" in each SWP Contractor's Water Supply Contract. It contains an annual buildup in Table A amounts of SWP water, from the first year of the Water Supply Contract through a specific year, based on growth projections made before the Water Supply Contract was executed. For most Contractors, the maximum annual Table A amount was reached in 1990. The total of all SWP Contractors' maximum Table A amounts is currently about 4.17 million acre feet per year.

Local Groundwater

In the Calleguas Creek Watershed, retail-level water purveyors rely on a combination of imported water and groundwater to meet demands. Though considered a "supplemental" supply, imported water now serves as a primary water source for cities in the watershed. The actual proportion of import to groundwater varies with the availability of State Project Water and the amount and quality of groundwater available. Often imported water is blended with local groundwater to provide better water quality. Over the past century, a combination of increasing urban and agricultural activities in the area has caused groundwater overdraft, seawater intrusion, and groundwater contamination within the region.

To ensure reliability of local groundwater supply, most of the groundwater basins in the Region are managed. The Fox Canyon Groundwater Agency (FCGMA) and United Water Conservation District (UWCD) are the two largest entities focused on groundwater conservation and management. A majority of the water purveyors in the County pump groundwater from a basin managed or

monitored by one of these two agencies. Those that pump from other basins have developed, or are currently preparing, groundwater management plans to assist in maintaining the reliability of their local groundwater supply. Operation of UWCD's Freeman Diversion Project is critical in maintaining groundwater levels beneath the Oxnard Plain.

Other basins are also being addressed. The Santa Paula Groundwater Basin is adjudicated and has its own plan to address reliability. There is also a groundwater management plan for the Ojai Groundwater Basin.

Water Reliability Strategies

In areas of the State where source water (county of origin) is high quality and plentiful, reliability is measured against population growth and general demand forecasts. However, other areas must contend, not only with growth, but also with the variability of supplies. Groundwater is vulnerable to overdraft and contamination, particularly to seawater intrusion in coastal regions. Surface water is subject to hydrologic/weather conditions, such as drought, pollution and environmental constraints, as it also serves as habitat for various species. The reliability of Ventura County's main source of imported water, the State Water Project, is threatened on several fronts, due to its passage through the Sacramento San Joaquin Delta. According to DWR, the levees, upon which the SWP relies to convey water south, have a 66 percent chance of catastrophic failure in the next 50 years due to seismic and flood risks in the region. In addition, declines in Delta fish populations and Delta water quality limit the export capacity of the SWP.

To address these uncertainties, water agencies are working to diversify the water resources mix so that regions are less dependent on a single source of supply.

Reliability strategies include investments in following: conjunctive use, groundwater management, conservation, recycling, desalination (brackish & ocean), water transfers (North/South limited to SWP/Banks pumping capacity), interconnection of adjacent systems where these do not now exist, and investments across watersheds that can provide system redundancy and allow for conjunctive use of local resources.

In general, water purveyors import water to meet the difference between demand and available local water supply (i.e., groundwater and recycled water). Therefore, the reliability and delivery of the imported water is vital to ensuring these demands are met. Furthermore, for many of the water purveyors, imported water also serves as a means for blending with local groundwater supply to meet water quality standards.

With the variability of surface water and groundwater supplies and potential uncertainty about the availability and cost of imported water, managing the quantity of water in Ventura County is critical. By increasing use of local supplies and reducing dependence on imported water, water supply reliability can be enhanced. As seen in Metropolitan's IRP process, one of the goals of implementation of water management strategies is the enhancement of water supply reliability. Examples of some of these strategies and their ability to impact reliability are discussed below. Details regarding some of the projects mentioned herein are provided in Section 6.

Conjunctive Use

Conjunctive use refers to the planned joint use of surface and groundwater to improve the reliability, economics and firm yield of the total water resource. It allows water managers to take advantage of occasions when certain supplies are more plentiful than others and includes the use of recycled water, conservation, and other measures employed to maximize the water supply to meet present and future needs.

One example of using a conjunctive use strategy is Calleguas' Las Posas Basin Aquifer Storage and Recovery (ASR) project. The Las Posas Basin ASR project is designed to provide for subsurface storage of up to 300,000 acre feet of imported water. The completion of the Las Posas ASR Project will improve water supply reliability by storing (excess) imported water in the Las Posas groundwater basin during the wetter winter months. This supply will be available to the region in times of drought or emergency, when SWP supplies may be interrupted or limited.

Conjunctive use allows for the management of groundwater to reduce dependence on less reliable imported water.

Efficiency (Conservation)

Water use efficiency is an important means to improve reliability. Ongoing water use efficiency programs being implemented by local water agencies are described in their Urban Water Management Plans and in updates to the California Urban Water Conservation Council by agencies which have signed the Memorandum of Understanding for Urban Water Conservation.

Water use efficiency programs help extend local supplies and augment reliability.

Groundwater Management

As described in detail in the Draft Fox Canyon Groundwater Management Agency's Groundwater Management Plan, and in other groundwater management plans and in the Urban Water Management Plans, there are efforts underway to better manage local groundwater resources to improve reliability. For example, Ventura County Waterworks District No.1 and Calleguas are considering a project to pump and treat water from the South Las Posas Basin. Treatment of this water is necessary to reduce total dissolved solids and chloride concentrations to acceptable levels. 5000 acre feet per year of water could potentially be developed from this source that would not otherwise be usable. Also, the United WCD has, for many years, been enhancing groundwater supplies through recharge projects.

By pumping and treating groundwater for potable use in lieu of using imported water, water supply reliability would be increased and reliance on the use of imported SWP water would be reduced.

Water Recycling

Several local jurisdictions are studying or implementing recycling projects which enhances reliability due to the predictability and drought-proof nature of recycled water. The Cities of Ventura and Oxnard, and the Camrosa Water District are a few of the agencies already implementing substantial recycling efforts. The Ventura County Water Works District No. 1 (VCWWD No. 1) is proposing to expand their recycled water system to provide recycled water for use at agricultural and/or additional landscape irrigation sites in the VCWWD No. 1 service area.

By making recycled water available for non-potable uses, another drought-proof and constant source of water is created for some users. In addition, other potable supplies are made available for potable purposes. The result is improved use of local supply, increasing water supply reliability and reducing dependence on imported SWP water.

Brine Disposal

Calleguas is developing a brine line project that will be used to convey reverse osmosis concentrates and other acceptable brines from Simi Valley, Moorpark, Camarillo, and Camrosa to an ocean outfall for disposal. Development of this project will allow agencies in proximity to the brine line to develop groundwater treatment projects that can further enhance the yield of local water supplies.

By providing brine disposal from desalting of brackish groundwater, the brine line allows the local groundwater to be used for beneficial potable and agricultural use, thus increasing water supply reliability and reducing reliance on the use of imported SWP water.

Desalination

There are several proposed desalination projects in Ventura County, focusing on treatment of brackish water. One example is the Camarillo Groundwater Treatment Facility project involves the construction of a four million gallon per day brackish groundwater treatment facility. The facility would be located in Camarillo and be owned by the City. Reverse osmosis (RO) treatment technology would be used to produce potable quality water. Brine waste, containing concentrated salts from the RO process, would be discharged to the brine line and exported out of the Watershed. Other examples are the Moorpark and Somis desalters.

The construction of desalters, like the Camarillo Groundwater Treatment Facility, would allow brackish water that is currently unusable to be used beneficially, increasing water supply reliability and removing salts through brine disposal outside of the Watershed.

Stormwater Management

The Conejo Creek North Fork -Wildwood Park Water Management Enhancement Project (Wildwood Project) would improve approximately 2900 feet of the North Fork of Conejo Creek. The objectives of the project are: to enhance and create wetland habitat; restore a portion of the Conejo Creek Watershed; provide for stormwater capture; increase groundwater recharge and infiltration; and improve water quality from stormwater runoff of the surrounding housing area.

By detaining stormwater flows, the Wildwood Project would enhance groundwater recharge and infiltration and improve the quality of recharged flows, thus increasing water supply reliability and reducing reliance on the use of imported SWP water.

Water Transfers

One of the primary goals of Metropolitan and its member agencies is to develop additional reliability through the California Aqueduct by purchasing out-of-region storage for SWP water and SWP water transfers. Metropolitan's IRP calls for developing a total of 460,000 AF of dry-year storage and water transfer deliveries by 2020. Metropolitan has developed groundwater storage programs with Semitropic Water Storage District and Arvin-Edison Water Storage District, which together will provide up to 245,000 AFY during dry years.

Another example of a local water transfer program is the Calleguas and United Water Conservation District's Supplemental Municipal & Industrial (M&I) Program. Up to about 4000 AF per year of water could be delivered under this Program, depending on groundwater conditions and availability, by allowing customers who buy water from both Calleguas and UWCD to utilize

Calleguas' GMA credits to receive supplemental water from the surplus in the Oxnard-Hueneme system.

Water transfers allow for movement and storage of surface water, groundwater, and "paper water" in order to maximize current supplies and increase the reliability of future supplies.

Blending

Blending refers to the mixing or "blending" of local groundwater supplies with imported surface water to balance water quality and cost. A number of agencies within Ventura County blend their supplies for this purpose, including the Cities of Oxnard (50-50 blend), Camarillo, Moorpark, Simi Valley, and Camrosa Water District.

Blending groundwater not suitable for potable uses increases its water quality and allows the local groundwater to be used for beneficial potable and agricultural use, thus increasing water supply reliability and reducing reliance on the use of imported SWP water.

Benefits of Implementation

The overall benefit of water supply reliability is the increased probability of being able to meet the water demands within the Region and help protect the purveyors' service areas from droughts and emergencies through development of reliable local resources.

Increased reliability through local supply development offers benefits, not just to local resources and habitat, but to the Bay-Delta ecosystem, where the imported water supply originates and to other water users within the region. Increased reliability also offers economic benefits by allowing for flexibility in management of local resources which helps in their cost-effectiveness, and has water quality benefits from strategies that address TMDLs.

Furthermore, implementation of these reliability strategies is an important aspect in the maximization of benefits, especially since water quality and water quantity issues for the Region must be addressed at the watershed level. The coordination and collaboration efforts of the Region's stakeholders and regulatory agencies allows for the implementation of projects that would benefit the entire Region, not just one agency's service area or one population.

Constraints to Implementation

Interdependence is key to the success of these strategies. That is, water supply reliability cannot truly be achieved unless the dependence on imported water is reduced. Similarly, the individual strategy objectives require the coordination and regional planning efforts developed through the process of increasing water supply reliability. Finally, the reduction in imported water cannot occur until the local water supply is being used most efficiently. This requires increasing local water supply reliability and improving local water quality.

Related Documents and Websites

Documents

Urban water supply reliability issues are addressed specifically in agencies' Urban Water Management Plans which are required to be updated every five years. A number of local agencies are required to comply with this law based on their size (over 3000 AF of water served to M&I

customers, or over 3000 M&I service connections). Calleguas, Metropolitan, the Cities of Camarillo, Fillmore, Oxnard, Thousand Oaks and Ventura, the Camrosa Water District, the Casitas Municipal Water District and VCWWD No. 8 have all prepared 2005 UWMPs that are available electronically from the individual agencies.

In addition, Metropolitan's 1996 IRP and the Report on Metropolitan's Water Supplies have recently been updated. The 2003 Update of the IRP was intended to provide a review of resource development goals and current levels of achievement relative to the 1996 report, identify significant changed conditions that may affect water resource development relative to the 1996 report, and evaluate the reliability of the preferred water resource mix (adjusting targets as necessary to reflect changed conditions and extending the projections through 2025.) The 2003 Update is available on Metropolitan's website.

Other helpful documents include the CALFED Programmatic Record of Decision (ROD), reflecting the long-term plan for the Bay-Delta and goal of increasing the reliability of SWP dependent on the Bay-Delta resources; and the California Water Plan 2005 Update (Bulletin 160-05) which provide resource management strategies to help local agencies and governments manage their water and related resources within the State.

Web Resources

- Information regarding urban water management plans: http://www.owue.water.ca.gov/urbanplan/index.cfm
- Metropolitan Water District of Southern California's IRP: http://www.mwdh2o.com/mwdh2o/pages/yourwater/irp/integrated01.html
- California Bay-Delta Program, Record of Decision: http://calwater.ca.gov/Archives/GeneralArchive/RecordOfDecision2000.shtml

Recommended Future Projects or Actions

Agencies within the Region covered in this IRWM Plan have identified objectives and priorities with the purpose of assuring a reliable supply of water. Specific management strategies and projects have been included which will be developed or enhanced in order to continue to assure a reliable supply for local communities.

These projects include water recycling, desalination, conjunctive use, and water transfers. Each of these water management strategies are discussed in more detail in the remainder of this section. Individual projects are discussed in Section 6.

Integration with Other Strategies

Maintenance and improvement of water supply reliability is dependent on many of the water management strategies contained in this IRWMP as follows: Water Supply Enhancement.

