

CHAPTER 8. IMPLEMENTATION

Key Points

Implementation actions are the steps and measures needed to meet the dissolved oxygen and temperature TMDL, achieve water quality standards, and protect and restore the beneficial uses of water in the Shasta River watershed.

The implementation actions are structured to contain the five key elements required in a nonpoint source pollution prevention program as defined in the NPS Policy. The implementation actions also rely entirely upon existing authorities. No new authorities are proposed.

- The implementation actions are designed to build upon the on-going, proactive restoration and enhancement efforts underway in the watershed.
- The implementation plan provides actions to:
 - Increase riparian vegetation along the Shasta River and its tributaries as a mechanism to lower water temperatures and promote stream bank stability;
 - Control tailwater to prevent the discharge of nutrient enriched and elevated temperature return flow to the Shasta River and its tributaries;
 - Encourage efficient water use in the Shasta River watershed to increase dedicated cold water flow in the Shasta River;
 - Remove, re-engineer, or limit construction of minor instream impoundments or other structures capable of impeding free flow of water conveyance as a mechanism to decrease oxygen demanding sources in the Shasta River;
 - Bring the discharge of Dwinnell Dam into compliance with the dissolved oxygen TMDL;
 - Bring the Yreka wastewater treatment facility into compliance with existing Regional Water Board Orders and compliance with the dissolved oxygen TMDL;
 - Prevent the discharge of polluted urban and suburban runoff from entering Shasta River or its tributaries;
 - Address activities on U.S. Forest Service and Bureau of Land Management lands;
 - Address activities conducted as part of timber harvest activities on non-federal lands, and
 - Address discharge from State controlled roads.

This chapter describes the steps or implementation actions necessary to ensure that the purpose of the TMDL will be achieved. The proposed implementation actions are organized and grouped under primary source or land use categories. This organization mirrors that of the proposed Basin Plan amendment language and is designed to make it easier for stakeholders to find the implementation actions that apply to their specific activities. More than one section may apply.

8.1 Implementation Actions Overview

Many individuals, groups, and agencies have been working to restore and enhance water quality and fish habitat in the Shasta River watershed. Regional Water Board staff recognize that these proactive efforts have improved water quality conditions, and that continued water quality improvements will occur much faster and easier if stakeholders continue their efforts and help implement the Shasta River TMDL Action Plan. Therefore, many of the implementation actions described in this section are designed to support and monitor the results of the continued implementation of on-going watershed restoration and enhancement efforts.

For example, the Natural Resources Conservation Service (NRCS) provides aid in securing financial assistance and technical support for the implementation of beneficial management practices throughout the United States. Several programs may be available to agricultural interests in the Shasta River watershed, including an Irrigation and Water Management Program under the umbrella of the NRCS Conservation Planning Program (1997a). Also available through the NRCS is the National Agronomy Manual (NRCS 2002), with land use practices and actions designed to achieve sustainable use of different natural resources while protecting the environment.

The continued participation by the NRCS in the Shasta River watershed is valuable for water quality and TMDL-related efforts. The technical resources available to landowners and stakeholders through the NRCS are particularly useful for preventing, minimizing, and controlling oxygen consuming material (and sediment waste) discharges and high water temperatures. The Regional Water Board shall increase efforts to work cooperatively with the NRCS to provide technical support and information to willing landowners and stakeholders in the Shasta River watershed, and to coordinate educational and outreach efforts.

The Shasta Valley Resource Conservation District (Shasta RCD) has been, and continues to be a source of funding and technical assistance for stakeholders in the Shasta River watershed. For the last 10 years, the Shasta River Coordinated Resources Management and Planning Committee (CRMP) has performed work to restore anadromous fish production in the Shasta River watershed under the umbrella of the Shasta RCD. Past efforts of the Shasta RCD included funds and technical assistance for stream restoration projects, efficient irrigation water application, water diversion management, stock water conservation management practices, and other programs.

Like the NRCS, the Shasta RCD primarily provides technical, financial, and other assistance to landowners and watershed groups. The Regional Water Board shall increase efforts to work cooperatively with the Shasta RCD to provide technical support and information to willing landowners and stakeholders in the Shasta River watershed and to coordinate educational and outreach efforts.

Although the current proactive efforts to restore and enhance water quality in the Shasta River watershed can make a great difference, it is the responsibility of the Regional Water Board to develop and implement actions that will ensure attainment of the dissolved oxygen and temperature TMDLs and water quality standards. Further, the Regional Water Board must

ensure that the Shasta River TMDL Action Plan is in compliance with the state Nonpoint Source Policy (NPS Policy). The policy requires that all nonpoint sources of pollution (including nutrients and other oxygen consuming waste discharges, and elevated water temperatures) be regulated through, (1) prohibitions, (2) permits in the form of waste discharge requirements (WDRs), (3) waivers of WDRs or (4) through a combination thereof.

In addition, a nonpoint source pollution control implementation program must include five key elements as described in Table 8.1. The *Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program* was adopted by the State Water Board on May 20, 2004. The NPS Policy is available, at <http://www.waterboards.ca.gov/nps/docs/oalfinalcopy052604.doc>. As explained in the NPS Policy, the *Plan for California's Nonpoint Source Pollution Control Program* is to be implemented and enforced through California Water Code mandates and authorities, outreach, education, technical assistance, financial incentives, and collaborative efforts with other agencies and non-governmental organizations.

Table 8.1: Summary of the Five Key Elements of the Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program

Key Element 1	The nonpoint source pollution control program's ultimate purpose shall be explicitly stated.
Key Element 2	A description of management practices and other program elements that are expected to be implemented to ensure attainment of the purpose shall be included.
Key Element 3	When it is necessary to allow time to achieve water quality requirements, a specific time schedule and milestones shall be included.
Key Element 4	Sufficient feedback mechanisms shall be included.
Key Element 5	The potential consequences for failure shall be included.

The implementation actions as presented in the Shasta River TMDL Action Plan are organized by sources (or land use activities) and include specific actions (or management measures) to be undertaken by specific responsible parties by a specific time period. Responsible parties identified under these actions include, in part, the Regional Water Board, its staff, other regulatory agencies, Shasta Valley RCD and its CRMP, municipalities and individual stakeholders. Implementation actions are summarized below.

Implementation actions for range and riparian land management sources include support for and implementation of specific grazing and riparian management practices and the development and implementation of ranch management plans in site-specific situations. The Regional Water Board will also address the removal and suppression of riparian vegetation and activities in the riparian zone as part of the Stream and Wetland System Protection Policy under development by Regional Water Board staff and their contractors.

Implementation actions for tailwater sources include support for and implementation of management practices presented in the CDFG Coho Recovery Strategy, the Shasta CRMP Shasta Watershed Restoration Plan and the Shasta RCD Draft Incidental Take Permit Application.

Implementation actions for water use and flow sources include support for and implementation of management practices for water use and conveyance efficiency and increased dedicated cold water instream flows as presented in Shasta CRMP Shasta Watershed Restoration Plan, CDFG Coho Recovery Strategy and the Draft Incidental Take Permit Program.

Implementation actions for irrigation control structures and minor impoundment sources include support for and implementation of removal or alternation of minor impoundments to lessen their impacts on water quality, where feasible, on the mainstem Shasta River.

Implementation actions for sources related to discharges from Dwinnell Dam include requiring the Montague Water Conservation District to develop and implement a plan that contains appropriate actions to reduce nitrogenous oxygen demand from the Dwinnell Dam outflow.

Implementation actions relative to the City of Yreka Wastewater Treatment Facility include Regional Water Board staff's pursuit of compliance with existing Regional Water Board Orders, including cleanup and abatement orders and monitoring and reporting programs.

Implementation actions relative to urban and suburban runoff include supporting implementation of the management measures in the state *Nonpoint Source Pollution Control Program, Urban Management Measures*.

Implementation actions for sources related to activities on United States Forest Service (USFS) holdings include application of prescriptions as described in the appropriate National Forest Land and Resource Management Plan.

Implementation actions for sources related to activities on Bureau of Land Management (BLM) holdings include implementation of best management grazing strategies detailed in the joint management agency document *Riparian Management, TR 1737-14 1997, Grazing Management for Riparian-Wetland Areas*.

Implementation action for timber harvest activities on non-federal land will rely on the existing regulations and permitting authority, including watercourse protection measures described in the 2006 Forest Practice Rules, general waste discharge requirements and waivers thereof.

Sources associated with California Department of Transportation will be addressed through the existing permitting program (Caltrans Storm Water Program).

Consistent with the NPS Policy, the Regional Water Board will waive the requirement to file a Report of Waste Discharge under Water Code section 13269 for responsible parties identified in the Action Plan that discharge, if the responsible party chooses to participate in the on-going collaborative programs and implement recommended measures as applicable. A discharge includes land uses that may remove and/or suppress vegetation that provides shade to a water body, tailwater runoff, and the tailrace from water impoundments. Should a responsible party that discharges choose not to participate, or if the Regional Water Board's Executive Officer determines additional measures are necessary, they must submit a Report of Waste Discharge (RWD) and filing fee to the Regional Water Board immediately or in accordance with the written notice. If the implementation actions identified in Table 4 of the Action Plan fail to be implemented by the responsible party or if the implementation actions prove to be inadequate the Regional Water Board shall take additional permitting and/or enforcement actions, as necessary. The conditional waiver will not apply to any discharges for which a WDR, waiver, or prohibition is issued under a separate action of the Board. The conditional waiver expires upon Regional

Water Board adoption of a superseding regulatory action after the evaluation period specified below for each source category, or after five years, whichever occurs first.

The nonpoint source pollution control actions contained in the Shasta River TMDL Action Plan, include a variety of measures developed to achieve water quality standards, attain the TMDLs, and comply with the NPS Policy. The five key elements of the NPS Policy are included as part of the required implementation actions for each of the sources or land use activities identified in the Action Plan. This includes specific time frames and reportable milestones for attainment of water quality requirements (Key Element 3).

Other permitting tools that may be applicable include, but are not limited to:

1. The authority to require technical reports on the conditions and operation of a facility, in accordance with Water Code section 13267.
2. The authority to require monitoring reports, in accordance with Water Code section 13267.
3. The authority to inspect a facility, in accordance with Water Code section 13267.
4. The permitting of the discharge of waste, or proposed discharge of waste, to waters of the state through Waste Discharge Requirements (WDRs), in accordance with Article 4 of the Water Code. WDRs may take the form of individual or project-specific WDRs, watershed-specific WDRs, or general WDRs that are applicable to a specific activity.
5. The authority to waive the requirements for a WDR, in accordance with Water Code section 13269.
6. The permitting of a discharge of waste to waters of the United States through National Pollution Discharge Elimination System (NPDES) permits, in accordance with Section 402 of the Clean Water Act and Water Code section 13370.
7. The certification that a proposed activity, which requires a federal permit or license, complies with water quality standards, in accordance with Section 401 of the Clean Water Act.

Enforcement tools that may be applicable include, but are not limited to:

1. The authority to require a time schedule of specific actions to be taken, in accordance with Water Code section 13300.
2. The issuance of a cease and desist order, in accordance with Water Code section 13301.
3. The issuance of a cleanup and abatement order, in accordance with Water Code section 13304.
4. The authority to impose monetary liabilities or fines (administrative civil liabilities), in accordance with Water Code sections 13268 and 13350.

