Issue List and Work Plan for the 2005 Triennial Review of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins

To meet requirements of Section 303(c) of the Federal Clean Water Act and Section 13240 of the California Water Code, the Central Valley Regional Water Quality Control Board (Regional Water Board) reviews the water quality standards contained in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) every three years. This Triennial Review consists of conducting a public workshop to receive comments on water quality problems in the two Basins and preparing a work plan which describes the actions the Regional Water Board may take over the next three years to investigate and respond to the problems. Implementation of the work plan depends upon the Regional Water Board's program priorities, resources, and other mandates and commitments. Crucial to successful implementation of the actions is adequate support of the Regional Water Board's Basin Plan activities.

The Regional Water Board began its 2005 Triennial Review by providing a 45-day public notice, culminating in a public workshop, to solicit comments on water quality problems. The public notice (Attachment A) contained a brief description of some problems identified by staff. The notice was mailed to the more than 2900 entities on the Basin Plan mailing list. A shorter notice (Attachment B) was published for one day in each of the five major newspapers covering the Basin Plan area (Attachment C).

The public workshop was held during the regularly scheduled Regional Water Board meeting on 18 March 2005 to receive oral comments. Attachments D and E are copies of the official agenda and minutes, respectively, of the meeting of the Regional Water Board at which the Triennial Review public workshop was held. Comments submitted after the public workshop were also considered in this review. The Regional Water Board received a total of 13 written comments and 7 verbal comments at the workshop. Responses to these comments are contained in Attachment F.

The issues listed below reflect the high priority water quality problems identified from public comments received during the review period and staff knowledge about problems in the Basin. The Regional Water Board does not propose to proceed directly with amendments to the Basin Plan as a result of this Triennial Review. The proposed actions consist of recommended investigations to determine the following:

1. Whether a problem exists.

2. The extent, source, frequency, duration, and magnitude of the problem.

3. Whether the problem can be resolved through a change in the way the Regional Water Board implements, enforces or otherwise gains compliance with existing standards.

4. Whether the problem must be resolved through amending the Basin Plan.

Two levels of actions are specified. Current Actions represent the staff's best judgment about what can be done from FY 06/07 through FY 07/08 to address the issue with available resources. Additional Actions depend on more resources becoming available. The priority for each issue indicates the intended order to address the issues.

Resources to support basin planning activities are very limited. The Regional Water Board annual budget to support basin planning activities regionwide is 0.6 Person Years (PY). From this resource, the Regional Water Board must conduct triennial basin plan reviews and prepare and propose amendments to the two Basin Plans that cover the Region. The FY 04/05 and 05/06 allocation was exhausted conducting the two triennial reviews and providing support for the development of basin plan amendments through other programs. A new Triennial Review will need to be completed three years from now. This leaves 1.2 PYs for 2 years (the two years between triennial reviews) to consider issues that may warrant revisions to the two Basin Plans. Existing resources only allow a small portion of the highest priority issue to be addressed. However, some stakeholders have provided funding for staff and studies to move certain issues forward. Also, other programs, such as the TMDL program, are including resources to complete basin plan amendments. These other sources of funding are identified in the workplan. The existing basin plan budget will be used to provide support in the preparation of basin plan amendments developed with these other sources of funding.

Based on the staff analysis, the following issues have been identified as high priority for the Sacramento and San Joaquin Rivers Basin.

- Beneficial Use Designations
- Regulatory Guidance to Address Water Bodies Dominated by NPDES Discharges
- Regulatory Actions in Agricultural Dominated Water Bodies and Agricultural Conveyance Facilities
- Regulatory Guidance for Salinity and Boron Discharges to the San Joaquin River
- Dissolved Oxygen Problems in the San Joaquin River near Stockton
- Organophosphorus (OP) Pesticide Control Efforts
- Mercury Load Reduction Program
- Policies for Maintaining Water Quality for Drinking Water
- Temperature Objectives to Protect Spring Run Salmon and Steelhead
- Salinity Policy

In addition to the above issues, the State Water Board is working on various plans and policies and it is necessary for Central Valley Water Board staff to participate in these processes.

- Policy for On-Site Disposal Systems
- Bacteria Objectives to Protect Waters Designated for Contact Recreation
- Chlorine Objectives

Resources to complete some of these high priority activities have been provided by the stakeholders, the TMDL program, and CALFED. Some resources have also been drawn from the point source regulatory and nonpoint source programs. However, there are not enough resources available to address all of the high priority activities.

The issues selected for the 2005 Triennial Review represent major water quality concerns based on what is currently known about them. Knowledge about pollution problems may change significantly from one year to the next.

Issue 1: **Beneficial Use Designations**

Discussion: The Basin Plan designates beneficial uses to surface waters in three different ways: (1) Table II-1 lists existing and potential beneficial uses that apply to surface waters of the basins; (2) The beneficial uses of any specifically listed water body generally apply to its tributary streams; and (3) The Basin Plan implements State Water Board Resolution 88-63 ("Sources of Drinking Water Policy") by assigning municipal and domestic supply uses (MUN) to all unlisted water bodies.

The Basin Plan states that all ground waters in the Region is suitable or potentially suitable for municipal and domestic water supply (MUN), agricultural supply (AGR), industrial service supply (IND), and industrial process supply (PRO).

Dischargers to both effluent and agricultural dominated water bodies question the appropriateness of the designated beneficial uses. Adjustments to designated beneficial uses for surface and ground waters can only be made through the Basin Plan amendment process. Because all the water bodies in the region have designated beneficial uses, changes to beneficial uses that result in less stringent criteria must be supported by a use attainability analysis as described in 40 CFR 131.10(g). Further discussion regarding issues specific to effluent or agricultural dominated water bodies is contained in Issues No. 2 and 3.

The State Water Board determined in Order No. 2002-0015, "… where a Regional Board has evidence that a use neither exists nor likely can be feasibly attained, the Regional Board must expeditiously initiate appropriate basin plan amendments to consider dedesignating the use. Moreover, the Regional Board can require dischargers to the affected waterbody to provide assistance, through data collection, water quality-related investigations, or other appropriate means, to support and expedite the basin plan amendment process."

Priority: High

Current Action: Planning staff is currently working on an assessment of certain beneficial uses in Alamo Creek, Ulatis Creek and Cache Slough, which is tributary to the Delta. Staff is also providing support for two relevant amendments which have been adopted by the Central Valley Water Board and are undergoing approval by the State Water Board, Office of Administrative Law and/or the US Environmental Protection Agency: the de-designation of four beneficial uses of Old Alamo Creek and the dedesignation of certain aquatic life uses for West Squaw Creek, tributary to Shasta Lake.

Current Resources: Stakeholders have funded staff to work on the Alamo Creek watershed and West Squaw Creek.

Additional Action: Because of the large number and size of the unlisted water bodies, developing a logical system of grouping some of the waterbodies and assigning beneficial uses to the groups would involve the most efficient use of resources. Staff would assemble and work with a stakeholder group to define the issues associated with any general classification system and to determine the best and most efficient approach to the assignment of beneficial uses. One possible conclusion of additional studies would be that categorizing the waterbodies will be technically infeasible and beneficial uses will need to be addressed on a site-specific basis.