- Groundwater management
- Water conservation
- Water quality protection and improvement
- Water recycling
- Conjunctive use
- Desalination

- Imported water
- Land use planning
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Possible Funding Sources

- State and Federal funding
- Grant funding
- Current and future bond funding
- Water rate increases
- Incentive Payments

5.2.15 Water Transfers

Description

Excerpt from the California Water Plan Update 2005

A water transfer is defined in the Water Code as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer or exchange of water or water rights. Many transfers, such as those among contractors of the State Water Project or Central Valley Project, do not fit this definition. A more general definition is that water transfers are a voluntary change in the way water is usually distributed among water users in response to water scarcity. Transfers can be from one party with extra water in one year to another who is water-short that year. (Source: California Water Plan, Section 2, Chapter 23)

Transferring water supplies, or water rights, from one area to another is an important tool for water management in California, particularly agriculture to urban transfers. Eighty percent of the water made available through the State Water Project goes to agricultural users. Urban use accounts for less than twenty percent. It came as no surprise when transfer activity increased substantially during the drought of the late 1980s and early 1990s, especially through the State-run Drought Water Bank. The Bank was flush with water made available from agricultural users. In recent years, according to the Department of Water Resources, water transfers have increased Statewide from 80,000 acre feet in 1985 to 1,250,000 acre feet in 2001.

The following information is an excerpt from the California Water Plan 2005, Section 2, Chapter 23:

> *Transfers can be between water districts that are neighboring or across the State, provided there is a means to convey and store the water. Water transfers can be a temporary or permanent sale of a water right by the water right holder; a lease of the right to use water from the water right holder; or a sale or lease of a contractual right to water supply. Water transfers can also take the form of long-term contracts for the purpose of improving long-term supply reliability. Generally, water is made available for transfer by five major sources:*
>
> 1. *Transferring water from storage that would otherwise have been carried over to the following year. The expectation is that the reservoir will refill during subsequent wet seasons.*
> 2. *Pumping groundwater instead of using surface water delivery and transferring the surface water rights.*
> 3. *Transferring previously banked groundwater either by directly pumping and transferring groundwater or by pumping groundwater for local use and transferring surface water rights.*
> 4. *Making water available by reducing the existing consumptive use through crop idling or crop shifting or by implementing water use efficiency measures.*
> 5. *Making water available by reducing return flows or seepage from conveyance systems that would otherwise be irrecoverable.*

One of the primary goals of Calleguas Municipal Water District (Calleguas), through Metropolitan, is to develop additional reliability through the California Aqueduct by purchasing out-of-region

storage for State Water Project (SWP) water and SWP water transfers. In Ventura County, water transfers can be classified first with respect to whether it's from outside the County with imported water, or within the County. Transfers within the County can occur between groundwater basins and watersheds. To date, most water transfers have been within the County and are closely linked with local groundwater management strategies. The Fox Canyon Groundwater Management Agency (FCGMA) is a Special District that manages groundwater in the southern portion of Ventura County and has overseen this activity.

Benefits of Implementation

Water transfer benefits can be realized generally in the following areas:

- Water supply enhancements
- Improved water reliability
- Water quality improvements
- Groundwater safe yield management
- Economic benefits to buyer and seller

Moving or transferring water from one groundwater basin to another can be beneficial to groundwater pumpers in both basins, if such transfers are handled properly. There are groundwater basins in the County that are filled to capacity, primarily because the water is non-potable. South Las Posas groundwater basin on the east side of the County is an example. Transferring water from a full basin to serve users that overlie an overdrafted aquifer, like Pleasant Valley farmers adjacent to the Oxnard Plain, produces an obvious benefit. Pumping reductions in the overdrafted basin will help provide for safe yield management. Furthermore, local water is being utilized, which keeps pressure off of the State's imported water system.

There are also economic benefits associated with such water transfers. The cost of groundwater is typically a factor of three less than imported State Project Water. There are also over-pumping penalties in place by the Fox Canyon Groundwater Management Agency equal to the cost of treated imported water. Transferring water from outside the County from the State Water Project has the advantage of providing water of very good quality. Used in combination with other management strategies, like conjunctive use, the County can manage its many water quality challenges. There are economic benefits with this as well, if the cost of local treatment far outweighs the cost of transfer water. Calleguas purchases water from Metropolitan which uses a tiered rate structure. There are opportunities for Calleguas to transfer water at a cost that is less than Metropolitan's higher tiered price (Tier 2).

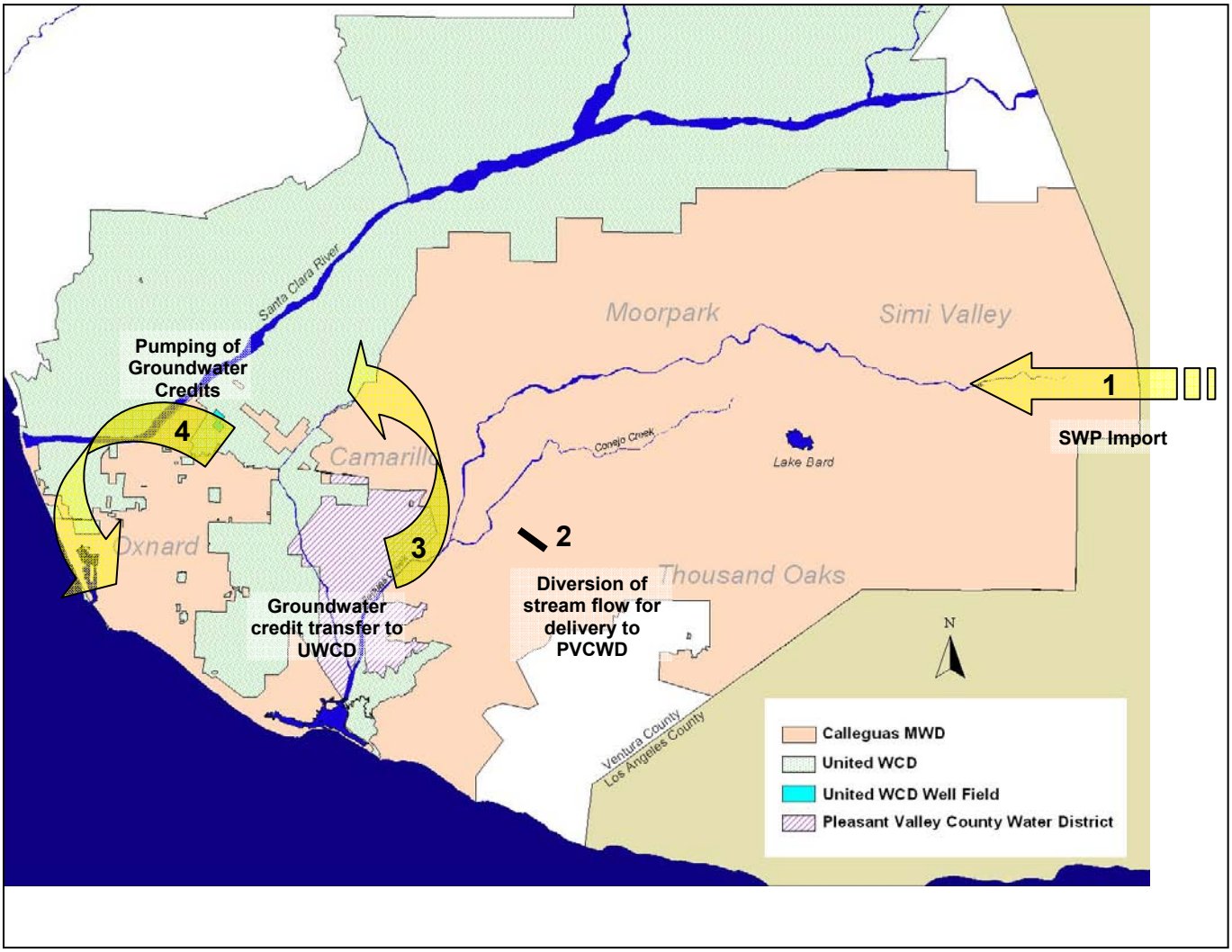
Existing Efforts

<u>Water Transfer Between Watersheds</u>

An excellent example of a successful water transfer in the County involves cooperation between multiple agencies in two watersheds. Flows in the Conejo Creek in the Calleguas Creek Watershed are dominated by high quality wastewater flows from the city of Thousand Oaks; a city that relies on imported State Project water for all of its supply. Consequently, flows in the creek are classified by the Fox Canyon Groundwater Management Agency (FCGMA) as "foreign water" since they originated outside the County.

Calleguas purchases this high quality wastewater from the City of Thousand Oaks. Calleguas

then sells water to Camrosa Water District. A downstream diversion structure owned and operated by Camrosa diverts water from Conejo Creek to provide a non-potable water source for agricultural and landscape irrigation within its service area. Flows are also diverted to a pipeline and pump station operated by Calleguas for sale to a large agricultural agency, the Pleasant Valley County Water District. Because Pleasant Valley is a large groundwater pumper in an over-drafted area, they reduce pumping by an amount equal to the Conejo Creek water diversion. Procedures developed by the FCGMA allow Calleguas to accrue an acre-foot for acre-foot groundwater credit. That groundwater credit is then transferred out to the United Water Conservation District (UWCD) in the Santa Clara River Watershed where it can be pumped from the Oxnard Forebay when conditions permit. UWCD then pumps that water and sells it to the UWCD Oxnard-Hueneme Pipeline System customers, including the City of Oxnard, Port Hueneme Water Agency, and several small mutual water companies, to help meet potable demands.. Since the City of Oxnard and Port Hueneme Water Agency utilize imported and local water, they are able to reduce import demands and take advantage of the lower priced water supplied by UWCD. This approach is supplying up to 4000 acre feet to all participants.



Central Valley Water Transfer

UWCD and Calleguas are exploring a water transfer from the Central Valley that would utilize UWCD's system to convey water to the Oxnard Plain. Water conveyed from the California Aqueduct to Lake Pyramid would be released from Pyramid Dam and flow 10 to 12 miles down Piru Creek until entering the upper headwaters of Lake Piru which is owned and operated by UWCD.

From Lake Piru, UWCD would release an equivalent amount of water from Santa Felicia Dam (at Lake Piru), and allow that water to flow down the Santa Clara River. UWCD would then divert flows 12 miles downstream from Lake Piru at the Vern Freeman Diversion facility. Water captured at the Freeman Diversion can be sent to farms east of the river or placed into groundwater recharge ponds adjacent to the river in what is called the Oxnard Plain Forebay Groundwater Basin.

Constraints to Implementation

Water transfers are typically unique. But the elements associated with a successful transfer are common to most and include:

- A willing buyer and seller
- Available conveyance capacity
- Point-to-point wheeling charges, including power costs
- Water quality requirements
- Institutional constraints
- Environmental constraints
- Third-party impacts

Care must be taken in any proposed transfers that would adversely affect riparian vegetation, wetlands, wildlife habitat or other aspects of the natural environment. State law prohibits transfers that would have an unreasonable impact on fish, wildlife or other in-stream uses; therefore, the State Water Resources Control Board cannot approve such transfers (Water Code Section 1025.5(b), 1725, 1736). The 1992 CVP Improvement Act (P.L. 102-575) prohibits transfers that significantly reduce the quantity or quality of water available for fish and wildlife. Similarly, public agency facilities cannot be used to convey transferred water if fish, wildlife or other beneficial in-stream uses are unreasonably affected or if the overall economy or environment in the county where the water originates would be unreasonably affected (Water Code Section 1810(d)). State and Federal endangered species laws may prohibit harm to particular plants, animals or habitat. Thus, a proposal to conserve and transfer runoff, tail water, or seepage water may be barred by the legal protections accorded to the plant and animal beneficiaries of the prior "inefficient" use.

One of the most important considerations is the protection of the rights of others not involved in the transfer, thus avoiding third-party impacts. Recent practice has tended to place the burden of proof that no harm will be done on the transfer proponents.

Related Documents and Websites

Urban Water Management Plans

The California Department of Water Resources (DWR) description of water transfers in California: http://www.watertransfers.water.ca.gov/

Excerpts from the California Water Plan, 2005 describing water transfers, oversight, etc.: http://www.waterplan.water.ca.gov/docs/cwpu2005/Vol_2/V2PRD23_watertrans.pdf#search='water%20transfers'

State Water Project – Translating Concepts into Reality, 1993 (includes definitions and terms): http://www.swpao.water.ca.gov/transfers/index.cfm

Recommended Future Projects or Actions

Water transfers will undoubtedly play a major role in Ventura County's water future; however, most transfer activity has been carried out between specific water suppliers. For the most part, uniform criteria and procedures have not, been developed and accepted for general use where water transfers are concerned. Some common truths and observations learned from past water transfers:

1. Every deal is unique and must be evaluated separately; however, there are some principles that are common to most proposals.
2. Every evaluation requires some degree of informed judgment about hydrologic reality.
3. Prospective water sellers and water operators often have differing views of hydrologic reality.
4. Care must be taken to avoid unintended reductions in the supplies of water users who are not parties to the transfer.