Additionally, enforcement actions should be consistent with the State Water Board's *Water Quality Enforcement Policy*, adopted February 19, 2002, as SWRCB Resolution No. 2002-0040, and as subsequently amended (SWRCB 2004). The Enforcement Policy has been codified in California Code of Regulations, title 23, section 2910. The Enforcement Policy promotes a fair, firm, and consistent enforcement approach appropriate to the nature and severity of a violation.

8.1.1 Prioritization of Implementation Actions

Where reaches of the Shasta River and its tributaries are providing suitable freshwater salmonid habitat, including providing connectivity of the stream system and/or refugia for coho salmon, protection of these areas should be a priority for restoration efforts. Further discussion with landowners and stakeholders can help determine where restoration efforts are likely to yield the greatest benefit to beneficial uses. Prioritization may be scaled to a sub-watershed or a stream reach.

8.2 Ranch and Riparian Land Management

In the Shasta River watershed, grazing and range management related activities have been observed to discharge sediment and oxygen consuming materials, and to contribute to elevated water temperatures. The Basin Plan states that: “Controllable water quality factors shall conform to the water quality objectives contained [in the Basin Plan]. When other factors result in the degradation of water quality beyond the levels or limits established [in the Basin Plan] as water quality objectives, then controllable factors shall not cause further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from man’s activities that may influence the quality of waters of the State and that may be reasonably controlled” (NCRWQCB 2005, p. 3-1.00).

These impacts are especially noticeable in locations where grazing animals have unhindered access to a watercourse where nutrients in the form of animal wastes are deposited in watercourses. Animal wastes generated at considerable distances from water bodies may also be discharged via storm water runoff or tailwater return flow to nearby watercourses. Either of these grazing activities may result in lowered dissolved oxygen concentrations. Water temperature is affected when grazing animals trample, eat, and suppress vegetation that would otherwise provide shade to a watercourse, thereby causing increases in solar radiation loads. Additionally, grazing animals often discharge sediment waste through direct soil disturbance, or indirectly when grazing animals trample, eat, and suppress vegetation, thereby reducing soil stability.

8.2.1 Grazing-Related Dissolved Oxygen and Temperature Control Actions

To address these issues, the Regional Water Board staff will encourage landowners in their employment of land stewardship practices and activities that minimize, control and, preferably, prevent discharges of sediment, nutrients and other oxygen consuming materials, as well as elevated solar radiation loads of the Shasta River and tributaries. There are a number of grazing and rangeland management practices that have already been developed by local farm bureaus, the University of California Cooperative Extension, and the Field Office Technical Guides available through the NRCS (NRCS 2002). Watershed specific measures were also developed by the Shasta Valley Resource Conservation District (Shasta RCD), Shasta Valley Coordinated Resources Management and Planning Committee (Shasta CRMP), and the California Department of Fish and Game (CDFG). Several of these management practices are listed in Table 8.2. The Regional Water Board staff will support those that oversee and manage grazing and range land activities in the Shasta River watershed to implement these practices where appropriate to their ranching and other agricultural operations. Activities on federal lands are addressed separately in sections 8.9 (Forest Service) and 8.10 (BLM) of the Staff Report.

Table 8.2: Grazing, rangeland, and riparian management practices

<p>(1) Protect sensitive areas (including streambanks, lakes, wetlands, estuaries, and riparian zones) by (a) excluding livestock, (b) providing stream crossings or hardened access to watering areas, (c) providing alternative water locations away from surface water, (d) locating salt and additional shade, if needed, away from sensitive areas, or (e) using improved grazing management (e.g. herding) to reduce the physical disturbance and direct loading of animal waste and sediment caused by livestock; and</p> <p>(2) Achieve the following on range, pasture and other grazing lands not addressed under (1) above: implement the range and pasture components of a Conservation Management System (CMS) as defined in the USDA NRCS Field Office Technical Guide applying the progressive planning approach of the USDA NRCS to reduce erosion. NPS Policy (MM 1E) (SWRCB 2000)</p>
<p>On properties owned by participants in the ITP livestock fencing shall be in place on at least 90% of that person's owned stream bank length where there is a potential to affect coho, or fencing shall be in active progress towards implementation along those streams with installation by January 1, 2008, and/or shall have CDFG approved livestock management measures in place that will provide similar protections to the streambanks and riparian zone. Livestock riparian exclusion fencing built after 3-30-05 needing to comply with the permit must be approved by SVRCD, will be expected to have a setback of at least 35 feet from normal high water line, and shall be maintained in good working order as long as the permit is in place and livestock are present. Draft Shasta ITP (Minimization Measures B) (SVRCD 2005b)</p>
<p>SVRCD will work with landowners and DFG on appropriate methodology and riparian species selection on a site by site basis. Draft Shasta ITP (Minimization Measures C) (SVRCD 2005b)</p>
<p>Grazing along the steam corridor may occur as a mechanism of riparian management and will be coordinated with the SVRCD, the landowners and CDFG staff. Draft Shasta ITP (Table 1-1) (SVRCD 2005b)</p>
<p>Planting of riparian vegetation along stream banks will be coordinated with the SVRCD, the landowners and CDFG staff. Draft Shasta ITP (Table 1-1) (Table 1-1) (SVRCD 2005b)</p>
<p>Address factors that contribute to high temperatures. Coho Recovery Strategy (HM-5a, b) (CDFG 2004b)</p>
<p>Promote coho salmon recovery by minimizing diversion entrainment, protecting riparian vegetation, and encouraging effective land use practices. Coho Recovery Strategy (P-1 through P-7).(CDFG 2004b)</p>
<p>Increase riparian vegetation. Coho Recovery Strategy (HM-4a-d) (CDFG 2004b)</p>
<p>Continue program of riparian fencing and native tree planting. Shasta Watershed Restoration Plan (Shasta CRMP 1997)</p>

The Shasta CRMP provides a multi-interest effort to cooperatively seek solutions, to help manage local resources, and to solve related problems (Shasta CRMP 2005). It completed the *Shasta Watershed Restoration Plan* (Shasta Restoration Plan) in 1997, which addresses multiple watershed issues including nutrient sources and other oxygen consuming materials that influence dissolved oxygen concentrations and elevated solar radiation loads to waters of the Shasta River system.

The Shasta Restoration Plan identifies the following recommended actions for ranch and riparian land management: 1) Continue program of riparian fencing for livestock control; 2) increase shade; 3) reduce fine sediment in spawning gravel; 4) continue native tree planting; and 5) focus erosion controls on methods that will be both effective and result in ongoing vegetative bank protection. The community-based nature of the Shasta CRMP, its accomplishments to date, history in the watershed, and the trust established with a diverse group of landowners and stakeholders make the Shasta CRMP highly suited to implement dissolved oxygen and temperature control strategies and practices. Because of its unique standing in the watershed, the Shasta CRMP is also in the valuable position of being able to effectively encourage and assist landowners in developing and implementing management practices that prevent, minimize, and control discharges.

First, the Regional Water Board and staff shall increase efforts to work cooperatively with the Shasta CRMP to provide technical support and information to willing individuals, landowners, and community members in the Shasta River watershed and to coordinate educational and outreach efforts.

Second, the Regional Water Board will coordinate with the Shasta CRMP to: (1) implement the strategic actions specified in the Shasta Restoration Plan, and (2) assist landowners in developing and implementing management practices that are adequate and effective at preventing, minimizing, and controlling discharges of nutrients and other oxygen consuming wastes, and elevated solar radiation loads. Such actions should address many of the sources of nutrients and oxygen consuming wastes and elevated water temperatures in the watershed. By implementing these restoration measures, the Shasta CRMP will greatly aid in the attainment of dissolved oxygen and temperature water quality standards in the Shasta River watershed. Additionally, implementing the strategic actions will likely result in a higher priority ranking for the Shasta CRMP when applying for grant funding from the Regional and State Water Boards.

Regional Water Board staff will coordinate with the Shasta CRMP to develop appropriate methods to monitor the Plan's implementation and effectiveness. Regional Water Board staff will provide annual updates to the Regional Water Board on the status of the program's effectiveness in achieving compliance with the TMDL, Basin Plan, and the NPS Policy.

Additionally, the Regional Water Board shall take appropriate permitting actions as necessary to address the removal and suppression of vegetation that provides shade to a water body in the Shasta River watershed. Such actions may include, but are not limited to, prohibitions, waste discharge requirements (WDRs) or waivers of WDRs for grazing and rangeland activities, farming activities near water bodies, stream bank stabilization activities, and other land uses that may remove and/or suppress vegetation that provides shade to a water body. Should prohibitions, waivers or WDRs be developed, they may apply to the entire North Coast Region or just to the Shasta River watershed.

8.2.2 Ranch Management Plans for Grazing Activities

Should voluntary efforts fail to be adequate and effective at preventing, minimizing, and controlling discharges of sediment, nutrients and other dissolved oxygen consuming materials, and elevated solar radiation loads, or a responsible party chooses to not participate in voluntary efforts, the Regional Water Board may require the appropriate responsible parties to develop, submit, and implement a ranch management plan. Any landowner is potentially subject to this requirement if livestock grazing activities on their property are discharging, or threatening to discharge oxygen consuming materials and/or are resulting in elevated solar radiation loads to a water body in the Shasta River watershed. The Regional Water Board's Executive Officer will require a ranch management plan and monitoring on an as-needed, site-specific basis, as determined by Regional Water Board staff.

Staff shall consider the following criteria when determining whether a ranch management plan is appropriate: 1) grazing activities that are the greatest threat to water quality, specifically the impacts of the discharge or threatened discharge to dissolved oxygen loads and/or the potential to

increase water temperatures that affect the beneficial uses of the Shasta River and its tributaries; and 2) significance of the discharge, including such factors as volume, percent delivery, and the feasibility and reasonableness of control.

The ranch management plan shall describe in detail:

1. Locations discharging and/or with the potential to discharge nutrients and other oxygen consuming materials, and elevated solar radiation loads to watercourses which are caused by livestock grazing.
2. How and when identified sites are to be controlled and monitored, and management practices that will be implemented to prevent and reduce future discharges of nutrients and other oxygen consuming materials, and elevated solar radiation loads to the Shasta River and its tributaries.

For stakeholders with mixed-use property management activities, such as range management and irrigated agriculture, the ranch management plan shall consider and include all aspects of such mixed land use management strategies. Should a landowner/discharger be required to develop, submit, and implement a ranch management plan and conduct effectiveness monitoring, the landowner/discharger will be notified in writing of the requirements. It is likely the landowner/discharger will first be asked to submit any pertinent information on grazing-caused discharges and management practices previously collected and completed by the landowner/discharger. Following analysis of this information, the Executive Officer shall determine if further information, in the form of a ranch management plan, is required. A ranch management plan will likely not be required if the landowner/discharger has already developed and is implementing grazing practices that are determined to be adequate and effective at preventing, minimizing, and controlling discharges of oxygen consuming material and elevated solar radiation loads. Additionally, the Executive Officer shall specify in writing the required contents of a ranch management plan.

The Shasta CRMP's role may entail assisting applicable stakeholders in developing individual or group ranch management plans. Ranch management plans shall include methods, activities, and systems to assure that oxygen consuming materials, organic compounds, and other oxygen demanding substances that may contribute to lowered dissolved oxygen levels are not discharged to affected watercourses. Where appropriate, a ranch management plan shall also address actions to reduce solar radiation loads to affected watercourses. The ranch management plan shall also illustrate compliance, as applicable, with the *Plan for California's Nonpoint Source Pollution Control Program, Section 1. Agricultural Management Measures, Subsections 1A-1F* (SWRCB 2000), Regional Water Board directives, the Basin Plan, and also with the Management Measures in the Nonpoint Source Pollution Control Plan.