Additional Resources Requirements:

1) Staff -- 1.0 PY for the first year to further define this issue. Future needs would depend on the number of water body categories that are identified.

2) Contract(s) -- Approximately $500,000 to help identify the scope of this issue and group water bodies into logical categories.

Issue 2: **Regulatory Guidance to Address Water Bodies Dominated by NPDES Discharges**

Discussion: It is sometimes difficult and expensive for dischargers to meet water quality objectives in water bodies dominated by NPDES discharges, also known as effluent dominated water bodies (EDWs). Where little or no dilution is available, effluent limits are set at not greater than the applicable water quality standard. Common parameters that have proven difficult to meet in typical discharges from wastewater treatment plants include copper, zinc, arsenic, pesticides and various organic compounds. In addition, the water quality objectives for turbidity, temperature, dissolved oxygen and pH are often violated. These four objectives are based on allowing only limited changes to background conditions. However background stream conditions can fluctuate and respond more quickly to environmental changes (i.e., rainfall, changes in air temperature) than effluents from wastewater treatment facilities. In some cases, wastewater treatment plants are capable of discharging high quality effluent that would fully support beneficial uses and yet still be in violation of the Basin Plan. The consistent flows provided by the wastewater discharge may also enhance some aquatic life beneficial uses but be detrimental to others that depend on the ephemeral nature of the stream. The original conditions in the stream may change, causing a shift in the specific uses within a beneficial use category (i.e. a shift from the unique uses of ephemeral waters to the uses of a perennial water). There are questions of whether the discharger should be required to fully protect these shifted uses when it is the discharge itself that allows the modified uses to exist at all. There are also questions regarding the fate of the original uses that are lost due to the discharge.

Stakeholders have suggested that the assigned beneficial uses of these water bodies are inappropriate and have requested that various alternatives be explored for assigning beneficial uses to EDWs. The alternatives suggested were to a) designate site specific beneficial uses, b) use “warm” and “cold” designations on a case by case basis rather than applying the “tributary rule,” c) develop an EDW beneficial use which would consist of a limited warm water habitat, recreation and/or

municipal use, d) adopt site specific objectives, or e) develop provisions for granting variances from compliance with water quality objectives.

All of the above alternatives can only be accomplished through the Basin Plan amendment process. They cannot be performed during the permit adoption process. Studies necessary to comply with Clean Water Act and California Water Code requirements for modifying or dedesignating beneficial uses have not been completed for most EDWs. Further discussion regarding the designation of beneficial uses is in Issue No. 1 Because of the number of water bodies where action is needed, alternative policies and actions would allow the most efficient use of resources.

Priority: High

Current Action: Because EDWs are a statewide concern; the State Water Board has taken the lead in developing statewide policies to address some of the issues. Central Valley Water Board staff will work with State Water Board staff to develop a strategy for addressing EDWs. This may include any or all of the following:

- Developing a policy to identify which water bodies are EDWs;
- Identifying appropriate beneficial uses through Use Attainability Analyses (UAAs);
- Developing site-specific or basin-wide objectives applicable to this special situation; and
- Developing other regulatory tools to address constituents of concern.

Currently, there is an EDW stakeholder group representing dischargers in the Sacramento and San Joaquin River Basins. Due to resource constraints, staff provides minimal coordination support for this stakeholder group. As regional issues are identified, the Central Valley Water Board will address them as resources allow.

Planning staff is currently working on two Basin Plan Amendments (BPAs) that directly address EDW concerns. The first is a basin-wide BPA for pH and turbidity that staff is developing with assistance from

the Basin Plan Advisory Committee - a coalition of dischargers organized by the City of Roseville and a subcommittee of the EDW Stakeholder Group. The second is an assessment of certain beneficial uses in Alamo Creek, Ulatis Creek and Cache Slough. Staff is also providing approval support for two relevant amendments: the de-designation of four beneficial uses of Old Alamo Creek and the Site-Specific Temperature Objectives for Deer Creek.

Current Resources: Stakeholders have funded work on the Alamo Creek watershed.

Additional Action: Additional funding will also be needed as potential amendments are identified.

Additional Resources Requirements:

1) Future amendments that deal with beneficial uses or water quality objectives require roughly 0.5 PY per year for three years to oversee and administer each basin plan amendment.

2) Contract(s) -- Approximately $500,000 to conduct studies to support a basin plan amendment. These studies include the scientific justification, environmental assessment and economic analysis.

Issue 3: **Regulatory Actions in Agricultural Dominated Water Bodies and Agricultural Conveyance Facilities**

Discussion: In agricultural environments, a complex network of modified natural and constructed channels convey irrigation supplies to farms and export agricultural drainage water to natural streams. Many of these waterways lack habitat and physical flow characteristics to sustain the full range of aquatic life and other beneficial uses. Based on information that the Central Valley Water Board staff collected in 1992, it is estimated that more than 130 natural water bodies, totaling more than 1100 miles, are dominated by agricultural drainage and supply water in the Sacramento and San Joaquin River Basins. There are more than 4100 water bodies, totaling over 9300 miles, which are constructed facilities designed to carry agricultural drainage and supply water. There are more than 75 water bodies, totaling almost 600 miles that are natural dry washes that have been altered to carry agricultural supply or drainage water.

Some of these water bodies were deliberately modified for the purpose of providing support to the agricultural industry. Stakeholders have commented that fully protecting the designated beneficial uses would result in loss of the agricultural functionality of the water body. Therefore, stakeholders have requested that the Central Valley Water Board develop plans and policies that recognize that the functionality of the modified water body should take precedence over any perceived beneficial uses.

Table II-I of the Basin Plan lists surface water bodies and beneficial uses that are designated for those water bodies. The Basin Plan states that the beneficial uses of any specifically identified water body generally apply to its tributary streams. Many of the agricultural dominated water bodies have designated beneficial uses through application of this tributary statement. Adjustments to these beneficial uses can only be made through the Basin Plan amendment process that would need to include all the considerations that are specified in Porter-Cologne and be consistent with requirements of the Clean Water Act.

Priority:	High
Current Action:	Certain water bodies are both effluent dominated and agriculturally dominated. Issues that are identified as part of the work on Effluent Dominated Water Bodies (EDWs) that relate to Agricultural Dominated Water Bodies will be addressed as part of the EDWs effort. See Issue No. 2 for more details on the status of EDWs. In addition, beneficial use adjustments were identified as a separate issue (see Issue No. 1 for more details regarding beneficial uses).
Current Resources:	None specific to this issue
Additional Action:	Work towards development of a strategy to specifically address agricultural dominated water bodies. This may include evaluation of any or all of the following: o A policy to identify which water bodies are agricultural dominated water bodies and, if needed, further subcategorization of these types of water bodies; o Beneficial use adjustments through Use Attainability Analyses (UAAs); and o Site-specific objectives or basin-wide objectives applicable to this special situation. Each of these evaluations may require separate studies for each water body.
Additional Resource Requirements:	1) Staff -- 0.5 PY for three years to oversee and administer each basin plan amendment 2) Contract(s) -- Approximately $500,000 to conduct studies to support a basin plan amendment. These studies include the scientific justification, environmental assessment and economic analysis.