Integration with Other Strategies

- Ecosystem restoration
- Environmental and habitat protection and improvement
- Water supply reliability
- Flood management
- Groundwater management
- Recreation and public access
- Stormwater capture and management
- Water quality protection and improvement
- Water recycling
- Conjunctive use
- Desalination
- Imported water
- Land use planning
- Surface storage
- Watershed planning

Possible Funding Sources

Ventura County's population continues to grow, while dependable new sources of water are becoming more difficult to secure. This is due to many factors such as the passage of various laws and regulatory actions, etc. Since prospects for developing any substantial additional water supplies through traditional means (such as building new reservoirs) are limited, increasing

attention is focused on water transfers. Many believe that a market-based allocation system would result in more "efficient" water use. Thus, water transfers are receiving strong support and are viewed by some as a simple answer to a complex problem.

The most likely sources of funding are listed below.

- Local funding (i.e., joint funding from water districts' general funds, user fees or surcharges)
- State and Federal grants (DWR, USBR, EPA, SWRCB/RWQCB)
- Local taxes or assessments to users, landowners, or beneficiaries of the water transfer

5.2.16 Water Treatment And Distribution System Water Quality

Description

Water Treatment

Water treatment facilities are designed to treat water sources to produce drinking water that is safe for human consumption, and that meets all regulatory standards promulgated under the Federal Safe Drinking Water Act (SDWA) of 1974, and currently regulated through the Surface Water Treatment Rule (SWTR) amendment to the Act. The California Department of Health Services (DHS) has primacy for enforcing these rules for all public water systems in the State of California. Public water suppliers are responsible for conducting regular water quality sampling, and must report the findings to DHS on a monthly basis.

Water treatment facilities are designed to meet maximum flow rates that equal current or future demands of a particular community. Other design considerations include the type and quality of a water source needing to be treated. Conventional surface water treatment begins with screening out any large particles and/or debris, followed by pretreatment (sedimentation, algae microstraining, chlorination, etc.), and coagulation/flocculation. Coagulants are chemicals mixed into the water that cause very small suspended particles to bind together into larger clumps called floc. Floculated water is then sent to large sedimentation basins where the heavy floc settles out prior to filtration. Direct treatment facilities bypass settling and apply flocculated water directly to the filters. Filters are usually layered with a combination of sand, gravel, and anthracite coal. Treatment concludes with injection of chlorine which prevents any microorganism re-growth in the distribution system. Sometimes the pH is adjusted to minimize lead and copper leaching in private plumbing. Fluoride may be added for public health purposes and is required for large water systems in California (over 10,000 connections).

The SWTR requires all surface waters be filtered and disinfected to inactivate any microorganisms associated with the source water. Treatment plants are primarily regulated by disinfection credits and water clarity (turbidity). Groundwater, however, is naturally filtered when it passes through soils and is usually only required to be disinfected. Groundwater often contains other constituents that require removal or reduction (salts, iron, manganese, etc. – See Section 2.1.9). Nitrate can show up in groundwater as well due to dilapidated septic tank systems or agricultural fertilizer runoff.

There are several methods for desalting groundwater, but the most common method is incorporating some type of microfiltration and/or reverse osmosis system to the water, which removes the salts and produces a higher quality of drinking water. Iron and manganese are a common problem and are usually removed or reduced by filtering the water through sand, anthracite coal, or some other commercially available filter media. Nitrate is difficult to remove and usually requires the source of nitrate be controlled or eliminated. Blending with other water sources, pumping and treating, or abandoning the well for other sources are other options. Nitrate is an issue because of its potential to cause "Blue Baby Syndrome" (infantile methaemoglobinaemia) in small children, which essentially strips oxygen from a child's blood. Nitrate can also cause eutrophication (water pollution caused by excessive plant nutrients) if released in excess amounts into the environment.

Distribution System Water Quality

The purpose of a distribution system is to distribute treated potable water to customers and to prevent any contamination that could occur. The distribution system must be designed to handle peak customer demands as well as firefighting demands. Distribution systems are regulated by DHS through three main SDWA regulatory rules: the Disinfection/Disinfectant By-Product Rule (D/DBP Rule), the Total Coliform Rule (TCR), and the Lead and Copper Rule (LCR). Title 17 Cross-Connection Regulations (CCR) requires proper backflow prevention programs and devices, to guard against potential contamination from accidental backflow or backsiphonage.

DBPs are formed through the disinfection process when organic material in the water reacts with chlorine or chloramine. The resulting DBPs are known as Trihalomethanes (THMs) and Haloacetic Acids (HAAs), both of which require quarterly monitoring. DBPs are known carcinogens, and are believed to increase chances of cancer from long-term exposure. Though DBPs are usually first formed at a treatment plant, they can increase over time in a distribution system. If a system has long detention times and high water age, DBP concentrations may increase. Tanks and reservoirs that are stagnant, have stratification, or dead zones, can increase DBP levels. Therefore, it is important to keep reservoirs and tanks completely mixed and fresh. Customers located at dead-ends or off of an oversized pipe may have increased levels of DBPs in their water. Therefore, it is beneficial to avoid installing dead-end piping and to install pipe loops whenever possible. The distribution system should be flushed regularly. Customers located at the very far reaches of a distribution system, consequently have the highest water age, and are likely to have higher DBPs in their water. Many utilities have reduced DBPs by switching from free chlorine to chloramine (free chlorine mixed with ammonia) as their secondary disinfectant. Chloramine produces less DBPs because it is not as reactive as free chlorine. Another way to reduce DBPs is to prevent organic material from entering the source water.

The TCR requires that chlorine levels anywhere in the distribution system be detectable at all times and that the system be free of any bacteria (measured by the presence or absence of coliform bacteria). Similar to DBP formation, chlorine loss can occur in systems with high water age, either through unmixed tanks and reservoirs, or dead-end/oversized pipelines. If chlorine levels are lost, bacteria and other microorganisms can re-grow. This is why TCR sample sites are distributed throughout a distribution system and sampled regularly. If pipes break or are replaced, they must be properly disinfected before they are placed back into service. Reservoirs and tanks should be cleaned regularly and pipelines flushed to remove chlorine demand from the distribution system.

The LCR requires monitoring of lead and copper concentrations at specific customer taps once per year. Reduced triennial monitoring is conducted by distribution system customers using a “first flush” method by collecting the sample first thing in the morning after water has sat stagnant in the pipes all night. Usually, lead and copper concentrations are minimal in a utility’s plumbing yet are substantial inside the plumbing of older private residences and businesses (plumbing installed before 1988). Regardless, the LCR requires that water purveyors initiate steps to reduce lead and copper leaching as well as provide free testing and education to the public. Utilities usually increase the pH of the delivered water, which reduces lead and copper leaching at the tap. Educational programs are initiated to educate the public about the danger and usually recommend flushing taps for 30 seconds to 2 minutes first thing in the morning.

Water Treatment and Distribution in Ventura County

There are three major water suppliers in Ventura County that provide water to the majority of Ventura County residents: Casitas Municipal Water District, United Water Conservation District, and Calleguas Municipal Water District. These three Districts provide treatment and deliver wholesale water through their transmission systems to roughly 180 individual public water purveyors.

The following table (Table 5-2) summarizes the major suppliers and their water treatment facilities in Ventura County, their present and future capacities, current treatment method and goals, as well as possible future treatment goals. The table is meant to show overall common treatment trends in Ventura County and is not a full inventory of all treatment facilities in Ventura County (many smaller purveyors may provide additional treatment not listed here). The information provided in this section was taken mainly from 2005 Consumer Confidence Reports (CCRs) and 2005 Urban Water Management Plans (UWMPs) available online.

TABLE 5-2 – SUMMARY OF MAJOR WATER TREATMENT PLANTS IN VENTURA COUNTY

Water Treatment Plant and (Water Source)	Treatment Plant Type	Current and Capacity	Current Treatment Goals	Future Treatment Goals
Casitas MWD				
Marion R. Walker Filter Plant (Casitas Reservoir)	High Rate In-line Pressure Filtration Plant with chloramination	18.6 mgd	Removal of high turbidity, silt, and organic matter.	Solids removal program. Phosphate addition for copper reduction.
Miramonte Well (Ventura River Groundwater Basin)	Chloramination	0.27 mgd	Mix high-nitrate water with Casitas water	Phosphate addition for copper reduction.
United WCD				
El Rio Plant – 12 wells (Oxnard Forebay/ Santa Clara River Recharge)	Chloramination	34 mgd	Mixing high nitrate well sources with low nitrate sources, or use deeper wells. Adding sequestering agent to deeper well sources for iron/manganese.	Desalting plants to remove/reduce salts. Early release of Piru water to dilute nitrates. Further treatment for iron/manganese.
Freeman Diversion (Santa Clara River/ Lake Piru and possible SWP)	Microscreening and Natural Filtration before Recharge	242 mgd	Recharge Oxnard Forebay with higher quality SC River water, provide natural filtration, and counteract saltwater intrusion.	
Calleguas MWD				
Joseph Jensen Filter Plant (from MWD) (Sacramento-San Joaquin Bay Delta Water through SWP)	Conventional with chloramination	750 mgd		
Lake Bard Water Filtration Plant	Direct with pre-microfiltration and chloramination	65 mgd	Zooplankton removal, taste and odor treatment, corrosivity.	

Casitas Municipal Water District

Casitas Municipal Water District source water consists of a mix of local surface water from Casitas Reservoir and local groundwater pumped from the Ventura River Drainage Basin. Surface water is treated at the Marion R. Walker Water Treatment Plant which employs a high-rate, in-line pressure filtration plant to remove turbidity, silt, and other natural materials from the water source. The solids are dried and then transported to the landfill. Groundwater is primarily taken from the

Miramonte Well, which is fairly high in nitrates. Nitrate levels are kept low in the distribution and transmission systems by mixing the well water with Casitas Reservoir water. The Casitas MWD distribution system recently showed elevated levels of copper, but these levels are being reduced by applying phosphate to the water. All Casitas MWD water is chloraminated before delivery to customers.

Though the Casitas Reservoir watershed is Federally protected to prevent potential contamination, the 2005 CCR lists the following as potential contamination sources: boat services (repair and refinishing), petroleum pipelines, body-contact recreation, private sewage disposal systems, livestock and wildlife grazing, pesticide and herbicide use, unauthorized dumping, new growth and homes, traffic accidents, and accidental spills. Potential sources of contamination of the Miramonte Well include fertilizers and animal grazing.

Casitas MWD water is delivered to several water purveyors in Northern Ventura County, including the following:

- City of Ventura
- County of Ventura
- City of Ojai
- Hermitage Mutual Water Company
- Meiners Oaks County Water District
- Ojai Basin Groundwater Agency
- Ranchitos Decielo Mutual Water Company
- Rincon Water & Road Works
- Senior Canyon Mutual Water Company
- Siete Robles Mutual Water Company Sisar Mutual Water Company
- Golden State Water Company
- Sulphur Mountain Road Water Association
- Tico Mutual Water Company
- Ventura River County Water District

United Water Conservation District

United Water Conservation District (UWCD) source water consists primarily of shallow groundwater pumped from the Oxnard Forebay aquifer near El Rio. The El Rio Plant consists of 12 wells and a chloramination facility. The El Rio source is supplemented by Santa Clara River water diverted from Freeman Diversion Dam during the wet season. The Santa Clara River water is sent to the Saticoy Spreading Grounds as well as the El Rio Spreading Grounds located directly adjacent to the El Rio Plant. The El Rio Plant supplies several smaller water purveyors via their Oxnard-Hueneme (OH) Pipeline.

The water has elevated levels of sodium, sulfate, and TDS. These constituents are all above established taste thresholds (U.S. EPA), and therefore may be detected by customers. Nitrate levels often become elevated in summer months (when Santa Clara River recedes), sometimes requiring a particular well be taken off-line. If high nitrate levels show up in several shallow wells, or any other water quality emergencies occur, deeper wells that are free of nitrate would be accessed. Another possible way to alleviate high nitrates is to conduct an early release of Lake Piru water, which would enter the Santa Clara River and be diverted to the El Rio Spreading Grounds.

Deeper wells, though seldom used, have high iron and manganese levels and prompt the addition of a sequestering agent. Even with the addition of a sequestering agent, it is believed the iron and manganese levels could remain elevated and could effect the operations of downstream purveyors. Consequently, further iron/manganese treatment methods are being investigated by the UWCD.