8.2.3 Stream and Wetland System Protection Policy

The Regional Water Board shall also address the removal and suppression of vegetation that provides shade to a water body through the up-coming Stream and Wetland System Protection Policy. During the 2004 Triennial Review of the Basin Plan, the Regional Water Board determined that the development of a riparian protection policy was a high priority. This policy will be comprehensive and region-wide and will address, in part, the importance of shade on instream water temperatures. This policy will also be developed to comply with the five key

elements of the NPS Policy. As the Stream and Wetland System Protection Policy will potentially propose new rules and regulations in the form of riparian setbacks, buffer widths, or other specific measures, the policy will take the form of a Basin Plan amendment with associated public noticing, review and comment period, and other environmental review requirements. As a result of Regional Water Board action on the Stream and Wetland System Protection Policy, modifications of measures recommended in the Shasta River TMDL Action Plan may be required for consistency with this policy. Regional Water Board staff, and their contractors, are currently developing the policy under a grant from the U.S. EPA. A draft of the policy is scheduled for public review in the Spring of 2007 with adoption by the Regional Water Board scheduled for Fall of 2007.

Permitting Action Development Schedule: The Regional Water Board shall develop and take appropriate permitting and enforcement actions to address the removal and suppression of vegetation that provides shade to a water body in the Shasta River watershed as more information becomes available on where discharges are occurring. Such actions may include, but are not limited to, general waste discharge requirements (WDRs) or waivers of WDRs for grazing and rangeland activities, farming activities near water bodies, stream bank stabilization activities, and other land uses that may remove and/or suppress vegetation that provides shade to a water body. Should prohibitions or general WDRs be developed, they may apply to the entire North Coast Region or just to the Shasta River watershed.

Compliance Schedule: Within ten years of EPA approval of the TMDL, all identified discharges associated with riparian land use activities shall be in compliance with water quality standards, the TMDLs and the NPS Policy.

8.3 Tailwater Return Flow

The Temperature TMDL (Chapter 6) determined that tailwater flowing over land exposed to solar radiation can increase significantly in temperature before discharging to nearby watercourses. Results from the Dissolved Oxygen Source Analysis (Chapter 4), also show that tailwater return flows are contributing factors to low dissolved oxygen concentrations in waters of the Shasta River. Tailwater associated with field flooding (sheet) irrigation methods are known to accumulate, transport, and discharge oxygen consuming materials including, among others, excess nitrogenous and phosphorous bearing compounds. This enriched tailwater contributes to the elevated nitrogenous oxygen demand (NBOD) rates in receiving waters where it is discharged and, as such, is a controllable water quality factor.

Additionally, sediment enriched tailwater return flows also appear to contribute to elevated sediment oxygen demand (SOD) rates in the Shasta River (Chapter 7). Elevated SOD results in reduced dissolved oxygen concentrations that are harmfully impacting the beneficial uses of water, particularly the salmonid populations of the Shasta River system.

Proper tailwater management is a major factor in achieving compliance with Basin Plan objectives and the TMDL. Therefore, it was determined that there should be no net increase in

stream temperature from tailwater return flows. The water quality compliance scenario of the dissolved oxygen TMDL (Chapter 7), calculated that a 50% reduction in photosynthetic and respiration rates from existing baseline conditions is achievable, when assuming a 50% reduction in the standing crop of aquatic vegetation. Hence, by reducing fine sediment sources to the river system the production of aquatic plants may also be reduced.

8.3.1 Implementation Actions

A number of tailwater management practices are presented in the NPS Program, CDFG Coho Recovery Strategy, the Shasta CRMP Shasta Restoration Plan, and the Shasta RCD Draft Incidental Take Permit Application. Practices include the reuse of tailwater, constructing off-stream retention ponds for percolating tailwater through the ground, and a community based approach to managing tailwater among groups of water users. Tailwater management practices are summarized below in Table 8.3.

Table 8.3: Tailwater Return Flow Management Measures

Develop and implement comprehensive nutrient management plans for areas where nutrient runoff is a problem affecting coastal waters and/or water bodies listed as impaired by nutrients. Such plans would include a plant tissue analysis to determine crop nutrient needs; crop nutrient budget; identification of the types, amounts, and timing of nutrients necessary to produce a crop based on realistic crop yield expectations; identification of hazards to the site and adjacent environment; soil sampling and tests to determine crop nutrient needs; and proper calibration of nutrient equipment. When manure from confined animal facilities is to be used as a soil amendment and/or is disposed of on land, the plan shall discuss steps to assure that subsequent irrigation of that land does not leach excess nutrients to surface or ground water. NPS Program (MM 1C) (SWRCB 2000)
Capture of additional tailwater from on-site or neighboring fields. Draft Shasta ITP (Table 1-1) (SVRCD 2005b)
The Shasta RCD will assist landowners/sub-permittees in designing and implementing tailwater capture systems that intercept and reuse runoff from on-site and off-site properties in accordance with standards outlined by the Natural Resources Conservation Service NRCS. Draft Shasta ITP (Table 1-1) (SVRCD 2005b)
Conduct assessments of tailwater return flows, promote opportunities to eliminate, minimize, reclaim and reuse, where feasible. Coho Recovery Strategy (WUE-7a-c) (CDFG 2004b)
Manage tailwater return flows so that entrained constituents, such as fertilizers, fine sediment and suspended organic particles, and other oxygen consuming materials are not discharged to nearby watercourses. This could include modifications to irrigation systems that reuse tailwater by constructing off-stream retention basins, active (pumping) and or passive (gravity) tailwater recapture/redistribution systems. (U.C. Davis 1998; NRCS 1997b)
Seek ways to reduce irrigation tailwater, or capture for reuse. Shasta Watershed Restoration Plan (Shasta CRMP 1997)

Implementing these management practices can assist in moderating and/or reducing water temperatures and decreasing substances that reduce oxygen levels in the Shasta River system. Parties responsible for tailwater discharge from irrigated lands, which may include landowners, lessees, and land managers, should implement the management practices described above. Regional Water Board staff will evaluate the effectiveness of these actions and develop recommendations, which may include parts or all of the management measures in Table 8.3, to determine the most effective regulatory vehicle to bring tailwater discharges into compliance with the TMDL and the Basin Plan. Information gathered during the evaluation phase will be used to formulate final recommendation(s) for the Regional Water Board's consideration. This evaluation phase shall be completed within one year of U.S. EPA approval of the TMDL.

Based on Regional Water Board staff recommendation(s) derived from the evaluation phase for tailwater management, the Regional Water Board shall adopt as appropriate, prohibitions, WDRs, waivers of WDRs, or any combination, thereof.

8.3.2 Tailwater Management Plan

Should voluntary efforts fail to be adequate and effective at preventing, or reducing water temperatures and decreasing substances that reduce oxygen levels in the Shasta River system, or a responsible party chooses to not participate in voluntary efforts, the Regional Water Board may require the appropriate responsible parties to develop, submit, and implement a tailwater management plan. The Regional Water Board's Executive Officer will require a tailwater management plan and monitoring on an as-needed, site-specific basis, as determined by Regional Water Board staff. The plan may include various elements such as discharge and receiving water sampling, monitoring, and reassessment. Additional management practices to assure that tailwater discharges to receiving waters comply with the TMDL and the Basin Plan may also be based on results from the tailwater management program.

Permitting Action Development Schedule: Within one year of the date the TMDL Action Plan takes effect, the Executive Officer shall provide a recommendation to the Regional Water Board on the most effective and appropriate permitting action(s) to address discharge from tailwater sources.

Permitting Action Adoption Schedule: Within five years of EPA approval of the TMDL, the Regional Water Board shall adopt a permitting mechanism to ensure tailwater discharges are in compliance with water quality standards, the TMDLs and the NPS Policy.

Compliance Schedule: Within ten years of EPA approval of the TMDL, all discharge of tailwater shall be in compliance with water quality standards, the TMDLs and the NPS Policy.

8.4 Water Use and Flow

Natural flows of the Shasta River system, in addition to seasonal snowmelt, are augmented by ground water accretion or as surface spring inflows. Surface water derived from a number of the larger springs, particularly those feeding certain reaches of Parks and Big Springs Creeks and the mainstem Shasta River, provided a source of cold water that noticeably decreases surface water temperature downstream from the springs. Additionally, the cumulative volumes of water discharged by these springs, if not diverted, would increase the overall volume of water in downstream watercourses, thus, increasing the thermal mass and velocity of the water. A significant source of cold groundwater to the Shasta River is that of Big Springs.

The TMDLs for both water temperature and dissolved oxygen show that decreased flows in the Shasta River mainstem and select tributaries are detrimentally affecting the beneficial uses of the cold water fishery. Surface water diversions in the Shasta River watershed has one of the most significant effects on stream temperatures and dissolved oxygen levels. Flow is diverted from natural sources for irrigation, stock watering, and domestic use.

The SWRCB, Division of Water Rights is the agency with authority to oversee and regulate water rights. Currently, the Division of Water Rights does not accept applications to appropriate surface water from the Shasta River because the stream system is listed on the Declaration of Fully Appropriated Streams. (SWRCB WR Order 98-08.) Surface water diversions in the Shasta watershed were subject to a statutory adjudication that resulted in a judgment and decree

approved by the Superior Court of the State of California, in Siskiyou County in 1932 (Siskiyou County Superior Court, 1932). Water rights are apportioned by quantity, and priority date. Senior right holders have earlier priority and may divert their entire share before those that are junior. The watermaster manages the water allocation on a day-to-day basis in accordance with the decree. At the time the watershed was adjudicated, there were approximately 40,000 acres of irrigated agriculture. Today there are 50,000 acres under irrigation. Riparian rights and groundwater pumping are not subject to the decree. Also, the decree contains no requirements for the protection of instream beneficial uses or consideration of the public trust doctrine.

8.4.1 Implementation Actions

A number of actions relative to water use and increasing instream flow were developed and presented by CDFG in the Shasta RCD Draft Incidental Take Permit Application and Coho Recovery Strategy. The Shasta CRMP also developed measures to address instream flow in the Shasta Restoration Plan. A summary of the instream flow and water use measures are presented in Table 8.4. These programs, when implemented, will help attain the TMDL and meet the water quality objectives in the Basin Plan. A brief overview of each program is discussed below.