Issue 4: **Regulatory Guidance for Salinity and Boron Discharges to the San Joaquin River**

Discussion: Water quality in the San Joaquin River has degraded significantly since the late 1940s. During this period, salt concentrations in the River, near Vernalis, have doubled and boron levels have increased significantly. These increases are primarily due to reservoir development and water diversions on the east side tributaries and upper basin for agricultural development, the use of poorer quality Delta water in lieu of San Joaquin River water on west side agricultural lands and drainage from upslope soils on the west side of the San Joaquin Valley. The lower San Joaquin River, namely that part of the River from Mendota Pool to the Delta, along with its tributaries Mud Slough (north) and Salt Slough have been listed in the Clean Water Act Section 303(d) list as impaired due to boron and salts. The Clean Water Act requires that states establish total maximum daily load limits (TMDL) for all Section 303(d) listed water bodies.

Priority: High

Current Action: A TMDL adopted by the Central Valley Water Board to implement salt and boron objectives in the San Joaquin River at Vernalis was approved by the State Water Board in November 2005. The Central Valley Water Board is developing numerical objectives for salinity in the San Joaquin River upstream of Vernalis. A TMDL and Basin Plan Amendment to implement these objectives is scheduled to be presented to the Central Valley Water Board by October 2006.

Current Resources: Staff is funded from specific basin planning resources for agricultural drainage and the TMDL program.

Issue 5: **Dissolved Oxygen Problems in San Joaquin River near Stockton**

Discussion: Low dissolved oxygen concentrations in the San Joaquin River in the vicinity of Stockton annually impact or threaten to impact beneficial uses. Basin Plan water quality objectives are frequently violated during high temperature periods in late summer and early fall. Adult San Joaquin River fall run Chinook salmon migrate up river between September and December to spawn in the Merced, Tuolumne, and Stanislaus Rivers. The San Joaquin River population has experienced severe declines and is considered a species of concern by the US Fish and Wildlife Service. Low dissolved oxygen in the San Joaquin River can act as a barrier to migration. Low dissolved oxygen levels can kill or stress salmon and other species present in this portion of the Delta. The San Joaquin River is on the Clean Water Act Section 303(d) list of impaired water bodies due to low dissolved oxygen. In addition, this part of the Delta was listed as a Toxic Hot Spot under the Bay Protection and Toxic Cleanup Program and a Cleanup Plan was adopted to address this issue.

An amendment regarding the dissolved oxygen in this part of the Delta has been adopted by the Central Valley Water Board and approved by the State Water Board. The amendment presents a phased approach to address this issue.

Priority: High

Current Action: The Central Valley Water Board will be reviewing the allocation and prohibitions in the recently adopted amendment by December 2009 as more information is developed. Staff will also be addressing the low dissolved oxygen impairment in Old River and Middle River (from the San Joaquin River to the Delta-Mendota canal).

Current Resources: Staff funded with CALFED resources.

Issue 6: **Pesticide Control Efforts**

Discussion: The organophosphorus (OP) pesticides diazinon and chlorpyrifos have been documented at toxic levels in numerous surface water bodies. Diazinon has been documented at toxic levels in the San Joaquin River, Sacramento River, Feather River, the Delta and tributaries to these water bodies. Chlorpyrifos has been documented at toxic levels in the San Joaquin River, the Delta and tributaries to these waters. These water bodies have been listed on the Clean Water Act Section 303(d) list of impaired water bodies. The Clean Water Act mandates that the Central Valley Water Board develop load reduction programs to resolve these water quality problems through a Total Maximum Daily Load (TMDL) allocation process. In addition, the implementation chapter of the Basin Plan outlines a specific review process that the Central Valley Water Board must follow to address pesticide problems that are identified.

To address the OP pesticide problem, the Central Valley Water Board has initiated steps to amend the Basin Plan to establish water quality objectives and an implementation program. Federal requirements to develop TMDL allocations will also be addressed in this process. A Basin Plan Amendment has been completed for diazinon in the Sacramento and Feather Rivers and received all necessary approvals. An Amendment for diazinon and chlorpyrifos in the San Joaquin River has been adopted by the Central Valley Regional Board and is pending approval from the State Water Board. The diazinon and chlorpyrifos Amendment for the Delta is under development.

In addressing the diazinon and chlorpyrifos issues, significant concerns have been raised regarding the impacts of replacement products, such as pyrethroids. Central Valley Water Board staff is working on a pesticide Basin Plan Amendment that would address pesticides that pose the highest risk to surface waters in the Sacramento and San Joaquin River Basins. 303(d) listed pesticides that are currently in use will be addressed as well as those pesticides that pose a potential risk. Water quality objectives and TMDLs will be proposed for those natural streams that could be

impacted by these pesticides. Public workshops and hearings will be held as part of the Basin Planning process to address these pesticides. It is anticipated that adopting numeric objectives for these pesticides will facilitate implementation of provisions of the Irrigated Lands Waiver, since well defined pesticide objectives and compliance time schedules will be established.

The public hearings will provide the review process that was established in the Basin Plan for addressing problem pesticides. The 2002 Clean Water Act Section 303(d) list identifies development of TMDLs for the San Joaquin River, Sacramento River, Feather River and Delta for the OP pesticides as a high priority activity.

Priority: High

Current Action: Central Valley Water Board staff is working with the Department of Pesticide Regulation, stakeholder groups, industry representatives, various commodity Boards, pesticide registrants and environmental groups to support efforts to develop management practices to reduce the levels of the pesticides reaching surface waters. CALFED and State proposition funds have been directed toward development of these practices in agricultural and urban settings.

Central Valley Water Board staff has developed a contract with the University of California, Davis to develop a methodology for deriving water quality criteria for pesticides. Staff also has a contract with UC Davis to collect water samples to assess whether the pesticides identified as high risk are at levels of concern.

Some staff resources have been shifted from Basin Planning activities to implementation of the adopted Basin Plan Amendments.

Current Resources:

1) Staff – TMDL resources.

2) Contract(s) -- about $450,000 is provided from state-wide TMDL resources and $56,000 from CalFed to conduct monitoring and support criteria development.

Additional Action:	Monitoring to establish the sources for impacted waters in the remaining Sacramento and San Joaquin River tributaries and development of TMDLs for these water bodies.
Additional Resource Requirements:	1) Staff – 0 PYs per year, assuming Irrigated Lands Program is sufficiently funded to assume majority of implementation tasks for previously adopted Amendments. 2) Contract(s) -- $200,000 per year for monitoring, assuming monitoring required under Irrigated Lands Program and NPDES permits is sufficient to characterize pesticide problems.