UWCD water is delivered to several water purveyors in Central Ventura County, including the following:

- City of Oxnard
- Cypress Mutual Water Company
- Dempsey Road Mutual Water Company
- Ocean View Municipal Water District
- Port Hueneme Water Agency
- Rio Del Valle and Rio Real Schools
- Saviers Road Mutual Water Company
- Vineyard Avenue Estates Mutual Water Company

Calleguas Municipal Water District

Sacramento-San Joaquin Bay-Delta water is supplied by the Metropolitan Water District (Metropolitan) to Calleguas Municipal Water District (Calleguas) through the State Water Project (SWP). Calleguas in turn supplies the water to several purveyors in Ventura County, including many of the Cities and special districts in eastern Ventura County. The water is treated by Metropolitan at the Joseph Jensen Water Treatment Plant located in Granada Hills, California. The Water Treatment Plan is a conventional treatment plant consisting of screening, coagulation/flocculation, sedimentation, filtration, and chloramination. The water tends to be of higher quality than local surface water due to lower amounts of dissolved solids. Therefore, the water does not require any additional treatment downstream of the plant and is generally accepted as a higher quality water source compared to local groundwater supplies.

Surplus water supplied to Calleguas is stored in Lake Bard, an uncovered and restricted reservoir located in Thousand Oaks. The water is treated at the Lake Bard Water Filtration Plant and supplements the system during peak demands and emergencies. The facility is a direct filtration plant that conducts pre-oxygenation to improve taste and treatability, pre-screening to remove zooplankton, and pre-oxidization (ozone) to improve taste and odor. The water is chloraminated before being delivered to customers.

Calleguas water is delivered to several water purveyors in Eastern and Southern Ventura County, including the following:

- Berylwood Heights Mutual Water Company
- Brandels Mutual Water Company
- California American Water Company
- California Water Service Company
- Camrosa Water District
- Capehart Housing – US Navy
- City of Camarillo
- City of Oxnard
- City of Thousand Oaks
- Crestview Mutual Water Company
- Lake Sherwood Community Services District
- Newbury Park Academy Water Company
- Oak Park Water Service
- Pleasant Valley Mutual Water Company
- Port Hueneme Water Agency Solano Verde
- Golden State Water Company
- Ventura County Water Works Districts (#1, 8 & #19) – City of Simi Valley, City of Moorpark

Other Treatment Facilities

The City of Ventura operates three water treatment plants with a combined capacity of 31 mgd: North Ventura Avenue Treatment Plant, Bailey Conditioning Facility, and the Saticoy Conditioning Facility. The North Ventura Avenue Treatment Plant is a conventional surface water treatment plant that treats Ventura River water, whereas the conditioning facilities remove iron and manganese from groundwater sources. All facilities adjust the pH for lead and copper protection and chloraminate the water prior to delivering to customers.

The Port Hueneme Water Agency utilizes a reverse osmosis/untrafiltration/electrodialysis desalting facility, which allows for further blending options to improve overall water quality for its customers. The City of Oxnard is currently constructing the Blending Station No. 1 Desalter Facility, which will utilize reverse osmosis to remove dissolved minerals from groundwater before blending with other water sources, in order to maintain or improve water quality.

Benefits of Implementation

The most important benefit of water treatment is protecting public health and giving customers confidence and in the quality of their drinking water. Since salt concentrations are elevated in many Ventura County groundwater sources, removing salts from the water makes the water taste better, makes it better for irrigation, and contributes to a healthier watershed. Removing organic material and algae from surface water decreases taste and odor issues and prevents the creation of carcinogenic DBPs. Adjusting pH for corrosion control, protects customers from lead and copper exposure. Regulating fertilizer runoff and converting septic tanks to sewer systems, reduces nitrates in local groundwater, which negates the need for more imported water for mixing and provides effortless protection from "blue-baby" syndrome. Designing and operating distribution systems with water quality in mind, ensures that treated water remains safe, fresh, and aesthetically pleasing.

Existing Efforts

There are currently plans being considered by several Ventura County water purveyors to dewater and desalt shallow groundwater basins known to have high salt concentrations. The strategy is to remove salt water from problematic groundwater basins and allow natural hydraulic pressures to slowly replace the water with fresher, low-salt water. This strategy would be coupled with a groundwater basin salt balance program where the total amount of salts entering and being removed from the watershed would be closely monitored to ensure salts entering are less than salts being removed. The strategy requires desalting plants to be constructed in specific problematic areas. This is currently being planned in the Calleguas Creek Watershed. Calleguas plans to install a brine conveyance line to transfer saline water from future desalting facilities for other uses in the watershed or to the ocean. Other desalting programs include groundwater recharge of fresher, low-salt water to counteract salt-water intrusion and regulating the use of private water softeners and ensuring proper brine waste disposal.

All residences located within the Oxnard Forebay are currently being switched from septic tanks to sewer connections. This is to be completed by January 1, 2008, and is required by CCR Title 23. The regulation was prompted because of the critical role the Oxnard Forebay plays in recharging the upper and lower Oxnard Plain aquifer systems. This action is expected to significantly lower nitrates in that area.

Beneficial use of tertiary treated recycled water is increasing in Ventura County. Recycled water is distributed to golf courses, parks, median strips, and irrigation of new development among others. The benefits are less dependence on imported water and indirect recharge of local groundwater sources. Also, using recycled water for irrigation frees up higher quality water for human consumption. Some districts are utilizing recycled water to directly recharge certain groundwater basins. It is important, however, that nutrients associated with recycled water be removed or monitored as these constituents could end up in groundwater sources.

Casitas MWD currently controls algae growth in Casitas Reservoir by applying copper sulfate and aeration, especially in the summer when algae growth is accelerated. Algae is a precursor for taste and odor issues as well as the creation of DBPs. A watershed sanitary survey is conducted every 5 years to assess any potential contamination sources in the watershed.

Casitas MWD also provides mechanical mixing in all of its tanks and reservoirs, which helps keep water mixed and fresh and prevents chloramine nitrification. More and more utilities in Ventura County are assessing whether their tanks and reservoirs are well-mixed and taking steps in design and operation to improve mixing.

Constraints to Implementation

The main constraint for most of these improvements is cost. Providing treatment of any variety can be very expensive. That is why it is important to try and remove salt and nitrate by not allowing it to enter the watershed in the first place. However, membrane technologies for treating salts are becoming more and more price-competitive with costs for importing water.

Many residents in Ventura County have their own private water softening devices. The problem with these devices is the brine waste they produce. Oftentimes this waste is not disposed of properly and may end up in local groundwater supplies. Ventura County is taking steps to limit the use of these devices and encourage proper disposal of brine waste.

Although septic systems are steadily being replaced in the most critical areas of Ventura County, nitrates from agricultural runoff are still an issue. More resources need to be directed towards best management practices related to agricultural fertilizer applications and educating farmers about directing their runoff to a proper disposal area. In the future the WCVC will work with the agricultural community to address best management practices for fertilizer application and irrigation for implementation as a regional project.

The demand for recreational use of surface water sources is continually increasing. The more recreational use that occurs in a source water reservoir, the more potential there is for contamination to occur. Therefore, steps need to be taken to educate recreational users and to enforce rules protecting the water source. The costs for enforcing such stringent rules can become exorbitant. Conversely, if rules are not enforced and a water source becomes contaminated, costs associated with regulatory non-compliance and citations can be equally or more exorbitant. In the long run, providing additional tiers of treatment may be the safest option.

Related Documents and Websites

Casitas Municipal Water District (www.casitaswater.org)

- 2005 Consumer Confidence Report
- 2005 Urban Water Management Plan

United Water Conservation District (www.unitedwater.org):

- 2005 Consumer Confidence Report
- 2005 Urban Water Management Plan
- 2003 Santa Paula Basin Annual Report
- 2003 Coastal Saline Intrusion Report

Calleguas Municipal Water District (www.calleguas.com):

- 2005 Consumer Confidence Report

- 2005 Urban Water Management Plan
- Calleguas Creek Watershed Integrated Regional Water Management Plan
- Calleguas Creek Watershed Salts TMDL

Metropolitan Water District (www.mwdh2o.com)

- 2005 Consumer Confidence Report
- 2005 Urban Water Management Plan
- Joseph Jensen Treatment Plant (http://www.mwdh2o.com/mwdh2o/pages/yourwater/plants/jensen01.html)

California Department of Health Services (http://www.dhs.ca.gov/ps/ddwem/technical/dwp/dwpindex.htm)

Federal EPA (http://www.epa.gov/safewater/)

American Water Works Association (www.awwa.org)

Recommended Future Projects or Actions

- Continue projects for dewatering/desalting, and watershed salts balance; continue research on the most cost-effective brine waste disposal methods or beneficial reuse.
- Provide education on private water softening devices and enforce new regulations for usage and brine disposal.
- Continue using recycled water for beneficial uses and provide incentives for recycled water use in new development projects. Research cost-effective nutrient removal methods.
- Conduct hydraulic computer modeling of water systems to ensure water is being managed in the most efficient way and to optimize water quality. Ensure new water facilities and older water facilities are outfitted with best available technologies for water quality and mixing. Research best operating methods for optimizing water quality in the distribution system.
- Continue septic system/sewer changeover projects.
- Investigate best methods for algae control and removal in surface water.
- Conduct in-depth sanitary surveys of all water sources and investigate cost-effective recreational management strategies for surface water quality.
- Initiate source-control programs and educate the public and farmers about runoff.
- Research cost-effective iron and manganese treatment for deep aquifer sources.

Possible Funding Sources

Possible funding sources for all of the treatment projects listed could be State grants, Federal grants, or low-interest loans. Increasing local connection fees and water rates is also a viable option.

5.2.17 Wastewater Treatment And Collection

Description

Wastewater treatment facilities are designed to treat water that is discarded by a community to a point that it becomes safe to return back to the environment or to reuse. Wastewater release into the environment is regulated under the Water Pollution Control Act of 1972, which was amended in 1977 and became known as the Federal Clean Water Act. The Act requires wastewater treatment facilities to apply and receive an National Pollutant Discharge Elimination System (NPDES) permit before they can discharge wastewater into any water body in the U.S. The California State Water Resources Control Board (SWRCB) has primacy for enforcing these rules in the State of California. The SWRCB is divided into several smaller regions throughout California, referred to as the Regional Water Quality Control Board (RWQCB). Permits are reviewed and considered on a case-by-case basis, depending on the nature of the wastewater needing treatment, and the proposed methods for meeting Total Maximum Daily Loads (TMDLs) for a particular receiving water body. The primary constituent of interest is biochemical oxygen demand (BOD), which is a measure of how much oxygen is required to biodegrade organic constituents. If a waste stream has too much BOD, the receiving water body may become low in dissolved oxygen (DO), threatening the survival of fish and amphibians. Other regulated constituents include total suspended solids (TSS), pH, chemical oxygen demand (COD), and various pathogens. Nutrients (nitrogen and phosphorus), refractory organics, heavy metals, and dissolved organic salts may also require treatment or removal.

Wastewater is usually treated by a public utility termed a "Publicly Owned Treatment Works" (POTW). POTWs receive and treat both domestic and industrial wastewater. Domestic wastewater is from residences, commercial buildings, and institutions; whereas industrial wastewater is primarily from manufacturing or chemical processing plants. POTWs construct collection systems of underground pipelines to collect the wastewater from a community and deliver it to the facility. Collection systems are usually designed to flow by gravity in order to reduce electrical power by avoiding pumping . This design is aided by the fact that most wastewater treatment facilities are built at low elevations near a receiving water body. Wastewater treatment facilities and collection systems are designed to receive roughly 70 to 80 percent of the amount of drinking water supplied, plus any wet-weather infiltration that occurs. Some older cities struggle with combined stormwater and sewer pipelines that can often overflow raw sewage during large rain events. Pre-treatment by industrial wastewater producers is required before the waste stream will be accepted by a POTW.

Sewer pipelines can be made of vitrified clay, plastic, or concrete. Pipelines flow by gravity from small laterals at residences, to mid-sized pipes called mains, to the large trunk or intercepting sewers that deliver the water to the treatment facility. Sometimes topography and geology may require mains to work as siphons or be pumped and pressurized. Pipelines that operate in this fashion are often called "force mains." Manholes are placed throughout the collection system to provide easy access for maintenance. The biggest maintenance issue faced by collection system operators is unclogging sewer pipelines. Clogs can occur from build-up of fats, oils, and grease (FOG - often from restaurants), blockages by tree roots, or from collapse. Many larger utilities regularly employ remote control mobile camera devices to survey certain pipelines and look for problems.

A typical domestic wastewater treatment facility consists of two tiers of treatment, termed primary and secondary treatment. Primary and secondary treatment usually provide sufficient treatment

for discharging the water back into the environment, and is the minimum level of treatment required for most treatment facilities. For industrial wastes, treatment facilities are required to treat the water with the "best available technology," depending on the constituents needing removal or reduction. If a particular receiving water body is especially vulnerable to wastewater discharges a third tier of treatment termed tertiary treatment may be required. Biological nutrient removal (BNR), using nitrification/denitrification process, is sometimes required by an NPDES permit if the receiving water body is vulnerable to eutrophication. Many POTWs in Ventura County use BNR for this reason, and some use BNR to gain process stability. Increasingly more wastewater treatment facilities are treating wastewater to tertiary standards to produce recycled water for beneficial reuse such as irrigation, wetland creation, miscellaneous industrial use, dust control, and groundwater recharge. Using recycled water for non-potable purposes frees up higher quality water sources for drinking, reduces the overall demand for treated potable water, and thereby conserves water throughout Ventura County and California.