Table 8.4: Instream Flow Management Measures

<p>Promote effective irrigation while reducing pollutant delivery to surface and ground waters. Pursuant to this measure, irrigation water would be applied uniformly based on an accurate measurement of cropwater needs and the volume of irrigation water applied, considering limitations raised by such issues as water rights, pollutant concentrations, water delivery restrictions, salt control, wetland, water supply and frost/freeze temperature management. Additional precautions would apply when chemicals are applied through irrigation. . Additional precautions would apply when chemicals are applied through irrigation. NPS Policy (MM 1F) (SWRCB 2000)</p>
<p>All persons covered by the permit and diverting water from within the Shasta River watershed will be expected to support ongoing watermaster services (either by DWR or by some other entity) should DWR cease to provide service) and pay their proportionate cost of that service to provide watermaster service in the Shasta Valley between April 1 and October 1 when instream flows are likely to be most critical to coho. Individual proportional costs for this activity are expected to continue to be collected by the County of Siskiyou via annual property taxes.</p>
<p>Those participants exercising riparian rights and not subject to watermaster control will cooperate with the watermaster in assuring they are within their legal rights and will inform the watermaster of any changes in the quantities of water they will be diverting. Draft Shasta ITP (Avoidance Measures III. A. i.) (SVRCD 2005b)</p>
<p>DFG, DWR, and the SVRCD shall develop and implement a management plan to coordinate and monitor irrigation season start up so as to minimize rapid deductions in instream flows. A draft Ramped Diversion Plan will be submitted to DFG by January 1, 2007 with a finalized plan submitted by January 1, 2008. Draft Shasta ITP (Avoidance Measures III. A. ii.) (SVRCD 2005b)</p>
<p>All persons covered by the ITP shall endorse continued efforts by DWR or other private watermaster organizations, to assure that flows year round shall not be allowed to fall below 20 cfs at the Shasta River near Montague (SRM) gage, a quantity that has been historically the watermaster’s minimum target for flow at that location, nor that flows at A-12 shall fall below 45 cfs at any time during the summer, a quantity that will assure that substantial cold water refugia areas are retained upstream of the point. Draft Shasta ITP (Avoidance Measures III. A. iii.) (SVRCD 2005b)</p>
<p>The SVRCD will develop a dry and critically dry year plan to assure that stranding, or elimination of needed cold water refugia areas does not occur during extremely dry years. The dry year plan will be developed by SVRCD and will insure that previously described flows at 50 cfs at A-12 and 20 cfs at Montague-Grenada road are achieved. A draft Dry Year Plan will be completed by the SCRCB one year from the issuance of the permit. Draft Shasta ITP (Avoidance Measures III. F) (SVRCD 2005b)</p>
<p>The SVRCD will work with those entities seeking coverage under the ITP to assist them in their efforts to upgrade overall irrigation efficiency. Potential projects that may be implemented to improve flows include upgrade of water delivery systems to reduce waste, upgrade of water application systems, monitoring crop water requirements vs. soil moisture, etc. Draft Shasta ITP (Minimization Measures V. A. i.) (SVRCD 2005b)</p>

Table 8.4 (continued): Instream Flow Management Measures

Encourage the Shasta CRMP to develop a dry year water plan for the Shasta River watershed. Coho Recovery Strategy (WM-1a) (CDFG 2004b)
Add additional oversight and more people to verify water use and better manage water in current watermaster service areas. Coho Recovery Strategy (WM-2a) (CDFG 2004b)
Institute a cooperative agreement between diverters to stage/stagger their irrigation starts and completions (ramped flows) to gradually change flows over several days. Coho Recovery Strategy (WM-3a) (CDFG 2004b)
CRMP, CDFG, and voluntary landowner participation: agree to pull diversions for a limited time period to produce a pulsed flow downstream. Coho Recovery Strategy (WM-4a) (CDFG 2004b)
Determine unused diversion rights and approach those diverters about providing flows for instream use without affecting the water rights of others. Coho Recovery Strategy (WM-5c) (CDFG 2004b)
For critical streams/reaches, diverters could rotate irrigations so diversions do not coincide when increased flows are critical for fish. Coho Recovery Strategy (WM-6a) (CDFG 2004b).
Provide headgates and measuring devices for diversions located in riparian areas Coho Recovery Strategy (WM-7a) (CDFG 2004b)
Study and forecast correlation of stream flow with other parameters to predict weekly flow rates. Can be based on snow surveys, precipitation, aquifer condition, etc. Coho Recovery Strategy (WM-8b) (CDFG 2004b)
Seek funding to conduct instream flow studies to determine flow-habitat relationships. Coho Recovery Strategy (WM-9) (CDFG 2004b)
Provide a structured process for willing participants to donate, sell, or lease water rights to provide improved stream flow. Coho Recovery Strategy (WA-1b, c, d & WA-7a, b, c) (CDFG 2004b)
Acquire water rights that shall be dedicated to instream flow. Coho Recovery Strategy (WA-7) (CDFG 2004b)
Support preparation of a water balance study. Apply study results to water management, augmentations, and Habitat enhancement recommendations. Coho Recovery Strategy (WM-1b) (CDFG 2004b)
Study feasibility of building storage reservoirs to capture excess winter runoff (solely) for the benefit of coho salmon, not for irrigation augmentation. Coho Recovery Strategy (WA-2a & WA-3b) (CDFG 2004b)
Identify and prioritize benefits and/or detriments to lining/piping surface ditch systems; promote ongoing diversion ditch maintenance. Coho Recovery Strategy (WUE-3; WUE-4) (CDFG 2004b)
Promote and/or retain water efficient irrigation practices. Coho Recovery Strategy (WUE-5a-e) (CDFG 2004b)
Prepare a comprehensive groundwater study to determine the current status of groundwater in the Shasta Valley and its relationship to surface flows. Coho Recovery Strategy (WM-10a) (CDFG 2004b)
Continue pulsed flow program to flush salmonids downstream during lethal water temperature conditions. Shasta Watershed Restoration Plan (I B-2) (SRCRMP 1997)
Support creation of dedicated instream flows for fish and wildlife. Shasta Watershed Restoration Plan (I B-2) (Shasta CRMP 1997)
Contemplate the impacts of readjudication of both surface and ground water. Shasta Watershed Restoration Plan (I B-9) (Shasta CRMP 1997)
Continue pulse flows until water quality is improved. Shasta Watershed Restoration Plan (III B-3.e) (Shasta CRMP 1997)
Seek funding for purchase of water for instream flows from willing sellers. Shasta Watershed Restoration Plan (III B-6) (Shasta CRMP 1997)
Where other means of adequate protection (for fish) are unlikely, support the purchase of key (property) areas from voluntary sellers whose sale would protect remaining land uses in the Shasta Valley. Shasta Watershed Restoration Plan (III B-7) (Shasta CRMP 1997)

8.4.2 Incidental Take Permit Program

Section 1602 of the California Endangered Species Act prohibits the unauthorized take¹ of threatened species, including coho salmon. “The CDFG may authorize take of a listed species by issuing a permit, known as an ‘Incidental Take Permit,’ if the take is incidental to otherwise lawful activity, such as a permitted agricultural diversion, and any take is minimized and fully mitigated” (CDFG 2005a, p. 1). Parties whose activities may result in a take of coho salmon can comply with Section 1602 by individually applying for an Incidental Take Permit. To ease possible burdens on landowners conducting certain activities in the Shasta River watershed, the CDFG is currently working with the Shasta RCD on a watershed-wide permitting approach to implementing the Incidental Take Permit Program (SVRCD 2005b). The primary activity covered by the Incidental Take Permit in the Shasta River watershed is surface water diversions associated with irrigated agriculture. Other activities include livestock management, fishery restoration projects, streambed and bank alterations, and vehicular impacts. Under the Watershed-Wide Incidental Take Permit, the Shasta RCD will be the permit holder allowing individual landowners to enroll in the program as sub-permittees. The sub-permittees will work directly with the Shasta RCD, avoid a CDFG fee, and be protected from enforcement action under the Endangered Species Act.

In order to fully avoid, minimize, and mitigate for incidental take of coho salmon under the Watershed-Wide Incidental Take Permit, the Shasta RCD developed avoidance, minimization, and mitigation measures, along with a plan to monitor effectiveness and compliance. For more information and details on these measures, see the Draft Incidental Take Permit Application (SVRCD 2005b) available from the Shasta RCD.

The Shasta RCD has submitted its application in March 2005 to CDFG for their Watershed-Wide Incidental Take Permit for Coho Salmon. CDFG is currently reviewing the application. Changes to the scope of the permit and the avoidance, minimization, and mitigation measures may occur.

The Shasta RCD draft application for an Incidental Take Permit for coho salmon requires prospective sub-permittees in the program to participate in watermastering control and oversight (SVRCD 2005b). Non-participation in watermastering services results in exclusion of sub-permittees from the Incidental Take Permit program and, therefore, makes them subject to regulation and enforcement actions by the CDFG if a take of coho salmon is deemed likely from the water diverter’s improper use of their water allocations. The Regional Water Board recognizes that not all agricultural and other water users with water rights diversions included in the Shasta River Decree may choose to, or are obligated to participate in the Shasta RCD Incidental Take Permit program. Therefore, to achieve strict and efficient use and conservation of diverted water, all water users with decreed rights to water in the Shasta Valley, including all waters upstream of Dwinnell Dam, are encouraged by the Regional Water Board to participate as sub-permittees in the Coho Salmon Incidental Take Permit Program upon final approval by the CDFG and adoption by the Shasta RCD.

² Take means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.

8.4.3 Coho Recovery Strategy

The CDFG has also developed a statewide *Recovery Strategy for California Coho Salmon* (Coho Recovery Strategy), which includes descriptions of the Shasta River watershed and recommendations for the recovery of coho salmon that are specific to both the Shasta River and Shasta River watersheds (CDFG 2004b). Implementation actions in the Coho Recovery Strategy are mostly of a general nature, but in many instances, they address individual streams and reaches, and near-stream and upslope areas when deemed critical to the recovery of coho salmon habitat.

Many of the recovery recommendations, or “tasks” detailed in the Coho Recovery Strategy focus on issues and actions pertinent to the efforts of the TMDL. Several management measures, all of which can be adapted to increasing instream flows in the Shasta River and its tributaries, include water conservation. Other management measures recommend the leasing, purchasing, or donations of water rights from willing water rights holders in the Shasta River watershed. All water diverters in the Shasta River watershed should participate in this program. The Regional Water Board shall work with the CDFG and aid, where appropriate, in the implementation of necessary tasks, actions, and recovery recommendations as specified in the Coho Recovery Strategy. The first step in this process will likely be the creation of an inter-agency working group. Regional Water Board staff also intends to work with CDFG staff in the development of the Watershed-Wide Incidental Take Permit, especially in relation to criteria for the management of grazing practices, riparian shade and other streamside activities, irrigated agriculture and other water use activities affecting the beneficial uses of water.

8.4.4 Shasta River Coordinated Resource Management and Planning Committee

In addition to the programs described above, a number of water efficient conservation practices are recommended in the Shasta CRMP Shasta Watershed Restoration Plan. The Shasta Restoration Plan provides water users throughout the Shasta River watershed with water management practices that would assist efforts in assuring adequate instream flows. Financial aid and staffing assistance with the above tasks may be available through the SWRCB, DWR, CDFG, NRCS, U.C. Cooperative Extension, the Shasta RCD, Shasta CRMP, USEPA, and/or other organizations.

Implementation of water conservation measures may not be effective in benefiting water quality because other water right holders may divert more water if more water is left available in the stream. In addition, an appropriative water right holder risks forfeiture for non-use if water is not used for a period of five years. The law of forfeiture applies to appropriative water rights, including those that were adjudicated, but will not affect riparian rights. The goal of water conservation is to increase stream flows to protect instream beneficial use. There are numerous legal tools available to water diverters to ensure that conserved water is applied to instream beneficial uses and will not be lost to forfeiture. Water made available through the implementation of conservation measures must be dedicated to beneficial use in order to be effective under this Plan. Dedicated means that the diverter, either individually or as a group, can demonstrate that the measure contains assurances that it will result in water quality benefits.