Issue 7: **Mercury Load Reduction Program (TMDL)**

Discussion: Mercury has been identified as a problem in the Delta and its tributaries and in Clear Lake and Cache Creek because it accumulates in aquatic organisms to levels that pose a threat to predator species and people that eat fish. Elevated mercury levels can be expected in areas where mercury was mined (Coast Range), where mercury was used to extract gold (Sierra Nevada and Cascade Range), and in downstream water bodies. Because of elevated mercury levels in fish tissue, numerous water bodies, including the Delta, have been included on the Clean Water Act Section 303(d) list of impaired water bodies. The Clean Water Act mandates that the Regional Water Board develop load reduction programs to resolve these water quality problems through a Total Maximum Daily Load (TMDL) allocation process. Health advisories have been issued for the Delta, the Lower American River, Lake Natoma, and other water bodies in the Central Valley due to the mercury levels in fish.

Priority: High

Current Action: Methylmercury cycling in the aquatic environment and the accumulation process in aquatic organisms is not well understood. Therefore, setting a reasonable goal in aquatic organisms and determining which sources are most important to control is not an easy task. While a significant amount of study and research have been completed to understand the mercury cycle, additional work is required to determine how to reduce methylation and control methylmercury sources. CALFED has funded studies on mercury in the water column, sediments, invertebrates, and fish. Both state and federal contract funds are being used for monitoring and analysis. Currently, data is being collected for loading studies in the Delta, Sacramento River, San Joaquin River and the American River watersheds.

The Regional Water Board has adopted a basin plan amendment incorporating a TMDL and an implementation program for controlling mercury and methylmercury in Cache Creek and its tributaries and it is pending approval by State Board, then the Office of

Administrative Law and the US Environmental Protection Agency. Staff is working on an amendment to control mercury and methylmercury in the Delta.

Current Resources:

1) Staff -- Funding provided from TMDL and CALFED resources

2) Contract(s) -- $125,000 per year from TMDL and/or CalFed resources

Additional Action:

Conduct source monitoring to refine the implementation program for watersheds upstream of the Delta and to support Clean Water Act Section 303(d) listings.

Initiate source monitoring and develop TMDL control programs for the Delta tributaries. Develop methylmercury and mercury reduction programs.

Additional Resource Requirements:

1) Staff -- 2 PYs per year

2) Contract(s) -- $500,000 per year

Issue 8: **Policies for Maintaining Water Quality for Drinking Water**

Discussion: The Sacramento/San Joaquin Delta is the source of drinking water for two thirds of the state's population (over 23 million people). In addition, the Sacramento and San Joaquin rivers, the two principal rivers discharging to the Delta, and their tributaries, are sources of drinking water for many Central Valley communities. The Sacramento and San Joaquin rivers receive pollutants from various activities in the Central Valley including agriculture, mining, confined animal facilities, and urban runoff and municipal and domestic wastewater. These pollutants include pesticides, trace elements, metals, nutrients, and pathogens. The Delta and segments of the Sacramento and the San Joaquin rivers are listed in the Clean Water Act Section 303(d) list due to impairment of beneficial uses by many of these pollutants. Due to increased intensity of development and coincident population growth, the demand for high quality drinking water will increase. Additionally, development within the watershed may increase the pollutant loads into these waters posing a greater threat to drinking water supplies.

State Water Board Resolution No. 88-63 (Sources of Drinking Water Policy), which is incorporated into the Basin Plan, recognizes municipal and domestic water supply (MUN) beneficial uses in all surface waters with a few limited exceptions. Maximum contaminant levels (MCLs) to protect drinking water supplies are contained in Title 22 of the California Code of Regulations and have been incorporated by reference into the Basin Plan for the protection of waters designated MUN. There are MCLs for some of the drinking water constituents of concern such as arsenic, salinity, nitrates, some pesticides, volatile organics, disinfection byproducts (trihalomethanes) and radiological constituents. However, there are no MCLs for other drinking water constituents of concern such as precursors to disinfection by-products (organic carbon and bromide).

In response to directives in the 1996 Reauthorization of the federal Safe Drinking Water Act, the USEPA has been developing more stringent regulations with respect

to controlling and reducing levels of disinfection by-products (DBPs) and pathogens.

High levels of organic carbon in source waters makes control of trihalomethanes and haloacetic acid compounds difficult if chlorine is the disinfectant and high levels of bromide in source waters makes control of bromate difficult if ozone is the disinfectant. The recent rules requiring reductions in DBPs and increased removal of pathogens are particularly challenging for water systems with source waters high in organic carbon and bromide.

The Sacramento River generally has low concentrations of organic carbon (generally around 2 mg/L); however, the San Joaquin River and the Delta have higher concentrations. In addition to the two major rivers, Delta agricultural drainage and the smaller rivers that flow into the Delta are sources of organic carbon. As urban areas develop within the Delta, there is increasing concern that urban runoff and wastewater will contribute organic carbon to Delta waters. The tidal exchange between the Delta and San Francisco Bay brings bromide into the Delta. Median Delta bromide concentrations are more than 6 times the national median. The combination of organic carbon and bromide make it difficult and expensive for Delta water purveyors to meet the current and anticipated regulations.

In addition to pathogens and DBP precursors, concerns have also been expressed with salinity. See Issue No. 10 for more details regarding development of a salt management policy.

The promulgation of drinking water regulations raises concerns regarding water constituents not previously regulated by the Central Valley Water Board. In addition, the CALFED Record of Decision (ROD) adopted targets of 3 mg/L TOC and 50 ug/L bromide at Delta pumping plants or an equivalent level of public health protection. The ROD obligates the Central Valley Water Board, with support from the CALFED agencies and the Department of Health Services (DHS), to develop and adopt a policy to protect sources of drinking water in the Central Valley. The technical

	studies needed to support the policy include identification of key sources of drinking water contaminants and an evaluation of the feasibility and cost of controlling contaminants at the source rather than removing them at water treatment plants. The policy will include identification and implementation of appropriate pollutant source control measures, focused regulatory and/or incentive programs targeting pollutants of concern, and development of a monitoring and assessment program. Any policy developed would need to be adopted into the Basin Plan and would require approval of the State Water Board, OAL, and USEPA.
Priority:	High
Current Action:	Central Valley Water Board Staff are working with CUWA, CALFED, the Department of Water Resources (DWR) and other interested stakeholders to develop a monitoring program to support the development of a drinking water policy. CUWA has successfully applied for a grant from the State Water Board to assist in this work.
Current Resources:	Stakeholders have funded staff to develop a drinking water policy. Stakeholders have also successfully applied for a grant to provide funds for technical studies to support policy development.
Additional Action:	Continue work with CUWA, DWR, DHS, CALFED and other interested stakeholders to conduct the technical studies required for policy development.
Additional Resource Requirements:	Staff -- 1.0 PYs per year to work with stakeholders to develop a policy and oversee and manage any basin plan amendments.

Issue 9: **Temperature Objectives to Protect Spring Run Salmon and Steelhead**

Discussion: The general temperature objective to protect aquatic life beneficial uses is that *"at no time or place should waters be increased more than 5 degrees Fahrenheit above natural receiving water temperature."* The Basin Plan also contains specific temperature objectives for the Sacramento River. These objectives may not be consistent with current science to protect migration, spawning and rearing salmon and steelhead.