For a typical domestic wastewater facility, treatment begins with screening out any large objects like trash, wood, and rags from the influent, which is often followed by some sort of grit removal system. Screening may also remove any large FOG solids. Water then begins primary sedimentation, starting with a clarifier or settling basin where the majority of organic solids are removed. The solids are then sent for further treatment and disposal (to be discussed later). The wastewater leftover from primary treatment is sent to secondary treatment, which begins with aeration and biological treatment. Biological treatment consists of providing an oxygen-rich environment so that microorganisms can rapidly convert suspended and dissolved organic material into biomass. This is done either by cascading water over a trickling filter mesh or running water through some type of aeration basin where oxygen is supplied (activated sludge method). This process significantly decreases the amount of BOD in the waste stream. The water is then sent to a secondary clarifier where the biomass settles out and is removed. The resulting effluent is usually chlorinated and dechlorinated before it is released into the environment. Other disinfection methods may include UV disinfection or ozone disinfection before the effluent is released.

The wastewater discharge requirements outlined in an NPDES permit for discharging to a receiving water body can be very expensive to achieve, and sometimes there is not a water body with sufficient dilution available. Evaporation/percolation is a viable alternative to stream-discharge, and is used by many Ventura County POTWs. After the wastewater is treated and meets all discharge requirements, it is sent to a percolation pond where the water evaporates and slowly percolates into the ground.

Settled solids from primary and secondary treatment are gathered from all the settling processes, dewatered or "thickened," and either aerobically (with oxygen) or anaerobically (without oxygen) digested to remove any pathogens, reduce volatiles, and render the solids inert. A by-product of anaerobic digestion is methane, which is often collected and used to supplement the plant's energy needs. The resulting solids are usually sent to a landfill, incinerated, or used for land applications or composting.

Smaller communities, or those with low-cost treatment objectives, may choose to meet primary and secondary standards using a series of oxidation ponds. Facultative ponds are shallow water basins that utilize the natural aerobic decomposition from the atmosphere and from algae and natural anaerobic decomposition at the bottom of the pond. In some cases, the pond will be artificially oxidized by mechanical means to speed up the decomposition process. Another option is the use of treatment wetlands. Wetlands can be used to meet secondary treatment objectives or as a means to polishing water quality before it is released back into the environment. A major benefit of wetlands

is the ability of wetlands to uptake nutrients (nitrogen and phosphorus). Treating wastewater using oxidation ponds or wetlands are both viable treatment alternatives but require more time and more land to operate.

Tertiary treatment is achieved by diverting a portion or all of the secondary effluent to a filter process similar to what is used to filter drinking water. The water is then chlorinated with a minimum contact time, and a minimum CT (chlorine concentration multiplied by contact time), as determined by Department of Health Services (CDHS), before it is delivered to customers. Some agencies provide BNR in addition to tertiary treatment to gain process stability. If the treated wastewater is to be discharged into a watercourse, the CDHS is not involved in the regulatory process.

Wastewater Treatment in Ventura County

There are approximately 14 large wastewater treatment facilities in Ventura County. Roughly half of these facilities employ tertiary treatment for beneficial reuse, and 4 have plans to construct tertiary treatment facilities. About 9 of the 14 treat to remove nitrogen. The majority of the facilities (8) dispose of their wastewater effluent in local rivers and streams, 5 percolate it back into the ground, and 1 discharges directly to the ocean. Table 5-3 below summarizes these wastewater treatment facilities, treatment levels, disposal methods, secondary and tertiary capacities, and future treatment goals.

TABLE 5-3 – SUMMARY OF LARGE WASTEWATER TREATMENT FACILITIES IN VENTURA COUNTY

Wastewater Treatment Facility and (Capacity)	Treatment Level and (Disposal Method)	Tertiary Use and (Capacity)	Future Treatment Goals
Camarillo Sanitary District (6.75 mgd)	Tertiary with BNR (Discharge into Conejo Creek or used for irrigation)	Irrigation (beginning in 2007) (6.75 mgd)	Increase irrigation usage of tertiary water. Cease effluent discharge into Conejo Creek by early 2008
Camrosa Water District (1.5 mgd)	Tertiary with BNR (Leftover water discharged to Conejo Creek)	Irrigation, CSUCI campus irrigation (1.5 mgd)	Sell all tertiary effluent to customers and discharge in Conejo Creek only during peak wet season; buy additional supplies from Camarillo SD
City of Fillmore (1.33 mgd)	Secondary (Percolation into Fillmore Basin)	None	Plans for a new 1.8 mgd water recycled water plant in 2009
City of Oxnard (31.7 mgd)	Secondary (Discharge to Ocean)	None	Provide tertiary recycled water to Oxnard and Port Hueneme Water Agency for industrial purposes, landscape irrigation, agricultural use, and groundwater injection for seawater intrusion and against salt water intrusion barrier (6.25 mgd in Phase 1; 25 mgd ultimate); receive groundwater recharge credits and build distribution system. Reduce effluent THMs
City of Santa Paula (2.55 mgd)	Secondary (Discharge into Santa Clara River)	None	Currently in process of designing a 4.2 mgd tertiary recycled water plant
City of Simi Valley (12.5 mgd)	Tertiary with BNR (Discharge into Arroyo Simi)	Irrigation, washwater, and dust abatement (0.9 mgd)	Investment in a regional recycled water distribution system including new pipelines and 2 new reservoirs.
City of Thousand Oaks – Hill Canyon WWTP (14.0 mgd)	Tertiary with BNR (Discharge into north fork of Arroyo Conejo)	Irrigation and wetlands (14.0 mgd)	
City of Ventura (14.0 mgd)	Tertiary with partial BNR (~90% discharge into the Santa Clara River Estuary, ~10% to golf course and other uses)	River discharge and irrigation of golf courses (14.0 mgd)	Full BNR, continued recycling to NPDES Permit limits

TABLE 5-3 – SUMMARY OF MAJOR WASTEWATER TREATMENT PLANTS IN VENTURA COUNTY (CONTINUED)

Wastewater Treatment Facility and (Capacity)	Treatment Level and (Disposal Method)	Tertiary Use and (Capacity)	Future Treatment Goals
Montalvo Municipal Improvement District (1.1 mgd)	Secondary (Discharge into the Santa Clara River Estuary)	None	
Ojai Valley Sanitation District (3.0 mgd)	Tertiary with BNR (Discharge into Ventura River)	Discharged to river (3.0 mgd)	Thalium and Bis (2-ethylhexyl) phthalate reduction
Saticoy Sanitary District (0.3 mgd)	Secondary with nutrient removal (Percolation ponds)	None	
VCWWD No. 1 – Moorpark WWTP (3.0 mgd)	Extended air, secondary activated sludge, filtered tertiary, with BNR (Percolation ponds or optional discharge to Arroyo Las Posas)	Irrigation of golf course (1.5 mgd)	Provide tertiary treatment for all wastewater; increase total capacity to 5.0 mgd. Expand infrastructure and provide tertiary water for agricultural and other irrigation uses in lieu of potable water.
VCWWD No. 16 – Piru WWTP (0.26 mgd)	Secondary (Percolation ponds)	None	Increase capacity to 0.5 mgd
VCWWD Todd Road WWTP (0.06 mgd)	Secondary with BNR (percolation)	None	

BNR = Biological Nutrient Removal

Benefits of Implementation

The main benefits of providing wastewater treatment are protecting public health and protecting the environment. Meeting regulatory compliance standards when discharging wastewater to the environment ensures streams remain safe for fish and wildlife, groundwater quality is protected, and surfers and swimmers are protected at Ventura County beaches. Providing higher levels of treatment, such as tertiary treatment, salts removal, or nutrients removal, provides an even higher level of protection. Utilizing recycled water for non-potable use frees up higher quality potable water to be used specifically for drinking. By doing so, less imported water is required, and potable treatment demand decreases. Recharging groundwater with recycled water is an effective way to supplement local aquifer supplies and can be used to combat saltwater intrusion. Using recycled water in constructed wetlands provides habitat for many endangered animals and provides open space for hikers and bird-watchers. In addition, wetlands provide a natural way to polish wastewater and naturally remove nutrients.

Existing Efforts

Most of the recycled water in Ventura County is used for irrigating golf courses, parks, schools, median strips, and dust abatement. The majority of treatment agencies have plans to expand production and uses of recycled water. Several agencies are partnering to build recycled water distribution systems, and more water purveyors are buying the water to serve to their customers. For example, the Camrosa Water District is planning to purchase additional recycled water from Camarillo Sanitary District, to aid in supplying local agriculture and California State University, Channel Islands' irrigation needs. Camrosa Water District also requires dual plumbing for all new subdivision development. The City of Oxnard is planning to construct a recycled water distribution system and will sell the water to the Ocean View Municipal Water District, Port Hueneme Water Agency and other agencies. Triunfo Sanitation District and Las Virgenes Water District work together to distribute recycled water to Ventura County for beneficial uses. The City of Simi Valley/Ventura County Waterworks District No. 8 is currently updating the Simi Valley County Sanitation District Reclamation Facilities Plan Update (Engineering Science, 1992). The Plan will further describe recycled water opportunities.

Recycled water is another form of water conservation. Better use of recycled water is critically important to stretching California's water resources. Cities are requiring new developers to incorporate recycled water into their irrigation plans. Ventura County recycled water purveyors are educating the public on the beneficial uses of recycled water, and the water source is becoming increasingly accepted.

In May 2006, the SWRCB adopted a General Waste Discharge Requirement (WDR) that requires POTWs with greater than one mile of sewer pipe to electronically report all sanitary sewer overflows (SSOs) to their California Integrated Water Quality System (CIWQS). Many POTWs in Ventura County are currently preparing for this requirement.

Constraints to Implementation

Not all wastewater treatment facilities remove or treat nutrients. Removing nitrogen and/or phosphorus from wastewater is important because they are the limiting nutrients for aquatic plant and algae growth. If a water body receives too many nutrients, eutrophication, or overgrowth of plants causing anoxic conditions could occur and endanger wildlife. Also, nutrients in secondary or tertiary wastewater could end up in local groundwater supplies, working against existing efforts by water agencies to keep nitrate levels low (See Water Treatment and Distribution System Water Quality section). Removal of nutrients can be very costly.

Salts that are in drinking water or are added by residents often remain in the treated wastewater effluent. If salts are not removed or reduced, they may show up in local groundwater supplies, working against efforts to reduce salts in local groundwater by various Ventura County water agencies (See Water Treatment and Distribution System Water Quality section).

Some restaurants, businesses, and residents may, with or without malicious intent, dump FOG and various toxic chemical into the sewer system. FOG can prematurely clog system pipelines and lift stations requiring significant man-hours and cost to remove such clogs. Clogs in the collection system can cause backup and flooding, placing public health and the environment at risk. Toxic chemicals can cause harmful reactions in the collection system or treatment facility, including pipeline corrosion or killing all the beneficial microorganisms in secondary treatment that decompose the wastewater. Therefore, it is imperative that wastewater districts conduct

educational programs to educate the public about this problem, as well as provide information and easy access to oil recycling and toxic substance disposal. Water sampling should be conducted regularly from various branches of the collection system to isolate any problematic waste streams or illegal dumping. Source Control Officers should review water quality data, investigate unlawful waste disposal, and conduct regular inspections of suspected or high-risk entities.

Ventura County already has successful household hazardous waste drop-off programs scattered throughout the County. While some sites are only open once a month, several recycling centers are open daily. They accept paints, solvents, cleaning products, lawn and garden products, photographic chemicals, oil, antifreeze, car and household batteries, light tubes, and more.

Many scientific studies are showing that treated wastewater often still contains pharmaceutical and personal care products (PPCPs) and/or hormonal waste chemicals that are causing problems with fish and amphibians. These chemicals have been termed "contaminants of emerging concern" (CECs), because they are new contaminants that are not yet well understood. Scientific studies of fish and amphibians located just downstream of wastewater and industrial treatment plants have shown problems with reproductive health, and in some cases male fish and amphibians have become feminized. Chemicals that interfere with normal reproductive health are termed "endocrine disruptor compounds" (EDCs). The fate and transport of such chemicals and their effects on humans is not well understood. More efforts are needed to research the health problems associated with endocrine disruptors and apply best-available technologies to remove such chemicals from wastewater effluent.

Related Documents and Websites

Emerging contaminants and endocrine disruptors:
http://toxics.usgs.gov/regional/emc/index.html

California Department of Health Services:
http://www.dhs.ca.gov/ps/ddwem/publications/waterrecycling/index.htm

Federal Clean Water Act:
http://www.epa.gov/watertrain/cwa/
http://cfpub1.epa.gov/npdes/home.cfm?program_id=45

Water Environment Federation (WEFTEC)
http://www.wef.org/Home

Water Reuse Information:
http://www.watereuse.org/news/wrnews_050905.htm

Ventura County Household Hazardous Waste Disposal:
http://www.wasteless.org/5_5HHWCollect.html

Recommended Future Projects or Actions

- Investigate other potential recycled water uses and try selling recycled water to more potential users.
- Continue to educate the public about the uses and benefits of recycled water, about water conservation, and about recycled water safety.
- Research creative ways to provide more incentives for public use of recycled water.