For example, under Water Code section 1707, any person entitled to use water, whether based on an appropriative, riparian, or other water right, may petition the State Water Board to change the

purpose of use to the preservation and enhancement of wetlands habitat, fish and wildlife resources, or recreation. The State Water Board may approve the petition if the change does not increase the amount of the original entitlement, does not unreasonably affect any legal user of water, and meets other requirements of the Water Code. The Action Plan also encourages water conservation and other flow measures on a watershed-wide scale to be the most effective, such as coordinating pulse flows as contemplated in the CDFG Coho Recovery Strategy. The Plan allows for creative solutions to dedicate these flow measures, including collaborative agreements. Any agreement should clearly delineate how measures ensure benefits to water quality.

If the measures summarized in Table 8.4 fail to be implemented or effective, the Regional Water Board will consider other actions for flow related impacts on water quality. The SWRCB Division of Water Rights is the agency primarily responsible for water right administration. Regional Water Board action consists primarily of various recommendations for state action. It may be appropriate for the State Water Board to consider various options in the water rights context to respond to the over-allocation, including but not limited to, seeking modifications of the decree, proceedings under the public trust doctrine, and/or proceedings under the waste and unreasonable use provisions of the California Constitution and the California Water Code. The doctrine of reasonable use “limits all rights to the use of water to quantities necessary for beneficial use, but prohibits waste or unreasonable use or unreasonable methods of use or diversion” (SWRCB 1990). The Regional Water Board may request that the SWRCB consider riparian rights and groundwater use in reviewing the adjudications and other proceedings.

Implementation Schedule

Effective prior to the date the TMDL Action Plan is adopted, water diverters should participate in the CDFG's Coho Recovery Strategy (CDFG 2004b) and Incidental Take Permit Program (CDFG 2005a)

The Regional Water Board shall work with CDFG to establish monitoring and reporting elements of these programs in order to gauge their effectiveness. Water diverters should participate in and implement flow-related measures outlined in the Shasta CRMP Shasta Watershed Restoration Plan. The Regional Water Board shall work with the Shasta CRMP to establish monitoring and reporting elements in order to gauge the Plan's implementation and effectiveness.

Reporting Schedule:

Within two years, and again within four years, of EPA approval of the TMDL water diverters shall report to the Regional Water Board, either individually or through the Shasta Valley RCD and its CRMP, on the measures taken to increase the dedicated cold water instream flow in the Shasta River by 45 cfs or alternative flow regime that achieves the same temperature reductions from May 15 to October 15.

Within five years of EPA approval of the TMDL, water diverters shall provide a final report to the Regional Water Board, either individually or through the Shasta Valley RCD and its CRMP, on documenting dedicated cold water instream flow in the Shasta River in relation to the 45 cfs goal or alternative flow regime that achieves the same temperature reductions from May 15 to October 15.

Dedicated cold water instream flow is defined as water remaining in the stream in a manner that that the diverter, either individually or as a group, can ensure will result in water quality benefits. Temperature, length and timing are factors to consider when determining the water quality benefits of an instream flow.

If after five years, the Regional Water Board Executive Officer finds that the above-measures have failed to be implemented or are otherwise ineffective, the Regional Water Board may recommend that the SWRCB consider seeking modifications to the decree, conducting proceedings under the public trust doctrine, and/or conducting proceedings under the waste and unreasonable use provisions of the California Constitution and the California Water Code.

8.5 Irrigation Control Structures and Impoundments

Since approximately 1915, extensive irrigation water control structures have been built in many watercourses in the Shasta Valley by private landowners and/or cooperatively controlled water and irrigation districts (KRBFTF 1991). These structures consist of weirs, dams, and other minor impoundments (collectively referred to as minor impoundments), of varying construction across the Shasta River and several tributaries that impound water to achieve an irrigation head for direct and/or indirect diversion to adjacent fields. A number of these impoundments are controlled by flashboard dams and other instream structures.

Some of the known effects that minor impoundments on the Shasta River have on the beneficial uses of water include a lack of and/or insufficient riparian vegetation along natural streambanks and/or man-made structures, such as levees and the banks of the impoundments themselves. Insufficient riparian shade increases solar radiation loads. In particular, instream impoundments, by virtue of providing larger surface storage areas and shallow depths, allows increased solar radiation to reach the waters surface, which cumulatively add to increased water temperatures. Other effects include areas of localized erosion, largely caused by the lack of root strength from insufficient or non-existent streamside vegetation. Impoundments have also been shown to increase sediment oxygen demand (SOD) rates beyond what would naturally occur without the impoundments. Accumulations of fine sediment and organic particles provide favorable conditions for the growth of aquatic macrophytes that, in turn, can trap and store additional fine sediment. These conditions are well suited for the growth of microbial communities that contribute to the relatively high sediment oxygen demand rates in select reaches of the Shasta River system affected by impounded water.

The Dissolved Oxygen TMDL (Chapter 7) determined that water quality compliance for dissolved oxygen concentrations could be achieved if the sediment oxygen demand rates were reduced by 50% from the existing rates (referred to as baseline) at river locations influenced by minor impoundments. Water quality compliance in the Basin Plan for waters of the Shasta Valley, excluding Lake Shastina, is a minimum dissolved oxygen concentration of 7.0 mg/L (NCRWQCB 2005).

8.5.1 Implementation Actions for Irrigation Control Structures and Minor Impoundments

The Shasta RCD and the Shasta CRMP, working cooperatively with other organizations and private parties, removed one impoundment that, since it was installed in 1889, impeded juvenile and adult salmon migration. Negotiations are ongoing for the removal and/or modification of two additional impoundments upstream from the completed project. Further upstream there are also three additional impoundments that are considered candidates for removal or modification (Shasta RCD 2005b). To assist in efforts toward achieving the TMDLs for temperature, dissolved oxygen, Basin Plan objectives and, especially the health of the cold water fishery, all stakeholders should initiate or renew efforts to arrive at viable solutions for modifying and/or removing the remaining impoundments.

In addition, to reduce solar radiation loads and sediment oxygen demand rates in the Shasta River system known to be affected by artificially impounded water, it is recommended that the various irrigations districts, individual irrigators, and other stakeholders that own, operate, manage, or anticipate construction of instream impoundments shall comply with the following measure.

Options may include, but are not limited to:

- Permanently removing impoundments in the Shasta River mainstem as a mechanism to provide for flushing flows capable of scouring fine sediment from the stream-river channel on which aquatic plants grow. Impacts to water quality to consider that may result from impoundment removal may include the short-term effects of flushing flows, instream increases in sediment routing and redistribution, bank erosion, and habitat

restructuring (including possible riparian and aquatic floral and faunal alterations) to downstream reaches.

- Re-engineering existing impoundments to decrease their surface area. The same concerns expressed for impoundment removal, above, regarding water quality impacts will also warrant investigation if impoundment alterations are considered as a management practice.
- Not undertaking the construction of new impoundments unless they can be shown to have positive effects to the beneficial uses of water relative to water quality compliance and the support of beneficial uses, including the salmonid fishery, in the Shasta River watershed.

Implementation Schedule

Within one year of TMDL approval by the U.S. EPA, individual landowners and/or landowner groups, irrigation districts, and any other entities responsible for owning, operating, and/or otherwise managing minor impoundments, such as flashboard dams, or other structures capable of blocking, impounding, or otherwise impeding the free flow of water in the Shasta River system shall report to the Regional Water Board methods and management practices they shall implement that will reduce sediment oxygen demand rates by 50% from baseline behind all minor impoundments.

The Regional Water Board has concluded, and strongly advocates that minor impoundments can be effectively removed and/or altered, and that new minor impoundments do not have to be constructed within those reaches of the Shasta River system without undue economic impacts to those stakeholders now dependent on their use. If it is determined that impoundment alteration or removal is a viable option, then doing so should be considered to advance the Shasta River system toward water quality compliance with the TMDL and the Basin Plan.

8.6 Lake Shastina and Dwinnell Dam

8.6.1 *Dwinnell Dam*

Dwinnell Dam impounds the waters of the Shasta River at approximately river mile 40, forming Lake Shastina (AKA Dwinnell Reservoir). This facility diverts water from Lake Shastina providing irrigation water for the Montague Water Conservation District (MWCD), and providing drinking water supply for the town of Mongatue..

As discussed in sections 2.4.4 and 4.4.3, during summer months dissolved oxygen concentrations in the deeper hypolimnion of Lake Shastina are below the Basin Plan objective of 7.0 mg/L, approaching anoxia at times. Further, there is known leakage from the toe of the impoundment and analysis indicates the reservoir is hydrologically connected to the Shasta River and down-gradient springs. Finally, section 2.5.2 and 4.4.3 demonstrates that concentrations of nitrogen and phosphorus in the outflow from Dwinnell Dam exceed USEPA criteria, are biostimulatory, and contribute to downstream oxygen demand. Given these findings the following action is proposed for the MWCD, the party responsible for controlling discharges from the dam: report to the Regional Water Board on a plan to bring the discharge(s) from Dwinnell Dam into compliance with the TMDLs, the Basin Plan, and the NPS Policy.

Implementation Schedule

Within 2 years of EPA approval of the TMDL the MWCD shall report to the Regional Water Board on a plan to bring the discharge(s) from Dwinnell Dam into compliance with the TMDLs, the Basin Plan, and the NPS Policy.

8.6.2 Lake Shastina

In addition to having dissolved oxygen concentrations below the Basin Plan objective during summer months, there is evidence that nitrogen concentrations in the outflow from Lake Shastina are higher than inflow concentrations (see section 4.4.3), indicating that the reservoir itself, or surrounding land uses, contributes nitrogen loads to the system.

To more fully characterize the water quality of Lake Shastina and source contributions from near- and upslope management practices, the Montague Water Conservation District, City of Weed, County of Siskiyou, Caltrans, and the Community of Lake Shastina shall take the following actions:

- Initiate, complete, and submit to the Regional Water Board Executive Officer for approval the results of a study characterizing water quality conditions and factors affecting water quality conditions in Lake Shastina.
- Develop a plan for addressing factors affecting water quality conditions in Lake Shastina
- The study and plan shall include: (1) a description of goals and objectives (NPS Policy Key Element 1), (2) data collection methods and procedures, (3) the general locations of data collection sites, (4) data analysis methods and procedures, (5) quality control and quality assurance protocols, (6) the parties responsible for data collection, data analysis, and reporting, (7) timelines and due dates for data collection, data analysis, and reporting, (8) financial resources to be used, (9) provisions for adaptive change to the investigation based on additional data and results, as they are available, and (10) appropriate actions, based on the investigation's results, to reduce nutrients and other oxygen demanding substances and to meet dissolved oxygen objectives in Lake Shastina.

Implementation Schedule

Within 2 years from EPA approval of the TMDL the Montague Water Conservation District, City of Weed, County of Siskiyou, Caltrans, and the Community of Lake Shastina shall complete the required study and plan. Within 5 years of EPA approval of the TMDL the responsible parties shall begin implementing the plan.