The spring-run Chinook salmon has been listed as Threatened under the federal and state Endangered Species Acts. The Department of Fish and Game provided the following information regarding the spring-run Chinook salmon in the Sacramento River watershed. Mortality to developing eggs and embryos may begin when daily average water temperatures exceed 56 degrees Fahrenheit and reaches 100 percent at 62 degrees Fahrenheit. A water temperature increase of 5 degrees Fahrenheit in cold water streams could result in water temperatures exceeding the maximum safe level for the survival and development of embryonic and juvenile life stages of salmon and steelhead. Furthermore, water temperatures exceeding 60 degrees Fahrenheit are deleterious to adult spring-run salmon. The effects of temperature on the growth and survival of salmonid eggs, alevins, and fry have been well documented. The effects of temperature on adult spring-run salmon are less clear. Typically, adult spring-run salmon hold in freshwater over the summer months before spawning in early fall. It is believed that they are particularly vulnerable to high water temperatures while holding in the summer.

In August 2005, NOAA Fisheries designated critical habitat for 19 Evolutionarily Significant Units (ESUs) of salmon and steelhead in the Northwest and California. The ESUs within the Central Valley are the Central Valley Spring Run Chinook Salmon and the Central Valley Steelhead. The ESU range for the Chinook salmon is the Sacramento River and the ESU range for the steelhead is the Sacramento River and the San Joaquin River and their tributaries. Essential features of critical habitat include adequate: (1)

substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions.

The Department of Fish and Game documents that for spring chinook, the nature and degree of threat causing historic population declines are attributable mainly to loss of upstream habitat and secondarily to harvest. The causes of the continuing decline in recent decades are presumably related to a combination of factors: poor survival of out-migrants (especially in the Sacramento-San Joaquin Delta), limited access of adults to upstream spawning areas, poaching and other forms of harvest, and other factors such as disease and the interbreeding of wild stocks with hatchery-reared genotypes.

“Inland Fishes of California” by Peter Moyle, identifies the most commonly mentioned general factors that have contributed to the decline of Chinook salmon as over harvest (both in ocean and in streams), entrainment of juveniles in water diversions, loss of floodplain and estuarine rearing habitat by diking and draining, enhanced predation (particularly from nonnative predatory fish), competition from hatchery-reared juveniles for food and space in streams and from adults for spawning areas, diseases (both native and introduced), pollution, loss of riparian forests increasing stream temperatures, siltation of spawning areas from catastrophic and chronic sources, effects of introduced fish, invertebrates and plants, and natural factors, such as long periods of drought.

Information on the declines and causes of declines for steelhead are not available, other than the construction of barriers and the diversion of flows, but are expected to be similar to Chinook salmon.

According to “An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria” by Kathleen Sullivan, et al, the risk to salmon and trout populations associated with temperature is perceived to be high because: 1) the potential for biological effects exists according to laboratory-derived results; and, 2) many populations are already exposed to temperatures

exceeding those believed to induce negative biological consequences. Water temperature plays a role in virtually every aspect of salmon life, and adverse levels of temperature can affect behavior (e.g. migration delays and timing), disease resistance, growth, and mortality.

Water temperature control in the upper Sacramento River is critical for the restoration/recovery of winter-run chinook salmon. In past years, significant egg mortality occurred in the upper river due to elevated water temperatures. The NMFS Winter-run Biological Opinion for the operation of the CVP and SWP (February 1993) requires CVP operations to meet specific temperature criteria in the upper river. State Water Resources Control Board Orders 90-5, 91-1, and 92-2 also require compliance with temperature objectives in the upper river. In 1997, construction was completed on the Temperature Control Device (TCD) at Shasta Dam. The TCD allows better temperature management in the river, while allowing power generation. [DFG, Sacramento River Winter-run Chinook Salmon, Biennial Report 2000-2001, March 2002]

The major activities that result in significant adverse effects on spring-run Chinook in the upper Sacramento River tributaries include gravel mining, hydroelectric and agricultural diversions, and bank protection. The primary objectives of the restoration activities are reestablishing flow regimes, passage, and stream channel process as necessary to recover sensitive species, and using a cooperative approach to solve environmental problems in key watersheds. [DFG, Sacramento River Spring-run Chinook Salmon, Biennial Report 2002-2003, June 2004]

Priority: High

Current Action: None

Current Resources: None

Additional Action: Establish maximum temperature limits in streams and/or stream segments that need protection for sustaining migration, spawning and rearing of

anadromous salmonid populations. Consider deleting the 5 degree increase limit where maximum temperature limits are established and consider the economic consequences to controllable factors including point and nonpoint source dischargers.

Additional Resource Requirements:

1) Staff -- 0.5 PY for three years to oversee and administer the basin plan amendment

2) Contract(s) -- $500,000 for a temperature study and $200,000 for an economics review.

Issue 10: **Salt Management Policy**

Discussion: Salt management is the most serious long-term water quality issue in the San Joaquin River Basin. The causes include increased urban and agricultural development, over allocation of surface water supplies, diversion of high quality flows to outside the basin, salty return flows from agriculture and higher salinity water being imported into the basin. Approximately 600,000 tons of salt are imported annually into the western portion of the San Joaquin Basin (west of the San Joaquin River) for crop irrigation and wetland management via federal, state, and local water projects. An additional 160,000 tons are applied through irrigation from San Joaquin River diversions. Some of this salt is returned to the river through tail water return flows and some is stored in the soil. Most, however, is purposefully leached below the root zone to maintain salt balance in the root zone. Much of this leached salt ends up in the groundwater.

Degradation of groundwater in the San Joaquin River Basin by salts is unavoidable without a plan to remove salts from the basin. The Central Valley Water Board's present policy is to promote the maximum export of salt from the basin. Therefore, the Central Valley Water Board supports a drain to carry salts out of the valley as the best technical solution to this water quality problem. While waiting for a permanent solution, the Central Valley Water Board allows the San Joaquin River to be used to remove salts from the Basin as long as water quality objectives are met. This has led to the need for the Board to adopt a plan to control salt and boron in the San Joaquin River as water quality objectives were not being met. The control program, however, only deals with control of loads discharged to the River. Since groundwater inflow is a contributor of salt to the river and beneficial uses of groundwater are being impacted, a parallel control plan needs to be established for the control of salts to groundwater. Even with a control plan, the use of the San Joaquin River to export salts creates additional problems. For example, salt that is being exported thru the San Joaquin River is being recirculated into the federal and State water project pumps and returned to the water users in the San Joaquin River Basin as well as to water users in the

Tulare Lake Basin where there is no outlet for salt at the present time.

In the Sacramento River Basin, salt buildup and control is rarely an intrabasin issue. However, changes in salinity of the Sacramento River impact many water users outside the Sacramento River Basin. For example, a 1 mg/l change in salinity of the Sacramento River results in an additional 5,000 tons of salt being exported by the federal and State Water Projects to the San Joaquin River and Tulare Lake Basins.