- Continue educational programs about FOG and toxic substances that should not be dumped down the drain.
- Continue providing easy-access FOG and toxic substance disposal or recycling centers for the public to properly dispose of problematic substances; continue household hazardous waste disposal programs and educational programs.
- Continue rigorous source control inspections and investigations of suspected illegal dumping; educate restaurant and other business owners of best management practices.
- Investigate and research emerging contaminants (endocrine disruptors) and employ treatment or reduction strategies where possible.
- Investigate low-cost nutrient and salt removal strategies for wastewater effluent.
- Continue installing tertiary treatment facilities and distribution systems.
- Continue beneficial reuse of digestor methane and research better methods of efficiency.
- Research best ways to remove nitrogen (ammonia) from wastewater effluents without increasing THM formation.
- Research the best means for meeting the new Waste Discharge Requirements, requiring the reporting of all SSOs to the State.
- Control use of water softeners to minimize chlorides and TDS concentration in the wastewater effluent.

Possible Funding Sources

Possible funding sources for all of the treatment projects listed could be obtained through State grants, Federal grants, or low-interest loans. Increasing local connection fees and water rates is also a viable option.

5.2.18 Water Use Efficiency (Conservation)

Description

Water use efficiency is a vital component of water management. Water use efficiency practices focus on reducing demand, which can either reduce the need for additional water supplies or free up supplies for other uses. Urban water use efficiency usually includes reductions realized from voluntary actions or more efficient water use practices promoted through public education, cost incentives, and mandated requirements such as installation of water-conserving fixtures in newly constructed or renovated buildings.

Agricultural water conservation (or agricultural water use efficiency) means reducing the amount of irrigation-applied water through measures that increase irrigation efficiency, or that control runoff or excess application losses.

Water conservation is a recognized method of augmenting local water supplies. Once considered primarily as a means to stretch water supplies during droughts or emergencies, ongoing water conservation or water use efficiency is now a standard element of any type of water management plan or process. Statewide standards were developed in the 1990's for both urban and agricultural water efficiency, however not all of these standards have been implemented, and there is still potential for gains in water use efficiency.

Water agencies in Ventura County have a long history of promoting water use efficiency, a practice that began in the late 1970's during an extended drought that affected many water agencies in California. In 1982, Ventura County became the first county in California to implement a regional water efficiency program as part of their focused water conservation initiative. The program was established and funded by a joint powers authority between the three Ventura County wholesale water agencies (Calleguas MWD, Casitas MWD and United WCD). The program addressed urban and agricultural water efficiency, and included participation by all local cities, water agencies, major irrigation districts, and agricultural organizations such as the Resource Conservation District, Natural Resources Conservation Service, and County Farm Bureau. This program was a direct result of the first comprehensive water planning effort by Ventura County known as the 208 Areawide Water Management Plan, 1979-1980.

Urban water use efficiency normally involves technological or behavioral improvements to indoor and outdoor residential, commercial, industrial and institutional water use that lower demand or lower per capita water use and result in benefits to water supply, water quality, and the environment. In residential areas, more than 50 percent of household water use is associated with landscape irrigation, so agencies are making a concerted effort to decrease landscape water demands. In addition to encouraging sprinkler controls, agencies are urging homebuilders and homeowners to landscape with drought tolerant and native plant species adept to the southern California climate. One such program, initiated by Metropolitan Water District of Southern California assists these customers in identifying and implementing "California Friendly" landscapes that utilize, on average, 30 percent less water than typical landscape plans.

Agricultural water use efficiency typically involves mechanical and operational improvements such as conversion to micro sprinklers, drip irrigation methods, or in-bed liquid fertigation, and controlling and capturing runoff or preventing tailwater losses. Irrigation scheduling can be improved through a variety of methods including use of real-time weather data produced by local

weather stations that help irrigators to compare present air and soil moisture values to water demand for specific crops, or in-ground lysimeters and other soil or crop root-zone moisture measurement devices. Planting schedules, tillage methods, and harvesting schedules/methods can also be examined and managed to use water more efficiently in agricultural operations.

Benefits of Implementation

The primary benefits of water use efficiency programs include: reduced need for development of more costly potable water supplies, reduced energy use associated with distribution, reduced heating costs for customers when they use less water in the home, additional water supplies available for environmental uses, reduced costs to users, and reduced operation and maintenance costs. Efficient management of existing water supplies is a critical element of water management and a cost effective alternative to developing new supplies.

Existing Efforts

Many agencies like the California Urban Water Conservation Council (CUWCC) oversee standards for urban water efficiency. These standards are usually referred to as "Best Management Practices" (BMPs) and have been determined through research to provide proven, reliable and often quantifiable water savings when rigorously implemented. There are several rather universal BMPs (see list below) that many water agencies in California have implemented. Hundreds of water agencies, water providers, and individuals (urban water suppliers, public interest groups, consultants, counties/cities, etc.) have signed a Memorandum of Understanding to help promote water use efficiency. Local signatory agencies include: Casitas Municipal Water District, Calleguas Municipal Water District, Camrosa Water District, California American Water Company, the cities of Camarillo, Oxnard, Thousand Oaks, Ventura, and the various Ventura County Waterworks Districts just to name a few.

These BMPs are also included as required demand management measures (DMMs) in the urban water management plans that urban water agencies with over 3,000 customers or 3,000 acre feet of water deliveries per year must prepare and update every five years, as required by the California Water Code. The Urban Water Management Planning Act (Act) is contained in California Water Code Sections 10610 through 10650. The Act requires that "every urban water supplier shall prepare and adopt an Urban Water Management Plan". Urban water supplier is defined as "a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre feet of water annually".

Local agencies required to prepare such plans include: Calleguas MWD, the Cities of Camarillo, Fillmore, Oxnard, Thousand Oaks and Ventura, Camrosa WD, Casitas MWD, and Ventura County Waterworks Districts #1 and #8 (Simi Valley and Moorpark). The required BMPs that aid in water conservation are listed in the table below:

Urban Best Management Practices

BMP 1: Residential Water Use Survey Programs
BMP 2: Residential Plumbing Retrofit or Rebate Programs
BMP 3: System Water Audits to help Educate Users
BMP 4: Accurate Volume Metering w/Pricing Incentives for Less Usage
BMP 5: Landscape Conservation (like better sprinkler timers that sense rainfall or soil moisture)
BMP 6: High Efficiency Clothes Washers
BMP 7: Public Information Programs
BMP 8: School Education Programs
BMP 9: Commercial-Industrial-Institutional Education/Audits/Pricing
BMP 10: Wholesale Water Agency Assistance to Retail Agency Programs
BMP 11: Conservation Pricing Incentives for Appliance Upgrades, etc.
BMP 12: Conservation Coordinators at Water Agencies and Large Businesses
BMP 13: Water Waste Prohibition Ordinances
BMP 14: Ultra Low Flush Toilet Exchange Programs for Residential and Business Applications

Agricultural water use efficiency involves improvements in technologies and management of agricultural water that result in water supply, water quality, and environmental benefits. Efficiency improvements such as better on-farm irrigation equipment, crop and farm water management, and water supply distribution systems are just a few of the options available to farmers. One no-cost source of help is the University of California Farm Advisor's Office, which can provide expertise to assist farmers in improving crop yield while saving water and energy, and improving water quality.

The Agricultural Water Suppliers Efficient Water Management Practices Act of 1990 (AB-3616) and the Federal Central Valley Project Improvement Act of 1992 (CVPIA) established guidelines for improving agricultural water use in California. Statewide groups like the Agricultural Water Management Council (AWMC) work together, through an MOU, with many irrigation water districts for the common benefit of all. In Ventura County, more than 70 large agricultural water users, at least three environmental organizations, and several wholesale and retail water districts have joined a co-op group called the Ventura County Farm Water Coalition (VCFWC) in an effort to improve water use efficiency and conservation through implementation of efficient water management practices. The Council recommends BMPs and tracks agency water management, planning, and implementation of cost effective efficient water management practices through a review and endorsement procedure. The agricultural water suppliers who are signatory to the MOU have voluntarily committed to implement locally cost effective and efficient EWMP's and BMPs. These agricultural water suppliers and users represent a significant number of total acres of irrigated agricultural land, and the majority of the annual water volumes supplied by retail water purveyors and private well owners in Ventura County.

Some of the Efficient Water Management Practices (EWMP's) or Best Management Practices (BMPs) available to agricultural water user to help with conservation efforts are listed below.

1. Prepare and adopt a farmwater management plan
2. Designate and train the irrigation supervisor to be a water conservation coordinator
3. Perform regular checks of water system hardware to check for leaks and proper water placement
4. Where appropriate, replace faulty sprinkler heads, turnouts, and valves

5. Evaluate the need, if any, for changes in watering policies or procedures
6. Facilitate alternative land use and/or drainage practices
7. Use recycled water (if available) that otherwise would not be used beneficially
8. Utilize low-cost financing of capital improvements (when available) for on-farm irrigation systems
9. Participate in voluntary water transfers that do not unreasonably affect the water user, water supplier, the environment, or third parties
10. Construct improvements (lining and piping) to control seepage from ditches, pipeline, and canals
11. Within operational limits, increase flexibility in water ordering and delivery from the water supplier
12. Construct and operate spill and tailwater recovery systems
13. Optimize conjunctive use of surface and groundwater supplies
14. Automate water supply control structures to prevent waste
15. Install and maintain water measurement devices and track water use with accurate reports
16. Take advantage of special pricing or other incentives to efficient water use

The Fox Canyon Groundwater Management Agency (FCGMA), is a special district with the sole purpose of groundwater management. THE FCGMA has been providing crop water use needs through a variety of weather stations for more than 12 years to local farmers in the southern portion of Ventura County to assist them with irrigation scheduling and to promote efficient groundwater use from public and private wells. This free service is accomplished via a series of weather stations (installed and maintained by a private FCGMA contractor) located throughout the FCGMA jurisdiction that were placed to represent various microclimate situations and crop types. The information is gathered every half hour and posted daily to the FCGMA website.

Constraints to Implementation

There are few constraints to implementation of BMPs for urban and agricultural water conservation or efficiency. Many of the BMPs are now considered standard practice among local agencies and water users, and are sometimes required by law (such as plumbing codes or the recent Los Angeles Regional Water Quality Control Board Total Maximum Daily Load or Farm Runoff rules). Public and private water agencies and irrigation districts that become signatories to various MOU's have collective access to technical assistance, research and data to guide their efforts. Although implementation of some BMPs (such as large landscape audits and construction of irrigation improvements) can be costly or labor intensive, collaborative group efforts often lessen the associated costs of compliance and help to create better, more comprehensive water conservation. The most common constraint to implementing such measures (BMPs), results when these measures are not cost effective to implement in the short-run (the water cost savings not justified in the short-term by the capital investment), or when a general consensus cannot be reached among stakeholders that the benefits accrued to water supply or rate payers are worth the investment in the long-run.

As implementation of these measures become standard, water demand "hardens" at a more efficient rate, and additional water savings from implementation of new savings techniques is limited. There may be constraints to achieving greater savings in the future in those areas that have adopted and implemented the BMPs.

Related Documents and Websites

As mentioned above, local urban water suppliers with more than 3,000 customers, or who deliver more than 3,000 acre feet of water volume annually must, by the California Water Code, prepare and implement Urban Water Management Plans, which must be updated every five years. The local retail and wholesale water agencies required to submit these plans include: Calleguas Municipal Water District, the Cities of Camarillo, Fillmore, Oxnard, Thousand Oaks and Ventura, the Camrosa Water District, the Casitas Municipal Water District and the Ventura County Water Works District #1 (Moorpark) and #8 (Simi Valley). Many of these plans were updated in calendar year 2005 and most are available from the individual agency websites or via paper copy at their respective offices.

In addition, signatories to the CUWCC Memorandum of Understanding (MOU) and recipients of State and Federal grant funds must typically prepare reports on an annual basis describing how they implement and update their efforts to implement BMPs. These documents can be found on the several locally generated websites.

Other helpful documents related to water conservation include the 1994 Ventura County Water Management Plan, the California Water Plan (Bulletin 160-2005) Volume 2, and numerous resources found on the water agency and agricultural organization websites.