8.7 City of Yreka Wastewater Treatment Facility

The City of Yreka owns and operates wastewater treatment and disposal facilities (Yreka WWTF) for municipal wastewater, WDID No. 1A840730SIS, for the community of Yreka. Waste Discharge Requirements Order No. R1-2003-0047 (Order No. R1-2003-0047) issued by the Regional Water Board regulates waste treatment and disposal from the Yreka WWTF. There are four percolation ponds and a 31-acre subsurface infiltration disposal field east of State Route 263 (formerly old U.S. Highway 99) and immediately adjacent to Yreka Creek. The percolation ponds and the disposal field are constructed on the site of dredge tailings from historic gold

mining (NCRWQCB 2004a). Provisions in Order No. 96-69 prohibit any direct surface and subsurface seepage discharges of raw and/or treated effluent and biostimulatory substances to Yreka Creek during any stage of operations at the Yreka WWTF. Table 8.5 shows parameters and limits for representative samples from wastewater effluent necessary for compliance with Order No. R1-2003-0047.

Table 8.5: Representative Upper Limits Samples for WDR Order No. 96-69 of Wastewater Effluent from the Yreka Wastewater Treatment Facility

	30-day Unit	7-day Average¹	Daily Average²	Constituent Maximum
BOD [20°C (68°F), 5-day]	mg/l	30	45	60
Suspended solids	mg/l	30	45	60
Settleable Solids	ml/l	0.1	---	0.2
Coliform organisms (Total)	mpn/100 ml	23 ³	---	230
Hydrogen Ion	pH	Not less than 6.5 nor greater than 8.5; within this range, the discharge shall not cause the pH of receiving waters to be changed at any time more than 05 pH units from which occurs naturally		

¹The arithmetic mean of the values for effluent samples collected in 30 consecutive days.

²The arithmetic mean of the values for effluent samples collected in 7 consecutive days

³Median

Additionally, eight Basin Plan water quality objectives for the receiving waters of Yreka Creek were emphasized in the Order, including the following three most pertinent to the TMDL:

- Waste discharges must not cause the dissolved oxygen concentrations to be depressed below 7.0 mg/l.
- During critical spawning and egg incubation periods the dissolved oxygen concentration from discharges shall not be depressed below 9 mg/l.
- The discharge must not contain concentrations of biostimulants that promote objectionable aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses of the receiving waters.

Bacteria, algae, and higher aquatic macrophytes require a variety of nutrients for growth and reproduction; some of the nutrients may be released during the decomposition of these plants, which may then act as biostimulatory oxygen-consuming materials, particularly nitrogenous and phosphorous compounds. Discharges of these oxygen consuming materials beyond that necessary to maintain natural populations of aquatic vegetation and bacteria often negatively affect dissolved oxygen concentrations beneficial to resident and anadromous salmonids, and adversely affect general stream health.

In 1997 and 1998, during field inspections and routine monitoring report reviews, the Regional Water Board determined that waste discharges were occurring from the lower percolation ponds to a cutoff trench that discharges directly to Yreka Creek. Subsequent laboratory sample analysis confirmed that levels of phosphorous, nitrogen, and ammonia in the percolation ponds, the cutoff trench drainage, and Yreka Creek below the percolation facilities were elevated compared to sample points upstream from the Yreka WWTF. Subsequently, Cease and Desist Order (CAO) No. 98-103 was adopted by the Regional Water Board during September 1998, requiring elimination of waste discharges to Yreka Creek. In May, 2003, the CAO No. 98-103 was rescinded and replaced with WDID Order No. R1-2003-0048 to reflect and include

improvements and upgrades to the Yreka WWTF. A major addition to the Yreka WWTF was the construction of the 31-acre subsurface infiltration field, just north of the percolation ponds. Monitoring and Reporting Program No. R1-2003-0047 was then issued in May 2003 to encompass changes to the operation of the WWTF.

After Order No. R1-2003-48 was in effect, Regional Water Board staff observed, and sample analyses indicated, that during the wet weather seasons of 2003 and 2004 waste effluents containing elevated levels of oxygen--consuming materials and other biostimulatory discharges were, in all likelihood, reaching Yreka Creek after the 31-acre infiltration field was taken out of service. Consequently CAO No. R1-2004-0037 was issued, directing the Yreka WWTF to comply with the WDRs in Order No. 96-69. To date there is no record of abatement of oxygen consuming material and other discharges that may affect dissolved oxygen concentrations to Yreka Creek from the Yreka WWTF.

In order to prevent, minimize, and control discharges of oxygen consuming material and other biostimulatory waste that may cause dissolved oxygen excursions from narrative and numeric requirements to Yreka Creek and or/the TMDL for the Shasta River, whichever is more protective of the beneficial uses of water, the Regional Water Board staff shall pursue aggressive compliance with Order No 96-69, and CAO No.R1-2004-0037. To ensure timely submittal of sampling and analytical results from the operators of the Yreka WWTF, the Regional Water Board staff shall also continue vigorous oversight and enforcement of Monitoring and Reporting Program No. R1-2003-0047.

Implementation Schedule

Regional Water Board staff is presently actively involved, and will continue to assist the City of Yreka's WWTF to achieve compliance with Order No. 96-69, CAO No. R1-2004-0037, and Monitoring and Reporting Program No. R1-2003-0047.

8.8 Urban and Suburban Runoff

Concerns have been expressed regarding urban and suburban polluted nonpoint source stormwater discharges to various watercourses in the Shasta Valley watershed from sources within and/or under the sphere of influence of urban population centers. The three largest urban and/or industrial population concentrations include the cities of Yreka, Weed, and the Lake Shastina Development. To date, these cities and developments have not characterized nonpoint source pollutant discharges (SVRCD 2005a). Municipal, industrial, and residential properties are often sources of a number of nonpoint source pollutants that are carried in stormwater via roads, drainage ditches, stormwater systems, and other runoff conveyances to nearby watercourses. Runoff from these sources often contains nutrient and bacterial products from lawn and garden fertilizers, detergents, pet wastes, and faulty septic systems. Other pollutants from urban and residential areas may include pesticides, herbicides, antifreeze, heavy metals, and petroleum products. Yreka Creek and other tributaries to the Shasta River, the mainstem Shasta River and, ultimately, the Klamath River are the potential receiving waters of many of these pollutants from upstream urban and suburban sources.

The SWRCB's *Plan for California's Nonpoint Source Pollution Control Program, Urban Management Measures, §3.1-§3.6- urban sources of nonpoint pollution* (SWRCB 2000),

provides guidance for the implementation of watershed management measures for the characterization, reduction, and/or control of polluted runoff to nearby watercourses. These measures are summarized in Table 8.6. In addition to addressing sediment generating nonpoint pollution sources, many of these management measures, though general in nature, have been shown to be effective in reducing discharges of nutrients, other oxygen consuming constituents, and biostimulatory materials to local waterbodies.

Table 8.6 Urban and Suburban Runoff Management Measures from NPS Program

<p>Develop a watershed protection program to</p> <ol style="list-style-type: none"> 1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss; 2. Preserve area that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; 3. Protect to the extent practicable the natural integrity of water bodies and natural drainage systems associated with site development – including roads, highways and bridges; 4. Limit increases of impervious surfaces; and 5. Provide education and outreach to address NPS pollution.
<p>Plan, design and develop sites to:</p> <ol style="list-style-type: none"> 1. Protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion or sediment loss; 2. Limit increase in impervious areas; 3. Limit land disturbance activities such as clearing and grading and cut and fill to reduce sediment loss; and, 4. Limit disturbance of natural drainage features and vegetation.
<p>By design or performance:</p> <ol style="list-style-type: none"> 1. After construction has been completed and the site is permanently stabilized, reduce the average total suspended solids (TSS) loading by 80 percent (for purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis; or 2. Reduce the post-development loading of TSS so that the average annual TSS loadings are no greater than pre-development loadings. 3. To the extent practicable, maintain post-development peak runoff rate and average volume at levels similar to pre-development levels.
<ol style="list-style-type: none"> 1. Reduce erosion and to the extent practicable, retain sediment on site during and after construction; and, 2. Prepare and implement, prior to land disturbance, an effective, approved erosion and sediment control plan or similar administrative document that specifies erosion and sediment control provisions.
<ol style="list-style-type: none"> 1. Limit application, generation, and migration of toxic substances; 2. Ensure the proper storage and disposal of toxic materials; 3. Apply nutrients at rates necessary to establish and maintain vegetation without causing nutrient runoff to surface waters; and, 4. Prepare and implement, prior to the use or storage of toxic material on site, an effective, approved chemical control plan or similar administrative document that contains chemical control provisions (e.g. minimize use of toxic materials; ensure proper containment if toxic materials are to be used /stored on site).
<p>Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development:</p> <ol style="list-style-type: none"> 1. Identify priority local and/or regional watershed pollutant reduction opportunities (e.g. improve existing urban runoff control structures); 2. Specify a schedule for implementing appropriate controls; 3. Limit destruction of natural conveyance systems; and, 4. Where appropriate, preserve, enhance, or establish buffers along surface waters and their tributaries.

The Regional Water Board staff will rely on supporting implementation of the management measures in the SWRCB’s *Nonpoint Source Pollution Control Program, Urban Management*

Measures. In order to prevent, minimize, and control discharges to watercourses within the Shasta River hydrologic system that may contain nutrients, oxygen consuming material, and other biostimulatory waste capable of depressing dissolved oxygen levels below water quality narrative and numeric requirements, Regional Water Board staff will coordinate with the appropriate parties and will support the following actions and/or recommendations to achieve compliance with the TMDL, the Basin Plan and the NPS Policy:

Implementation Schedule

Effective the date that the TMDL Action Plan is adopted, the Regional Water Board staff shall coordinate with stakeholders within the cities of Yreka, Weed, Lake Shastina development, and other stakeholders to assure that appropriate management practices are initiated to control polluted runoff to waters of the Shasta Valley watershed from facilities within their spheres of influence.

Parties responsible for the control and cleanup of pollutant discharges described above, shall submit to the Regional Water Board for review, management plans describing proposed actions, including timelines, to eliminate and/or control applicable pollutant discharges to waters of the Shasta Valley.

8.9 United States Forest Service

Portions of two national forests, the Klamath and the Shasta-Trinity National Forests, are located within the Shasta River watershed. The USFS administers the Klamath National Forests Land & Resource Management Plan (Klamath Management Plan [USFS 1995a]) for the Klamath National Forest, and the Shasta-Trinity National Forests Land and Resource Management Plan (Shasta-Trinity Management Plan [USFS 1995b]) for the Shasta-Trinity National Forest. The Klamath Management Plan applies to 48,677 acres including the mountainous regions of the Shasta River watershed west of Yreka and scattered lands in the eastern side of the watershed. The Shasta-Trinity National Management Plan applies to 71,211 acres of non-contiguous land in the southern and southeast mountainous regions of the Shasta Valley, primarily the forested slopes descending from the north side of Mount Shasta. Both Forest Management Plans incorporated direction from the Northwest Forest Plan (i.e. the Aquatic Conservation Strategy) and all amendments. The Forest Management Plans are the guiding management documents for both forests and provide guidance for the implementation of best management practices (BMPs) deemed to be protective of the environment while allowing resource extraction.

To date, there have been no watershed analyses by the USFS for the Parks-Willow, Upper Shasta River, and Whitney-Herd Peak watersheds located partly within the Shasta-Trinity National Forest. However, portions of the Klamath National Forest, including Little Shasta River and Grass Lake watersheds, are covered in the Goosenest Adaptive Management Area Ecosystem Analysis (USFS 1996). That analysis functions as a watershed analysis.