In addition to basin-wide issues, there are local areas of potential groundwater problems due to disposal of wastewater from food processing, septic tanks, municipal wastewater, confined animal facilities, and numerous other types of industrial dischargers. With no basin wide salt outlet in either the San Joaquin River or Sacramento River Basins, there are only two alternatives for these point source dischargers: isolate the salt and store it in the basin or dilute it for reuse. Both have long-term consequences.

Priority: High

Current Action: Staff is working on control programs for salinity and boron in the San Joaquin River. See Issue No. 4 for a more detailed description of the issue and current actions. Regulatory staff is including salinity limits in waste discharge requirements.

Current Resources: Programmatic resources

Additional Action: The Central Valley Water Board, in conjunction with the State Water Board and the Coastal Water Boards, should conduct an assessment of salinity levels in the valley and develop a consistent statewide policy on how salt is to be managed within the Valley and how salt disposal will be accomplished while maintaining the ground and surface water beneficial uses within the Valley and the beneficial uses in the Coastal Regions.

Additional Resource Requirements:

1) Staff -- 6 PYs per year

2) Contract(s) -- $2,000,000 per year

Issue 11: **Policy for On-Site Disposal Systems**

Discussion: There are approximately 500,000 single-family residential septic systems in the Central Valley Region that discharge 150 million gallons of sewage per day. Failed septic systems impact groundwater with nutrients and pathogens. In order to perform adequately, on-site systems must be properly designed, located, installed and maintained. The Central Valley Water Board's policy has been that control of individual waste treatment and disposal systems can best be accomplished by local county environmental health departments if these departments strictly enforce an ordinance that is designed to provide complete protection for groundwater and surface water quality and for public health.

More than 25 years ago the Central Valley Water Board established guidelines for siting and operation of individual disposal systems. These guidelines were designed to protect water quality and are intended to implemented through county government ordinances. In recent years, there has been a proliferation of residential and urban development in the Sierra Nevada foothills that utilize individual disposal systems. Some of these developments are likely to be sited in areas inadequate for septic systems due to steep slope, shallow soils and fractured rock geology. The Central Valley Water Board guidelines do not address non-alluvial siting of individual disposal systems. In addition, the guidelines do not address alternative systems that may provide protection of ground and surface waters beyond a traditional septic tank and leachfield system. These guidelines are obsolete and need to be updated and then enforced.

Priority: High

Current Action: The State Water Board has been required under Section 13291 of the California Water Code to adopt regulatory standards for the permitting and operation of onsite sewage treatment systems by 1 January 2004. The State Water Board has formed advisory groups to help develop these regulations. Central Valley Water Board staff is participating in the advisory groups. Section 13291(e) of the California Water Code requires the

Central Valley Water Board to incorporate the State Water Board regulations into the Basin Plan.

Current Resources:

1) Staff -- 0.1 PYs per year from regulatory resources

2) Contract(s) -- $0

Issue 12: **Water Quality Objectives for Bacteria Indicators in Waters Designated for Contact Recreation**

Discussion: The current fecal coliform objectives for waters designated REC-1 are based on the results of a series of epidemiological studies conducted in the late 1940s and early 1950s, which are summarized by Stevenson (1953). These studies showed that there was a significantly greater illness rate in individuals who swam in water with an average total coliform density of 2,300 organisms per 100 ml compared to those who swam in water with an average total coliform density of 43 organisms per 100 ml. This total coliform index was translated into a fecal coliform index by using the ratio of fecal coliforms to total coliforms at one of the original study sites. This change from total coliform to fecal coliform was made because fecal coliform is a better indicator of fecal contamination and was more stable than total coliform. Based on this ratio, it was assumed that for fecal coliform, one would observe statistically significant swimming-associated gastrointestinal illness at 400 organisms/100 ml. The National Technical Advisory Committee (NTAC) of the Department of the Interior, which oversaw these initial epidemiological studies, suggested that a detectable risk was unacceptable, and so proposed a density of 200 fecal coliform per 100 ml as the criterion (NTAC, 1968). The NTAC further proposed that not more than 10 percent of samples should exceed 400 fecal coliform per 100 ml. This criterion was recommended by USEPA in 1976 (USEPA, 1976)

In response to criticisms leveled at the fecal coliform objective, USEPA initiated another series of epidemiological studies in both fresh water and marine water. The purpose of these studies was to: (1) confirm that swimming in sewage-contaminated water carries a health risk for bathers and (2) determine which indicator(s) is best correlated with swimming-associated health effects. These studies found that swimming in sewage-contaminated water does carry a health risk. Enterococcus and E. coli were the indicators most strongly correlated with gastroenteritis. These studies found that total coliform and fecal coliform densities were only weakly correlated with gastroenteritis. The enterococcus and E. coli criteria

	now recommended by USEPA were calculated based on historical "acceptable" illness rates of 8 illness per 1,000 swimmers at fresh water beaches, and 19 illness per 1,000 swimmers at marine beaches, which are the illness rates associated with the fecal coliform criterion. (USEPA, 1986) As a result of the national epidemiological studies, the USEPA published revised criteria guidelines for bacteria, recommending that States use enterococcus in marine water and E. coli or enterococcus in fresh water (USEPA, 1986).
Priority:	High
Current Action:	The State Water Board is developing statewide criteria for bacteria to protect waters designated for contact recreation. Central Valley Water Board staff will work with State Water Board staff to develop the criteria.
Current Resources:	Basin planning resources

Issue 13:	**Chlorine Objectives**
Discussion:	The Basin Plan does not contain a numerical water quality objective for chlorine. In determining permit limits, staff relies on application of the narrative objective. Limits are placed in permits that take into account chlorine toxicity information, receiving water characteristics, available dilution and other considerations. The narrative toxicity objective and the Policy for Application of Water Quality Objectives in the Implementation Plan Chapter of the Basin Plan indicate that the Central Valley Water Board can use available information and numerical criteria and guidelines from other authoritative bodies to assist in determining compliance with the objective. However, non-uniform translation of narrative water quality objectives could be impairing the Central Valley Water Board's ability to properly protect the beneficial uses of its waters.
Priority:	Low
Current Action:	The State Water Board is developing statewide criteria for chlorine to protect aquatic life beneficial uses. Central Valley Water Board staff will work with State Water Board staff to develop the criteria.
Current Resources:	Programmatic resources
Additional Action:	None
Additional Resource Requirements:	None

Issue 14: **Groundwater Survey and Control Policies for Discharges to Groundwater**

Discussion: The Basin Plan describes various groundwater quality problems that exist throughout the region and includes numerous policies that address prevention and cleanup of groundwater quality problems. There are programs in place that are designed to address localized problems (i.e., underground tank and site cleanup program) but there has been no organized effort to address the wide spread problems of nitrates and salts. A major effort is needed to assess the current conditions, determine the factors contributing to present groundwater impacts, and develop policies that can be used to correct existing problems and prevent future problems.