Web Resources -

- California Department of Water Resources, Office of Water Use Efficiency: http://www.owue.water.ca.gov/
- Information regarding Urban Water Management Plans: http://www.owue.water.ca.gov/urbanplan/index.cfm
- California Urban Water Conservation Council: http://www.cuwcc.org
- U.S. Bureau of Reclamation - Water Conservation Program: http://www.usbr.gov/waterconservation

Recommended Future Projects or Actions

As mentioned previously, local Ventura County water agencies and users have been implementing water efficiency programs since the 1970s, at both the agency level, the individual well owner level, and at the regional level. Many local agencies have signed and are implementing BMPs recommended by respective MOUs that add to, or compliment water conservation measures. Future program recommendations, which can be coordinated through the Watersheds Coalition of Ventura County or the various farm or water supplier groups include:

- Encourage all local water agencies, well owners, or irrigation districts to sign the MOU's for urban and agricultural water efficiency (as appropriate) and appoint a water conservation coordinator for the county and/or large wholesale water districts.

- Coordinate implementation efforts on a regional level through joint powers agency agreements or other means, possibly through the Ventura County Association of Water Agencies (AWA) and/or the Ventura County Farm Bureau.
- Encourage habitat acquisition and restoration practices that increase in-stream flows, including removal of exotic species such as Arundo donax that consume significantly more water than their native counterparts, protection of open space which reduces land available for water-consuming landscaping, and riparian restoration that increases natural canopy cover over streams to reduce evaporation.

Integration with Other Strategies

Conservation or efficient use of water through implementation of best management practices (BMPs), EWMP's, and urban water management plans, positively benefit other water management strategies contained in this IRWMP. These include:

- *Environmental and habitat protection and improvement*
- *Water Supply Reliability*
- *Groundwater management*
- *Water quality protection and improvement*
- *Conjunctive use*
- *Desalination*
- *Imported water (reduced need for)*
- *Land use planning*
- *NPS pollution control*
- *Watershed planning*
- *Water and wastewater treatment*

Possible Funding Sources

- Local funding (i.e., joint funding from water districts' general funds, user fees or surcharges)
- State and Federal grants (DWR, USBR, EPA, SWRCB/RWQCB)

5.2.19 Watershed Planning

Description

Ventura County's watershed planning approach constructs a coordinating framework for resources management that focuses public and private sector efforts toward solutions to priority-ranked problems – both at a countywide and watershed level. It takes into consideration the entire hydrologic cycle and water budget including both ground and surface water flows. Approaches toward planning efforts and solutions suggested in each of the Ventura County's five watersheds vary in terms of specific objectives, priorities, elements, timing, and resources, but all have in common several countywide guiding principles as discussed below.

The countywide watershed planning effort is geographically focused on five downstream points of interest (watersheds). Four of these points of interest are at discrete points on the California coastline within Ventura County. The remaining point of interest is at a point of discharge into neighboring Santa Barbara County. Each of these watersheds is unique in terms of composition, community, and vision – the leadership of each watershed's planning effort are therefore different based on the different needs. Collectively the efforts are coordinated countywide by the Watersheds Coalition of Ventura County. The effectiveness of this planning approach is its geographic focus and structure.

The countywide watershed planning effort includes partnerships with those local stakeholders most affected by watershed management decisions. The local development of these plans serves vital local interests by placing the Plan in the hands of the stakeholders. These stakeholders have the greatest knowledge of both the resources and the aspirations of those who live and work within the watershed - they are also those with the greatest stake in the proper long-term management of the resources. This manner of plan development also serves the State's vital interests by ensuring that the State's water resources are used wisely, by providing for flood management, protecting water rights, protecting in-stream flows, protecting water quality, and providing for the economic well-being of the State's citizenry and communities.

Another guiding principle of the countywide watershed planning effort is the employment of sound scientific data, tools, and techniques. The data, tools, and techniques include:

1. The accurate and detailed inventory, assessment, and characterization of the watersheds' natural resources and the communities that depend upon them.
2. The goal-setting and identification of objectives based upon the condition or vulnerability of the resources and the needs of the community and ecosystem.
3. Identification of priority problems and needs.
4. Development of specific management options and action plans.
5. Implementation.
6. Evaluation of effectiveness and revisions of plans as an-ongoing practice.

The iterative nature of the planning approach encourages watershed stakeholders to set goals and to make maximum progress based upon available information while continuing to analyze and verify where information is incomplete.

At the core of the countywide watershed planning effort are two beliefs. First, the effort stresses that the combined review of the assessment efforts for flood management, surface and groundwater protection, pollution control, fish and wildlife protection, and other resource protection provides stakeholders and managers from all levels of government with a better understanding of the cumulative impacts of various human activities in order to determine the

most critical problems and needs within each watershed. Using this information, stakeholder can set priorities for action that allow the allocation of limited human and financial resources in the most effective manner. Second, the effort believes that communication and coordination among stakeholders in the watershed will reduce costly duplication of efforts and conflicting stakeholder actions.

Information About Watersheds

The five watersheds in Ventura County are (in order of size from smallest to largest): the Malibu Creek Headwaters; Cuyama Creek; Ventura River; Calleguas Creek; and the Santa Clara River. Planning efforts within the Malibu Creek Headwaters and Cuyama Creek are not addressed here. Instead the focus is on the larger and more populous watersheds in Ventura County.

Ventura River Watershed

The westernmost and least populous of the three largest watersheds in Ventura County is the Ventura River Watershed. It encompasses 228 square miles. Its three principal tributaries are San Antonio Creek from the east, Coyote Creek from the west, and Matilija Creek from the north. It is a perennial but interrupted river, running year round throughout its length but underground in some locations during the drier part of the year. The area averages 14 inches of precipitation per year near the coast and 40 inches per year in the mountainous reaches. Flows increase rapidly during winter high intensity rainfalls producing severe floods. Floods occur every 5 to 10 years causing substantial damage.

In addition to the steelhead, endangered species found along the river include the California condor, California red-legged frog, and California brown pelican. The major issue within this watershed is the dramatic historical decline of the southern California steelhead, which is an indication of the general health of the aquatic ecosystem. More than 5000 steelhead formerly migrated up the river and Matilija Creek before Matilija Dam was built in 1947. Now, less than 100 fish make their way up the river. The dam blocks access to more than 20 miles of some of the best remaining steelhead habitat in Southern California.

Much of the upper parts of the Watershed are protected as part of the Matilija Wilderness. Removal of Matilija Dam would provide fish passage to historic breeding waters in the upper watershed and greatly enhance the opportunities for restored habitat for many other species of concern.

The Watershed is home to the City of Ojai, a large part of the City of Ventura, and the County of Ventura unincorporated communities of Casitas Springs, Oak View, and Meiners Oaks. Water is supplied to the majority of watershed residents by the Casitas Municipal Water District – operator of the Ventura River Water Project which includes the Lake Casitas Dam and Robles Diversion Dam (owned by the Bureau of Reclamation) and the Matilija Dam (owned by the Ventura County Watershed Protection District). From a water supply perspective, it is the only self-sufficient Watershed in the County of Ventura.

The Matilija Dam Ecosystem Restoration Study, undertaken by the Ventura County Watershed Protection District and the United States Army Corps of Engineers, provides the foundation inventory and assessment information upon which the watershed planning efforts are founded.

This study starts at the river's mouth (Surfer's Point) and runs to its headwaters in the Matilija Wilderness. Specifically this study focuses on identification of: ecosystem restoration for terrestrial and aquatic habitat to benefit native fish and wildlife (including the Federally listed endangered southern California steelhead trout) to the Ventura River and Matilija Creek in the vicinity of Matilija Dam; and improvements to the natural hydrologic and sediment transport regime to support Ventura River's coastal beach sand replenishment. Enhancement of recreational use along the Ventura River and Matilija Creek compatible with the ecosystem restoration was also considered.

It is currently the single most comprehensive long-range planning and implementation project for the Ventura River. This plan has subsumed all previous watershed-wide plans. It also assumes that the Matilija Dam removal is the linchpin project for any viable ecosystem recovery. It is community-based and has resulted in an unprecedented agreement between disparate stakeholders on a long-term strategy for ecosystem protection while meeting the safety and supply needs of the community-at-large.

Organizations that have participated in the study process to date include the following agencies and groups:

Federal Agencies

U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
U.S. Forest Service, Los Padres National Forest
U.S. Geological Survey
National Marine Fisheries Service
National Park Service
National Fish and Wildlife Foundation

Local Committees/Groups

Casitas Municipal Water District
Matilija Coalition
Matilija Environmental Science Area (MESA)
Friends of the Ventura River
American Rivers
Surfrider Foundation, Ventura Chapter
Southern California Wetlands Recovery Project
Fixing Stream Habitats Technical Assistance Program (FiSHTAP)
BEACON
California Trout
Aspen Environmental Group
Southern California Steelhead Coalition

State Agencies

California Coastal Conservancy
California Department of Fish and Game
California Regional Water Quality Control Board

County of Ventura Agencies

County Board of Supervisors
Public Works
Watershed Protection District
County Executive Office
Environmental and Energy Resources Department

City Governments

Ventura
Oxnard
Ojai
Port Hueneme

Universities

University of California Cooperative Extension California State University, Northridge

In addition to the Matilija Dam Ecosystem Restoration Study, other major planning efforts in the watershed, such as the Ventura River Watershed Protection Plan, and the Ventura River Parkway, are being coordinated by the appropriate watershed stakeholder groups such as the Watersheds Coalition of Ventura County, and the Ventura River Watershed Council. Each of these forums is completely open – providing for stakeholder cooperation and coordination and comprehensive consideration of watershed protection plans and strategies. All plans are coordinated through the Watersheds Coalition of Ventura County.

Santa Clara River Watershed

The Santa Clara River is the largest river system in Southern California that remains in a relatively natural state. The river, from its headwaters at Pacifico Mountain in the San Gabriel Mountains to its mouth at the Pacific Ocean, drains a total area of about 1634 square miles. Ninety percent of the Watershed consists of rugged mountains, ranging up to 8800 feet high; the remainder consists of valley floor and coastal plain. Much of the Watershed's higher elevations lie in the Los Padres National Forest.

The Santa Clara River is the only remaining unchannelized riparian and wildlife corridor in Southern California. Extensive patches of high quality riparian habitat are present along the length of the river and its tributaries. In addition to steelhead trout, the endangered, unarmored stickleback fish, is resident in the river. One of the largest of the Santa Clara River's tributaries, Sespe Creek, is designated a wild trout stream by the State of California and supports significant spawning and rearing habitat. The Sespe Creek is also designated a Wild and Scenic River. Piru and Santa Paula Creeks, which are tributaries to the Santa Clara River, also support good habitats for steelhead.

The climate in the watershed varies from moist, Mediterranean in Ventura County near the Pacific Coast, to near desert at the extreme eastern boundary in Los Angeles County. In the warmer valley interior, maximum temperatures during the summer often exceed 100°F. The moderating influence of the ocean results in lower temperatures along the coast. During winter, temperatures rarely descend to freezing except in the mountains and some interior valley locations. Approximately 90 percent of the annual precipitation occurs in the six months from November to April. Mean annual precipitation ranges from approximately 8 inches in the easternmost part of the Watershed to more than 34 inches near the headwaters of Sespe Creek.

Historic records indicate that the climatic and basin characteristics of the Santa Clara River generally produce intermittent flows. Flows increase rapidly during winter high intensity rainfalls producing severe floods. Floods occur every 5 to 10 years causing substantial damage. The floods of 1938 and 1969 were the worst naturally occurring floods in recorded history of the Santa Clara River causing highway closures, building and bridge damage, agricultural land loss due to erosion and severe sediment deposition.

Stream flow is seasonal except for controlled releases and wastewater treatment discharges. Dry for much of its length in summer, the river collects winter rainfall in northwest Los Angeles and northern Ventura Counties. The flow rate can rise in winter storm periods to over 100,000 cubic feet per second. In 1996 the 25-year flood flow rate was estimated to be 110,000 cubic feet per second (200,000 cubic feet per second for the 100-yr flood flow rate).

Many thousands of people within the Watershed obtain their water supply from groundwater basins within the Watershed. The main groundwater basins in the Santa Clara River watershed within Ventura County are:

1. The Piru groundwater basin.
2. The Fillmore groundwater basin.
3. The Santa Paula groundwater basin.
4. The Montalvo groundwater basin.
5. The Oxnard Plain groundwater basin.

In Ventura County, the Santa Clara River water is diverted at the Freeman Diversion Dam to canals that take the water to percolation ponds, where the water recharges the underground aquifers. The United Water Conservation District has a diversion right of 375 cubic feet per second at any given time with a maximum of 144,000 acre feet per year. As a result, major recharge of the Oxnard Plain basin is achieved keeping seawater intrusion at bay.

The most comprehensive watershed plan for this river system, to date, is the Santa Clara River Enhancement and Management Plan (SCREMP). Its purpose is to provide comprehensive guidance for the preservation, enhancement, and sustainability of the physical, biological, and economic resources that occur within the 500-year floodplain limits of the Santa Clara River mainstem. Implementation of the SCREMP is guided by the vision of the SCREMP stakeholders:

The Santa Clara River[SCREMP] Stakeholders, represented by the Project Steering Committee, recognize the Santa Clara River within its 500-year floodplain limits as a body of physical, biological, and economic resources of regional importance. The committee consisting of Federal, State, and local government agencies, industrial and commercial enterprises, and citizen groups endeavors to preserve the river as a precious natural asset for residents of the entire Watershed

while recognizing its multi-use resource potential that can provide for sustainable healthy human growth and development.