As such, oxygen--consuming material reductions and water temperature control strategies for USFS lands within the Shasta River watershed have not been fully formulated. In the absence of watershed specific oxygen consuming material controls, and water temperature reduction actions, the USFS implements BMPs for the protection of water quality contained in the guidance document, *Water Quality Management for Forest System Lands in California, Best*

Management Practices (Guidance Document). The practices and programs in the Best Management Practices Program comply with section 208 and 319 of the Federal Clean Water. The Forest Service Best Management Practices Program arose from a formal Management Agency Agreement in 1981 between the USFS and the SWRCB, designating the USFS as a Water Quality Management Agency for USFS lands in California (USFS-SWRCB 1981).

8.9.1 Dissolved Oxygen and Temperature Related Efforts

The Aquatic Conservation Strategy, referred to above, also elucidates the *Standards and Guidelines for Riparian Reserves* that, for the most part, provide variable width reduced-harvest buffers around fish bearing streams, other wildlife sensitive streams, unstable slopes, and other sensitive features.

The USFS defines Riparian Reserves as Forest land allocations intended to protect riparian areas. Riparian Reserves are also defined as lands around fish bearing streams, other wildlife sensitive streams, lakes, wetlands, unstable areas, and potentially unstable areas, and other sensitive features where special standards and guidelines direct land use (USFS 1994). After each USFS management district performs a watershed analysis, decision-makers can then tailor the riparian reserve buffers of the Aquatic Conservation Strategy to conform to local conditions. Watershed analyses have not been fully completed for USFS holdings in the Shasta Valley and, in this situation, Riparian Reserve buffer widths conform to the general Interim Riparian Reserve Buffer Widths designated in the Aquatic Conservation Strategy. Specifically, Table 8.7 identifies the Riparian Reserve type and associated buffer widths that would apply to USFS land in the Shasta Valley. Any land management activity occurring within the Riparian Reserves would have to be consistent with the Aquatic Conservation Strategy and applicable Standards and Guidelines for Riparian Reserves.

Table 8.7 Recommended Interim Riparian Reserve Widths for Klamath National Forest and Shasta-Trinity National Forest Lands in the Shasta River Watershed¹

RIPARIAN RESERVE TYPE	Riparian Reserve Widths
Fish-bearing streams.	Include the stream and: area on each side from active channel edges to the top of inner gorge, or outer edge of 100 year flood plain, or to outer edge of riparian vegetation, or height of two site potential trees ² , or 300 feet slope distance, whichever is greatest.
Perennial, nonfish bearing streams	Include the stream and: area on each side from active channel edges to the top of inner gorge, or outer edge of 100 year flood plain, or outer edge of riparian vegetation, or height of one site potential tree ² , or 150 feet slope distance, whichever is greatest.
Lakes and natural ponds	Include the body of water and: area to the outer edge of riparian vegetation, or extent of seasonally saturated soil, or extent of unstable and potentially unstable areas, or height of one site potential tree ² , or 300 feet slope distance, whichever is greatest.
Constructed ponds, reservoirs and wetlands >1-acre in size	Include the body of water or wetland and: area to outer edges of riparian vegetation, or to seasonally saturated soil, or the extent of unstable and potentially unstable areas, or distance of one site potential tree, or 150 feet slope distance from wetland edge >1 acre, or the maximum pool elevation of constructed ponds, reservoirs, whichever is greatest.

Table 8.7 Recommended Interim Riparian Reserve Widths for Klamath National Forest and Shasta-Trinity National Forest Lands in the Shasta River Watershed¹

RIPARIAN RESERVE TYPE	Riparian Reserve Widths
Seasonally flowing or intermittent streams ³ wetlands <1-acre in size, and unstable or potentially unstable areas	At a minimum include: extent of unstable and potentially unstable areas (includes earthflows), stream channel and extend to top of inner gorge, stream channel or wetland and area from the edges of the stream channel or wetland to outer edges of riparian vegetation, and extension from edges of stream channel to height of one site potential tree ² , or 100 feet slope distance, whichever is greatest.

¹Information from the Land and Resource Management Plans for the Klamath and Shasta-Trinity National Forests, Klamath National Forest LRMP (USFS 1995a), Shasta-Trinity National Forest LRMP (USFS 1995b).

²Site potential tree, depending on site class, is an average maximum height of the tallest dominant tree, ≥ 200 years old.

³Intermittent stream defined as any nonpermanent flowing drainage feature with a definable channel having evidence of annual scour or deposition, includes ephemeral streams meeting these physical criteria.

Regional Water Board staff determined that application of the Interim Riparian Reserves management practices in the Klamath and Shasta-Trinity National Forests appear to adequately protect the beneficial uses of water from temperature related effects of timber harvest operations. The Riparian Reserve buffers will, over time, increase the riparian canopy, which will decrease solar radiation loads and lower water temperatures. The buffers will also allow the unfettered growth of riparian vegetation toward a late-seral community. The buffers of undisturbed riparian vegetation would also provide a “filtration strip” that can trap and filter nutrients and other oxygen-consuming constituents, preventing such discharges to adjacent water bodies.

8.9.2 Rangeland and Grazing Related Efforts

The extent and impacts of past and present grazing activities on USFS land to watercourses within the Shasta Valley is considered minor but warrant consideration to meet all aspects of the TMDL. The USFS implements rangeland management and grazing strategies designed to lessen impacts to water quality as described in Water Quality Management for Forest System Lands in California, Best Management Practices, 2000 and in grazing allotment management plans. A number of the best management practices for activities in riparian corridors, paraphrased from both documents, include deferred and rotational livestock grazing; controlling overall livestock numbers, season of use and distribution, and riparian exclusionary fencing as a fallback measure if other efforts fail to prohibit livestock from damaging riparian areas (USFS 2000). Grazing management measures are summarized in Table 8.8.

Table 8.8 Grazing Standards and Guidelines for Shasta-Trinity and Klamath National Forests¹

Adjust grazing practices to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives. If adjusting practices is not effective, eliminate grazing
Locate new livestock handling and/or management facilities outside Riparian Reserves. For existing livestock handling facilities inside the Riparian Reserve, ensure that Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, require relocation or removal of such facilities.
Limit livestock trailing, bedding, watering, loading, and other handling efforts to those areas and times that will ensure Aquatic Conservation Strategy objectives are met.

¹From Shasta - Trinity LRMP

8.9.3 Implementation Actions

In order to prevent, minimize, and control discharges of oxygen consuming material and nutrient waste discharges and high water temperatures on federal land from USFS activities, in particular rangeland and grazing activities, and silvicultural activities in the Shasta River watershed, the USFS should consistently implement rangeland management and grazing strategies as described in the individual Forest Management Plans, *Water Quality Management for Forest System Lands in California, Best Management Practices, 2000* and in grazing allotment management plans. The Regional Water Board staff will continue its involvement with the USFS to periodically reassess the mutually agreed upon goals of the Management Agency Agreement between the SWRCB and the USFS.

Additionally, the Regional Water Board shall work with the USFS to draft and finalize a Memorandum of Understanding (MOU). The MOU shall be drafted and ready for consideration by the appropriate decision-making body(ies) of the USFS within two years of the date the TMDL Action Plan takes effect.

The MOU shall include the following contents:

Contents specifically related to elevated water temperatures:

- A commitment by the USFS to continue to implement its Standards and Guidelines for Riparian Reserves per the Shasta-Trinity and Klamath Forest Management Plans.
- A monitoring plan to ensure that the Standards and Guidelines for Riparian Reserves are effective at preventing or minimizing effects on natural shade.
- A commitment by the USFS to implement the monitoring plan and conduct adaptive management.

Contents related to grazing activities affecting both dissolved oxygen concentrations and water temperatures:

- A date for the completion of a description of existing grazing management practices and riparian monitoring activities implemented on grazing allotments in the Shasta River watershed.
- A commitment by the USFS and the Regional Water Board to determine if existing management practices and monitoring activities are adequate and effective at preventing, reducing, and controlling discharges of biostimulatory waste and elevated water temperatures.
- A commitment by the USFS to develop revised management practices and monitoring activities should existing measures be inadequate or ineffective, subject to the approval of the Regional Water Board's Executive Officer.
- A commitment by the USFS to implement adequate and effective grazing management practices and monitoring activities and to conduct adaptive management.

In developing the MOU, the Regional Water Board shall work with the USFS to develop time lines that take into consideration USFS resources.

The Regional Water Board shall continue to implement *Order No. R1-2004-015, Categorical Waiver for Discharges Related to Timber Activities on Federal Lands Managed by the United States Department of Agriculture*². When the waiver expires on March 24, 2009, the Regional Water Board maintains the option of renewing the order. If it is determined that the prescriptions of the MAA are implemented and effective at controlling discharges of oxygen consuming waste and elevated solar radiation loads, Regional Water Board staff may recommend that an ownership-wide (in lieu of project-specific) waiver of WDRs be considered as part of an adaptive management approach to TMDL implementation.

Development of Permitting Action Schedule: Regional Water Board to work with the USFS to draft and finalize a Memorandum of Understanding (MOU). The MOU shall include, in part, buffer width requirements and other management practices as detailed in Tables 8.7 and 8.8.

Adoption of Permitting Action Schedule: The MOU shall be drafted and ready for consideration by the Regional Water Board and the appropriate decision-making body of the USFS within two years of EPA approval of the TMDL.

Compliance Schedule:

- 1) Regional Water Board continued involvement with the USFS to periodically reassess the mutually agreed upon goals of the Management Agency Agreement (SWRCB and USFS 1981).
- 2) Compliance with the Categorical Waiver for Timber Activities on Federal Lands.
- 3) Continued annual/periodic meetings between the USFS and the Regional Water Board assuring that MPs are fully implemented as per the guidance presented in *Water Quality Management for Forest System Lands in California, Best Management Practices* (USFS 2000).

8.10 United States Bureau of Land Management

The United States Bureau of Land Management (BLM) manages approximately 11,691 acres of public land in the Shasta River watershed, which consists mostly of dry foothills with ephemeral streams scattered along the western and eastern areas of the watershed. The primary land use on BLM lands in the Shasta River watershed is cattle grazing, although timber harvest, road use, recreational, and other activities are present or may occur in the future. Grazing activities include grazing allotments. Given the ecological characteristics and the dispersed nature of BLM land in the Shasta watershed, cattle grazing is expected to have a minor impact to water quality. To lessen impacts to water quality from grazing activities, BLM implements best management grazing strategies that are detailed in a joint management agency document titled: *Riparian Management, TR 1737-14 1997, Grazing Management for Riparian-Wetland Areas, USDI-BLM, USDA-FS*. Specific grazing management practices for Northwestern California, including all of the Shasta River watershed, were later submitted in a BLM document, *Record of*

² In order to regulate the discharge of waste from timber harvest activities on federal lands, the Regional Water Board adopted the Categorical Waiver for Discharges Related to Timber Activities on Federal Lands Managed by the United States Department of Agriculture (Order R1-2004-0015) in 2004. Timber activities on federal lands must meet several conditions to qualify for the Categorical Waiver. These conditions include, among other provisions, conducting an environmental review of the project pursuant to the National Environmental Protection Act (NEPA), the maintenance of a water quality program consistent with the Basin Plan, and a verification system acceptable to the Regional Water Board, including, but not limited to, inspection, surveillance, enforcement, and monitoring of management practices.