The 2003 update of the Department of Water Resources Bulletin 118 includes a summary of water quality from public supply water wells sampled from 1994 to 2000. In the Sacramento River Basin, 74 of 1356 wells had constituents that exceed one or more of the state's maximum contaminant levels (MCLs) for drinking water. The most frequently exceeded constituents were nitrates, volatile/semi-volatile organic compounds and inorganic chemicals. In addition, the Bulletin also notes that groundwater quality is generally excellent but there are areas with local groundwater problems such as natural water quality impairments at the north end of the Sacramento Valley and along the margins of the valley and around the Sutter Buttes, where Cretaceous-age marine sedimentary rocks containing brackish to saline water are near the surface. Human-induced impairments in this area are generally associated with individual septic system development in shallow unconfined portions of aquifers or in fractured hard rock areas where insufficient soil depths are available to properly leach effluent before it reaches the local groundwater supply.

In the San Joaquin River Basin, 126 of 689 wells had constituents that exceeded one or more MCLs. The most frequently exceeded constituents were pesticides, radiological contaminants and nitrates. In general, groundwater quality throughout the basin is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are

TDS, nitrate, boron, chloride, and organic compounds. Most of the TDS is naturally occurring. High TDS content in the trough of the valley is the result of concentrations of salts due to evaporation and poor drainage. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Boron and chloride are likely a result of concentration from evaporation near the valley trough. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected in groundwater throughout the region, but primarily along the east side of the San Joaquin Valley where soil permeability is higher and depth to groundwater is shallower. Industrial organic contaminants include TCE, dichloroethylene (DCE), and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Nitrates. A 1988 State Water Board report to the State Legislature on Nitrate in Drinking Water (SWRCB, 1988) reported that 10 percent of the samples in STORET (the USEPA database) were above the primary Maximum Contaminant Level (10 mg/L nitrate-nitrogen). A geographical depiction of wells with levels of nitrate above background (greater than 4.5 mg/L nitrate-nitrogen) showed the highest densities in the Central Valley are close to the Highway 99 corridor and primarily around population centers (e.g. Modesto, Yuba City, Fresno, and Bakersfield) and concentrated animal confinement areas (e.g. feedlots and dairies). As noted above in Bulletin 118, nitrate is one of the most frequently exceeded constituents in public supply wells.

The primary health concerns with the consumption of water with elevated nitrate is the condition known as methemoglobinemia. Methemoglobinemia, more commonly known as the “blue baby syndrome,” is the interference by nitrate to the absorption of oxygen by hemoglobin in the blood. Infants, younger than 6 months, are most susceptible and the oxygen deficit in the blood stream produces blue coloration of the lips and skin and hence the term “blue baby.” More severe cases result in death. The health impacts to infants subject to chronic oxygen deprivation, as a result of

nitrate consumption in drinking water, which do not result in mortality, are unknown. The condition is often misdiagnosed and is believed to be under reported. A survey of hospital discharge records by the Department of Health Services (DHS) between 1983 and 1995 revealed 97 cases of methemoglobinemia in children younger than one year. The database, however, was incomplete and it could not be determined how many cases were attributable to consumption of nitrate contaminated groundwater as other factors can also lead to this condition, such as aerosol deodorizers and certain pharmaceuticals.

The primary sources of nitrate in groundwater are application of nitrogen fertilizers, disposal or reuse of animal waste at confined animal production facilities, and individual sewer systems (septic systems).

Areas of intensive crop production in highly permeable soils, especially of crops with a high nitrogen demand (e.g., vegetables, citrus, and silage corn), are known or suspected of causing elevated nitrate levels in the groundwater (e.g., Salinas Valley, Chico Basin and Hilmar Area of Merced County). Groundwater in crop production areas can become contaminated with nitrate when nitrogen fertilizers are applied at rates in excess of crop utilization and inefficient irrigation or high rainfall leach the nitrate to groundwater. Other factors that put groundwater at risk are a shallow aquifer, the absence of a restricting layer to vertical migration of nitrate, permeable soils and poor well construction. The Irrigated Lands waiver may address some of these issues by starting the process of identifying impacts and requiring development and implementation of practices to reduce and/or eliminate the impacts.

In 1993, the Central Valley Water Board conducted a survey of groundwater beneath five typical well operated dairies in the vicinity of Hilmar. The average nitrate-nitrogen concentration beneath these dairies was 49 mg/L with a maximum value of 250 mg/L. This far exceeds the drinking water standard of 10 mg/L. Conditions were conducive to migration of nitrates to groundwater as soils are highly permeable (sandy) and the water table is shallow (4 to 25 below ground surface). There are 1600 dairies in the Central Valley

with approximately 1 million milking cows. The Central Valley Water Board is developing general waste discharge requirements to control nutrients from confined animal production facilities.

With respect to individual septic systems, the Central Valley Water Board has dealt with these on a case-by-case basis by prohibiting discharge in problematic service areas. Twenty-six prohibitions have been adopted by the Central Valley Water Board. The Central Valley Water Board has also adopted guidelines for use of septic tank systems in developments. Staff has encouraged counties to adopt and enforce ordinances that are consistent with the guidelines. However, these guidelines are now outdated and the State Water Board is working on regulations. See Issue No. 11 for a more detailed description.

Salt. Salts, as measured by Total Dissolved Solids (TDS) or electrical conductivity (EC) are of concern because they interfere with agricultural, industrial, and domestic beneficial uses of groundwater. However, salts are also of concern in surface waters. See Issue No. 10 for a more detailed description of salinity issues.

Priority: Medium

Current Action: The Supplemental Report of the 1999 Budget Act and later the Groundwater Quality Monitoring Act of 2001 required the State Water Board to develop a comprehensive ambient groundwater monitoring plan. To meet this mandate, the State Water Board created the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The primary objective of the GAMA Program is to comprehensively assess statewide groundwater quality and gain an understanding about contamination risk to specific groundwater resources.

Current Resources: None

Additional Action: Monitoring collected under the GAMA program should be evaluated to determine what discharge activities are impacting groundwaters and to develop management practices to protect groundwater quality. A groundwater monitoring program specific to the Sacramento River and the San Joaquin River Basins

should be developed to track trends in groundwater quality and to evaluate the effectiveness of implementation programs.

In the absence of a uniform statewide program for dealing with the impacts of nitrates and salt on groundwater quality, the Central Valley Water Board should develop a program to address these issues. The Central Valley Water Board needs to develop strategies and implementation programs that allow all ground waters to be maintained as close to natural concentrations of dissolved matter as is reasonable considering careful use and management of water resources. Stakeholder groups should be convened to identify management measures that would reduce the amount of nitrates and salt leached to ground water.

Additional Resource Requirements:

1) Staff -- 2 PYs per year for three years

2) Contract(s) -- $1,000,000 to develop a ground water monitoring program and conduct initial monitoring. $500,000 per year to conduct a continuous ground water monitoring program. $100,000 per year for three years to help develop an implementation program to protect groundwater quality.