The Santa Clara River is managed, used, and protected so as to ensure the preservation, enhancement, and sustainability of its physical, biological, and economic resources. The river, its ecosystems, and its natural resources call for stewardship, and are recognized as exceptional in their value and quality by the local communities and the public in Southern California.

The SCREMP study process focused on improving coordination and information exchanges among all Steering Committee members and on resolving conflicting uses along the river. The study gave balanced consideration to habitat objectives, natural river processes, private property rights, economic interests, and community objectives.

Building upon the SCREMP is the Santa Clara River Watershed Protection Plan (SCRWPP) currently under development. It is an $8 million watershed-wide stakeholder effort funded by the Ventura County Watershed Protection District, the Los Angeles Department of Public Works, and the U.S. Army Corps of Engineers. Its purpose is to enhance and expand upon the SCREMP – taking SCREMP principles watershed-wide.

It is the goal of the watershed study to develop the necessary baseline data and analytical tools, and a realistic set of objectives, that will encourage management decisions that help the planners and developers in both Los Angeles and Ventura Counties by providing the tools necessary for addressing the cause and effect of upstream changes to the downstream areas within the Santa Clara River Watershed.

Resource data from SCREMP, such as biological data, aggregate data, cultural data, GIS data, water-related data, will be reviewed and utilized to form the basis of the existing conditions within the 500-year floodplain of the Santa Clara River. SCRWPP efforts will include the following:

1. Determine the effect of upstream urbanization on discharge frequency and quantity.
2. Investigate sediment load change as the upstream areas are urbanized.
3. The increase in flood flows can be damaging to developments near the riverbanks.
4. Determine the effect of upstream urbanization on bank erosions in the river.
5. Explore possible ways to remedy excessive erosion.
6. Investigate the increased sediment flow downstream and its effects on the coastal areas at the mouth of Santa Clara River.
7. Determine how the river floodplain boundaries change with increased urbanization.
8. Determine the effect of upstream urbanization on groundwater and water quality.
9. Evaluate the effects on the fish passage in the Santa Clara River with increased urbanization upstream.
10. Analyze the effect of the increased runoff on fish passage.
11. Determine if the change in the water quality will cause a detrimental effect on fish passage.
12. Reduce the impacts to water quality due to upstream development.
13. Determine the significance of changes to the daily flow and more frequent wet channel bed and wet channel banks in the Santa Clara River to the farming industry.
14. Identify best management practices that can be used for zoning purposes.

The SCRWPP plan includes a semi-formal structure that encourages the participation of the community. It will eventually provide a collaborative, comprehensive, coordinated (on a priority

basis) watershed protection plan applicable to both current and future conditions. It includes a large element of ongoing work for monitoring and adaptive management as do the other Ventura countywide watershed planning efforts.

Calleguas Creek Watershed

The Calleguas Creek Watershed area is 30 miles long, 14 miles wide and has an area of approximately 343 square miles (approximately 224,000 acres). It extends from the Los Angeles County line in the east to Mugu Lagoon and the Pacific Ocean to the south. The watershed includes Calleguas Creek, Conejo Creek, Arroyo Las Posas, Arroyo Conejo, Arroyo Santa Rosa and Arroyo Simi, along with Revolon Slough and Mugu Lagoon. The northern boundary of the Watershed is formed by the Santa Susana Mountains, South Mountain and Oak Ridge; the southern boundary is formed by the Simi Hills and Santa Monica Mountains. Calleguas Creek is an effluent dependent watershed. Discharges of municipal, agricultural, and urban wastewaters have increased surface flow in the Watershed, which has resulted in increased sedimentation and water pollution in the Mugu Lagoon.

Beginning in 1996, a broad coalition of local property owners, water and wastewater agencies, environmental groups, agricultural parties, governmental entities, and other private interests joined together to openly develop a management plan for the Calleguas Creek Watershed. The Calleguas Creek Watershed Steering Committee was formed to produce a plan for implementing a coordinated water quality and land use planning strategy for the Watershed as a whole.

To address the various issues and concerns in the Watershed, the Steering Committee was divided into subcommittees: land use, water resources/water quality, Habitat/Natural Resources/Recreation, Flood Protection and Sedimentation, Public Outreach and Education

Each subcommittee was assigned responsibilities and a set of issues to analyze. Based upon this analysis, each subcommittee was then provided recommendations for consideration by the Steering Committee. The result was the Calleguas Creek Watershed Management Plan (CCWMP).

The CCWMP represents a long- range comprehensive water resources strategy which is cost-effective and provides benefits for all participants. It addresses water resources as well as land use, economic development, open space preservation, enhancement and management and the provision of public facilities. A key element of the Plan is a set of action recommendations, developed by the stakeholders, which address watershed-wide issues and needs with salinity management a primary objective. The CCWMP examined existing data and acquired the missing data necessary to produce an accurate characterization of the Watershed. This enabled stakeholders to develop action recommendations based on the best available data and modeling.

The CCWMP is founded on a number of technical studies (in addition to the on-the-ground historical and empirical information). The studies include:

- The Calleguas Creek Characterization Study completed in 2000 by the wastewater management agencies and Calleguas Municipal Water District - water quality and flow data, and a compilation of other available sources of information.

- The City of Thousand Oaks compiled a large amount of data during its recent water rights application and EIR process for the Conejo Creek Diversion Project.
- The City of Thousand Oaks characterization study of Conejo Creek - water quality, flow, and use data.
- Water supply agencies and wastewater agencies - data about water sources, water use, wastewater discharges, and water reclamation projects.
- Groundwater management agencies and water suppliers - data on groundwater quality and quantity, groundwater use, interactions between surface water and groundwater.
- Ventura County - GIS mapping of the watershed including natural habitats and land-use.
- California Coastal Conservancy - Watershed Evaluation Study addressing habitat and species issues and a Wetlands Feasibility Study that developed an interactive GIS-based application focusing on identifying and ranking wetland restoration opportunities throughout the Watershed.
- Ventura County Watershed Protection District - expanded basemap information, hydrologic studies and models, detailed orthophotography and contour data for the Watershed, a Hydrology and Hydraulics model (MODRAT) for the entire Watershed, and a Sediment Transport model (FLUVIAL-12) for the entire Watershed.
- Ventura County Watershed Protection/FEMA – updated rainfall curves and updated floodplain maps for the Watershed.
- Ventura County Watershed Protection – Draft long-range (25-year) Integrated Watershed Protection Plan prioritized with funding needs.
- TMDL technical studies and water quality information obtained in recent years. TMDL technical studies have been completed as follows: toxicity, organic compounds/PCBs and metals.

Combined with the empirical data, the technical studies provide the necessary foundation for the effective macro- and micro level treatment of the Watershed. Using the data, stakeholders have formulated watershed project and program priorities designed to protect and enhance the Watershed's many resources while providing for the needs of the larger community.

For more information about the Calleguas Creek watershed planning efforts and the list of stakeholders, refer to the Calleguas Creek Watershed Management Plan (CCWMP) Volumes I and II. They can be found at the Calleguas website at: http://www.calleguas.com

Benefits of Implementation

Increased flooding, diminishing water availability and quality, and the loss of critical habitat for fish and wildlife are key issues facing the residents of Ventura County. The entire Region depends on its networks of rivers', streams' and creeks' production of reliable supplies of clean water to support communities, habitat, restore resources and provide for agricultural production. Historic land-use practices has placed many downstream property owners at risk and created a tension between public safety and resource protection needs. In order to move forward on increasingly critical water issues, citizens, interest groups, and government agencies must develop more comprehensive, collaborative, and coordinated ways of solving problems – this is an objective of the Ventura countywide watershed planning efforts and the Watersheds Coalition of Ventura County.

The Watersheds Coalition of Ventura County's approach toward comprehensive watershed planning will create a framework for watershed management that will support economic growth

and promote water availability and quality. It will also contribute to protection of fisheries and the health of the natural environment. The WCVC provides a valuable forum for informed local decision-making, and developing a comprehensive approach to managing water resources. The combined watershed planning efforts hope to accrue the following benefits countywide:

1. Improved regulatory permit processing.
2. Greater understanding and advancement of local priorities.
3. Improved decision-making at all levels of government.
4. Increased predictability of water resource decisions.
5. Increased access to Federal and State water resources funding programs.
6. Improved resource management for endangered and threatened species.
7. Economy of implementation of Federal and State water quality requirements.
8. Enhanced watershed awareness that results in the incorporation of watershed thinking into everyday planning processes.

The WCVC effort is purposely non-prescriptive in terms of both procedural and substantive requirements. Within broad constraints, interested stakeholders participate in flexible watershed planning - determining the planning processes, and assessing watershed resources, needs and priorities for long-term protection and management strategies.

Constraints to Implementation

There are a variety of constraints and challenges to the effective implementation of watershed planning. Development of a comprehensive watershed management plan, including recommendations for action and specific projects, can be time consuming and expensive. Depending upon the recommendations that result from the stakeholder and consensus driven planning process, the constraints and challenges can be minimized. Another constraint involves the consensus process itself. It is not always possible to reach consensus among diverse members, or reconcile conflicting interests or needs.

Related Websites and Documents

- California Regional Water Quality Control Board- Los Angeles Region. State of the Watershed- Report on Surface Water Quality of the Ventura River Watershed, October 2004 Version
- California Regional Water Quality Control Board- Los Angeles Region. State of the Watershed- Report on Surface Water Quality of the Santa Clara River, October 2004 Version
- California Regional Water Quality Control Board- Los Angeles Region. State of the Watershed- Report on Surface Water Quality of the Calleguas Creek Watershed, October 2004 Version
- Los Angeles County Department of Public Works, Ventura County Watershed Protection District and SCREMP Project Steering Committee, Public Review Draft. Santa Clara River Enhancement and Management Plan. Prepared by AMEC Earth & Environmental

- http://www.matilijadam.org/index.html
- http://www.calleguascreek.org/ccwmp/
- http://www.vcwatershed.com/
- http://www.vcwatershed.org/Projects_IWPP.html
- http://www.vcwatershed.org/Watersheds_Ventura.html
- http://www.vcwatershed.org/Watersheds_SantaClara.html
- http://www.vcwatershed.org/Watersheds_Calleguas.html
- http://www.vcwatershed.org/Watersheds_Malibu.html
- http://www.vcwatershed.org/Watersheds_Cuyama.html
- http://www.vcwatershed.org/Watersheds_Coastal.html
- http://www.coastalconservancy.ca.gov/

Recommended Future Actions

- There are several watershed planning efforts underway or proposed for implementation. A major watershed planning program has been proposed for the Ventura River Watershed. The development of a watershed protection plan has been proposed as part of a suite of projects for the Region, in the Step 2, Implementation Grant application.
- Coordinate IWPP effort with the WCVC IRWM planning and implementation.

Integration with Other Strategies

The Watersheds Coalition of Ventura County has determined that watershed planning addresses or is integral to all other water management strategies in one way or another.

Possible Funding Sources

- State and Federal funding
- Grant funding
- Current and future bond funding

5.3 Integration of Water Management Strategies

Included in this IRWMP is a thorough discussion of all the water management strategies contained in the State's IRWMP Guidelines. As can be seen in Table 6-2, many of these strategies overlap and are linked to one another.

This IRWMP is the result of a coordinated effort among many local agencies and stakeholders. The process has included identification of major local water related issues and problems, identification of key objectives of the coordinated Countywide program guided by the WCVC Group; and identification of cost effective and feasible projects, programs and studies to address those objectives. An important element is the ongoing collaboration among local agencies to continue or establish programs, studies and plans which will carry on the long tradition of regional, cooperative water management in Ventura County, regardless of whether State/Federal funds are available. Some of these programs include: regional water use efficiency, water quality studies and projects, wastewater recycling studies, groundwater management, habitat restoration, stormwater pollution prevention and flood management.

The Plan will be implemented through efforts both at the Regional level, and the watershed level through the efforts of the individual watershed committees. This IRWMP contains recommendations for additional future programs, projects and actions that build upon or enhance existing water management efforts, or create new, innovative programs. Some of these programs may be regional in nature, some may apply only to particular watersheds. The WCVC will also provide the institutional structure for implementation of the Plan and related projects.

In addition to these implementation projects, the WCVC will pursue other water management priorities, as set forth in the approved objectives. These include water use efficiency, recycling, and land use controls. The implementing agencies will be the various water and sanitary districts, Cities, the County and Non-Governmental Organizations (NGO's) that submitted the projects.

Δ The 2007 update of this IRWMP will include a more thorough discussion of how the strategies and projects are integrated with each other and with the objectives of the Region and each of the Watersheds. This IRWMP is an ongoing process and the document will continue to grow and change as the local stakeholder process evolves and the needs in the Region change.