Decision, Northwestern California, Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1999). This document also recognizes that riparian standards and guidelines in the Northwest Forest Plan are extended to all anadromous watersheds beyond the range of the northern spotted owl, which includes all of the Shasta Valley. The Secretary of the USDI approved the Northwest CA ROD in July 2000 (BLM 2000). Management measures for riparian areas are summarized in Table 8.9.

Table 8.9 BLM Grazing Management Measures

Grazing management must provide an adequate cover and height of vegetation on the banks and overflow zones to promote natural stream function (sediment filtering, bank building, flood energy dissipation, aquifer recharge and water storage) ¹ .
Control the timing of grazing to prevent damage to streambanks when they are most vulnerable to trampling.
Ensure sufficient vegetation during periods of high flow to protect streambanks, dissipate energy, and trap sediment ¹ .
Techniques that restrict livestock from riparian areas, including fencing or fence relocation, barriers such as thickets or brush wind rows, water gaps in erosion-resistant stream reaches, hardened crossings or water access, and relocation of bed grounds and management facilities ¹ .

¹From Riparian Management, TR 1737-14 1997, Grazing Management for Riparian-Wetland Areas, USDI-BLM, USDA-FS

Additionally, in order to prevent, minimize, and control biostimulatory, nutrient, and other oxygen depleting material discharges and elevated water temperatures from activities on BLM lands in the Shasta River watershed, the Regional Water Board shall work with the BLM to draft and finalize a Memorandum of Understanding (MOU). The MOU shall be drafted and ready for consideration by the appropriate decision-making body(ies) of the BLM within two years of the date the Shasta River TMDL Action Plan takes effect. The MOU shall include the following contents:

Contents Specifically Related to Elevated Water Temperatures:

- A commitment by the BLM to continue to implement the riparian area requirements.
- A monitoring plan to ensure that the riparian area requirements are effective at reducing high water temperatures.
- A commitment by the BLM to implement the monitoring plan and conduct adaptive management.

Contents Related to Grazing Activities Affecting Both Dissolved Oxygen Concentrations and Water Temperatures:

- A date for the completion of description of existing grazing management practices and riparian monitoring activities implemented in grazing allotments in the Shasta River watershed if different than the Northwest CA ROD.
- A commitment by the BLM and the Regional Water Board to determine if existing management practices and monitoring activities are adequate and effective at preventing, reducing, and controlling discharges of biostimulatory waste discharges and elevated water temperatures.
- A commitment by the BLM to develop revised management practices and monitoring activities should existing measures be inadequate or ineffective, subject to the approval of the Regional Water Board's Executive Officer.

- A commitment by the BLM to implement adequate and effective grazing management practices and monitoring activities and to conduct adaptive management.

In developing the MOU, the Regional Water Board shall work with the BLM to develop time lines that take into consideration BLM resources.

Through the development, review, and implementation of the MOU, Regional Water Board staff shall determine the appropriate permitting or enforcement actions necessary to prevent, minimize, and control biostimulatory, nutrient, and other oxygen demanding material discharges and elevated water temperatures from BLM lands in the Shasta River watershed. Such actions include, but are not limited to, WDRs, waivers of WDRs, cleanup and abatement orders, or other appropriate permitting or enforcement action(s).

Should the BLM choose not to participate in the development, finalization, and implementation of a MOU, Regional Water Board staff shall initiate appropriate permitting or enforcement actions on activities on BLM land within the Shasta River watershed for consideration by the Board on an as-needed basis.

Development of Permitting Action Schedule: Regional Water Board to work with the BLM to draft and finalize a Memorandum of Understanding (MOU) concerning management practices specific to BLM land in the Shasta River watershed that complies with the Shasta TMDL. The MOU shall include, in part, riparian area requirements and other management practices as detailed in Table 8.9

Adoption of Permitting Action Schedule: The MOU shall be drafted and ready for consideration by the Regional Water Board and the appropriate decision-making body of the BLM within two years of EPA approval of the TMDL

Compliance Schedule: Begin annual/periodic meetings between the BLM and the Regional Water Board assuring that measures are fully implemented as per the guidance presented in Continued annual/periodic meetings between the USFS and the Regional Water Board assuring that MPs are fully implemented as per the guidance presented in *Water Quality Management for Forest System Lands in California, Best Management Practices* (USFS 2000).

8.11 Timber Harvest Activities on Non-federal Lands

Past timber harvest activities have often been shown to contribute to elevated solar radiation loads to many North Coast watercourses. Because timber harvest activities in the Shasta watershed are limited, a watershed-specific source analysis for solar radiation loads to watercourses from timber harvest activities in the Shasta River watershed was not conducted for the TMDL. The Regional Water Board shall rely on applicable current regulations, existing permitting and enforcement tools, and other ongoing staff involvement, summarized in Table 8.10. As such, no new regulations or actions are being proposed in association with this TMDL. Existing regulations and permitting tools include:

- Z’Berg-Nejedly Forest Practice Act and the California Environmental Quality Act (CEQA)

- Management Agency Agreement between the CDF and the State Water Resources Control Board to oversee water quality protection on timber operations on non-federal lands in California.
- Watercourse protection measures as required in the 2006 Forest Practice Rules.
- Senate Bill 810, enacted in 2003, provides that a Timber Harvest Plan (THP) may not be approved if the Regional Water Board finds that the proposed timber operations will result in discharges to a water body impaired by sediment and/or is in violation of the Basin Plan.
- Regional Water Board Timber Harvest General Waste Discharge Requirements (Order No. R1-2004-0030) and Categorical Waiver of Report of Waste Discharge (Order No. R1-2004-016) for timber activities on non-federal lands. Both the Categorical Waiver and the General Waste Discharge Requirements programs use the CDF timber harvest, functional equivalent review process for THPs and Non-industrial Timber Management Plans (NTMP) to ensure compliance with the CEQA.
- Active and continuous oversight by Regional Water Board staff of the timber harvest review and inspection process.
- Habitat Conservation Plans and Sustained Yield Plan review.
- CDF and Board of Forestry meetings and review.

Table 8.10 Examples of Select Management Measures for Timber Harvest Activities on Non-federal Lands from the 2006 California Forest Practice Rules

Every timber operation shall be planned and conducted to prevent deleterious interference with watershed conditions that primarily limit the values set forth in “the rules” (e.g. sediment load increase where sediment is the limiting factor, thermal load increase where water temperature is the primary limiting factor, etc). Section 916.9, 936.9 (a)
Comply with the terms of a Total Maximum Daily Load that has been adopted to address factors that may be affected by timber operations, if a TMDL has been adopted, or not result in any measurable sediment load increase to watercourses of lakes. Section 916.9, 936.9 (a) (1)
Not result in any measurable steam flow reduction during critical low water periods except as part of an approved water drafting plan. Section 916.9, 936.9 (a) (4)
Protect maintain and restore the quality and quantity of vegetative canopy needed to: (a) provide shade to the watercourse or lake, (b) minimize daily and seasonal temperature fluctuations, (c) maintain daily and seasonal temperature within the preferred range for anadromous salmonids. Section 916.9, 936.9 (a) (6)
Any timber operations or silvicultural prescriptions within 150 feet of any Class I watercourse or lake transition line or 100 feet of any Class II watercourse or lake transition line shall have protection, maintenance, or restoration of beneficial uses of water or the populations and habitat of anadromous salmonids or listed aquatic or riparian-associated species as significant objectives. Section 916.9, 936.9 (c)
The minimum WLPZ width for Class I waters shall be 150 feet from the watercourse or lake transition line. Section 916.9, 936.9 (f)
Within a WLPZ for Class I waters, at least 85 percent overstory canopy shall be retained within 75 feet of the watercourse or lake transition line. Section 916.9, 936.9 (g)

8.11 8.12 California Department of Transportation

The primary mission of Caltrans is to provide the people of California with a safe, and efficient intermodal transportation system. This mission involves planning, designing, constructing, and maintaining large-scale transportation facilities, such as freeways, highways, interchanges, bridges, and tunnels.

The California Department of Transportation (Caltrans) has jurisdiction over three state highways in the Shasta River watershed: State Route 3, State Route 263, and State Route 97.

There is also a major segment of U.S. Interstate Highway 5, which Caltrans is responsible for maintaining and that is within the watershed (Siskiyou County 2005). State roads and highways are known to be possible sources of anthropogenic waste discharges, including fine sediment, road oils, pesticide and herbicide residues, oxygen-consuming materials from weed, tree and shrub cuttings and other substances due to improper road location, surfacing, drainage design and chemical applications during routine highway maintenance activities.

Caltrans has sampled stormwater runoff from their facilities (facilities are highways, maintenance yards, and construction sites) that included ammonia, nitrates and nitrites, phosphorous compounds, and fecal and total coliform. The analytical results were reported as averages, which were then compared to the most stringent water quality objectives in the nine Regional Water Board's Basin Plans. Sample results did show some exceedences of the most stringent numeric and narrative targets in the Basin Plans but the results were not ascribed to a particular Regional Water Board's watershed (Caltrans 2003).

Discharges of waste from Caltrans' facilities are regulated by the State Water Board under the National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit, and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans) (Order No. 99-06-DWQ and NPDES No. CAS000003), which was adopted on July 15, 1999. This permit, and the program to implement the permit, are generally known as the Caltrans Storm Water Program.

The overall goal of the Storm Water Program is to integrate appropriate storm water control activities into ongoing activities, thus making control of storm water pollution a part of Caltrans' normal business practices. As described by Caltrans (Caltrans 2003), components of the Storm Water Program include:

- Storm Water Management Plan (SWMP). Caltrans developed the SWMP to describe the procedures and practices used to reduce the discharge of pollutants to storm drainage systems and receiving waters.
- Annual Report and Regional Workplans. The Annual Report describes the activities that Caltrans has undertaken in the previous fiscal year to implement the SWMP. The Regional Workplans describe the activities that Caltrans Districts will undertake in the next fiscal year to implement the SWMP.
- Monitoring and Best Management Practice (BMP) Development. The purpose is to identify pollutants of concern in storm water runoff from Caltrans facilities and to describe how Caltrans identifies, evaluates, and approves BMPs.
- Public Education.
- Guidance for Design, Construction and Maintenance Activities. Guidance documents have been developed to implement storm water BMPs in the design, construction and maintenance of highway facilities.

In order to address possible discharges of chemical, nutrient and other oxygen demanding substances, sediment, and also operations that may increase solar radiation loads to watercourses that may result from Caltrans' activities on roads and other facilities, Regional Water Board staff shall periodically evaluate the effectiveness of the Caltrans Storm Water Program. The purpose for evaluating the Caltrans Storm Water Program is to determine if it is adequate and effective at

preventing, minimizing, and controlling any of the aforementioned discharges in the North Coast Region, including the Shasta River watershed. The evaluation shall be completed within two years of the date the TMDL Action Plan takes effect. If Regional Water Board staff find that the Caltrans Storm Water Program is inadequate, Regional Water Board and State Water Board staff shall develop specific requirements for State Water Board consideration to be incorporated into the Caltrans Storm Water Program at the soonest opportunity, or the Regional Water Board shall take other appropriate permitting or enforcement actions.

Implementation Schedule

Regional Water Board staff shall complete an initial evaluation of the Caltrans Stormwater Program within two years of the date the TMDL Action Plan takes effect.

After the initial two year evaluation is completed, the Regional Water Board staff shall continue periodic reviews of the Caltrans Storm Water Program to assure ongoing compliance with the Shasta River TMDL.