Issue 15: **Aquifer Storage and Recovery Projects**

Discussion: In the April 2005 draft of the California Water Plan, ground water recharge was defined as the movement of surface water from the land surface, through the topsoil and subsurface, and into de-watered aquifer space. Recharge occurs naturally from precipitation falling on the land surface, from water stored in lakes, and from creeks and rivers carrying storm runoff. Recharge also occurs when water is placed into constructed recharge ponds (also called spreading basins), when water is injected into the subsurface by wells, and when water is released into creeks and rivers beyond what occurs from the natural hydrology (for example, by releases of imported water). These later examples of recharge are often called artificial, intentional, managed or induced recharge. Significant amounts of recharge can also occur either intentionally or incidentally from applied irrigation water and from water placed into unlined conveyance facilities. Groundwater banking is the recharge (often of imported surface water or local flood water) into de-watered aquifer space for later recovery and use or exchange with others.

Many of the projects in the Central Valley use spreading basins. Recently, Aquifer Storage and Recovery (ASR) projects are being considered by a number of municipalities to increase their drinking water supplies by pumping surface water underground in times of abundant supply and extracting water from the same aquifer in times of need. In contrast to other types of conjunctive use projects, ASR projects may use disinfected drinking water as the source of injected water and do not receive the treatment that occurs by filtration through the unsaturated zone above the aquifer.

There have been a number of concerns expressed over the use of injecting treated water into ground water. One concern is the impact of injecting water of lower quality than the ground water. At issue are the potential degradation of the ground water aquifer, addition of man-made chemicals (e.g., disinfection byproducts) to the ground water, and whether the blended water will be able to meet future drinking water standards as those standards become increasingly stringent. Another

concern is the impact of injecting water that is different in quality from the natural ground water and the potential to change the characteristics of the aquifer and possibly reduce its capacity to store water.

Some stakeholders feel that consideration should be given to the need to increase water storage for future statewide needs. In addition, requiring a higher quality of injected water than that currently imposed on drinking water purveyors could erode public trust in the drinking water supply.

Priority: Medium

Current Action: Project proponents are being asked to implement the project in two phases. In the first phase, the project proponents perform a small-scale operation to define the nature and extent of influence of the project on aquifer quality and characteristics and to demonstrate control over the injected water within the project area. The second phase would be full-scale operation of the project. With appropriate monitoring and a contingency plan to address identified impacts, both phases could be conducted under a waiver of waste discharge requirements (WDRs).

Current Resources: Regulatory resources from the Land Discharge (WDR) program.

Additional Action: Direct injection into an aquifer bypasses the natural attenuation processes that normally occur with surface recharge. Studies are needed on the long-term impacts to the physical and chemical properties of the aquifers that receive injected water.

Additional Resource Requirements:

1) Staff – 0.25 PYs per year for three years to oversee contract investigations and provide technical assistance.

2) Contract(s) -- $200,000 per year for three years

Issue 16: **Sediments**

Discussion: Accelerated erosion from subdivision construction, agricultural land conversion, highway construction, and nonpoint source activities contributes to turbidity and sedimentation in the region's streams. The Central Valley Water Board recognized this problem in 1979 and adopted guidelines to reduce erosion from agriculture and subdivision construction. No additional comprehensive review has been done since then and sediments continue to impact streams. These sediments may be impairing the municipal, recreational and aquatic life beneficial uses of affected water bodies.

Priority: Medium

Current Action: Erosion from construction activities disturbing 1 acre or more is being addressed through stormwater permits. Activities in riparian areas may also be subject to water quality certification requirements.

Current Resources: No staff resources are available to address the basin plan portion of this issue; however, stormwater and water quality certification resources are available to carry out the mandated activities under these two programs as described above.

Additional Action: Although some erosion issues are being addressed through our stormwater and water quality certification programs, other erosion-causing activities would still be addressed by the Erosion/Sedimentation guidelines. The Erosion/Sedimentation guidelines in the Basin Plan are outdated. Potential sedimentation sources need to be evaluated, and the guidelines should be revised as necessary and re-incorporated into the Basin Plan.

Additional Resource Requirements:

1) Staff -- 2.0 PYs for two years

2) Contract(s) -- $0

Issue 17: **Ammonia Objectives**

Discussion: The Basin Plan does not contain a numerical water quality objective for ammonia. In determining permit limits, staff relies on application of narrative objectives. Limits are placed in permits that take into account ammonia toxicity information, taste and odor thresholds, receiving water characteristics, available dilution and other considerations. Staff also relies on the 1991 USEPA Technical Support Document that discussed permit derivation procedures. The narrative toxicity objective and the *Policy for Application of Water Quality Objectives* in the Implementation Plan Chapter of the Basin Plan indicate that the Central Valley Water Board can use available information and numerical criteria and guidelines from other authoritative bodies to assist in determining compliance with narrative objectives. Therefore, the information that is contained in the USEPA Technical Support Document and numerical criteria and guidelines may be used by staff to derive permit limits. However, non-uniform translation of narrative water quality objectives could be impairing the Central Valley Water Board's ability to properly protect the beneficial uses of its waters.

Priority: Low

Current Action: None

Current Resources: None.

Additional Action: Develop water quality objectives for ammonia. Staff will work with interested stakeholders to finalize ammonia objectives to prevent toxicity and adverse tastes and odors.

Additional Resource Requirements:

1) Staff -- About 0.5 PYs for two years

2) Contract(s) -- $0

Issue 18: **Dissolved Oxygen Objectives**

Discussion: The basin plan includes general dissolved oxygen objectives that apply to all water bodies designated as supporting warm freshwater habitat (WARM), cold freshwater habitat (COLD) and fish spawning (SPWN) and site specific objectives for certain water bodies that are typically higher than the general objectives. Both general and site-specific objectives are applied as minimum levels that are to be equaled or exceeded at all times. These objectives have existed in the Basin Plan since its original adoption in 1975. In 1986, the USEPA developed National Criteria for dissolved oxygen. The National Criteria have not been evaluated for use in the Sacramento River and San Joaquin River Basins.

An additional concern is that the specific dissolved oxygen objectives for the Delta contains ambiguous language regarding applicable water quality objectives for "bodies of water which are constructed for special purposes and from which fish have been excluded or where the fishery is not important as a beneficial use." There is an unresolved disapproval from the US Environmental Protection Agency on the editing of the language that created this ambiguity.

Priority: Low

Current Action: None

Current Resources: None

Additional Action: Re-evaluate the water quality objectives for dissolved oxygen.

Additional Resource Requirements:

1) Staff -- About 0.5 PYs per year for two years

2) Contract(s) -- $0

Issue 19:	**Current USEPA Criteria**
Discussion:	The Central Valley Regional Board is currently implementing standards promulgated by USEPA in 2000. These standards are known as the California Toxics Rule (CTR). Since the promulgation of the CTR, USEPA has published updated guidance for 98 pollutants, pursuant to Section 304(a) of the Clean Water Act. The updated guidance represents the most current science and may provide better criteria to protect beneficial uses.
Priority:	Low
Current Action:	None
Current Resources:	None
Additional Action:	Review updated criteria to determine whether amendments are needed to the water quality objectives to ensure that beneficial uses are protected.
Additional Resource Requirements:	1) Staff -- About 0.5 PYs per year for two years 3) Contract(s) -- $0