ATTACHMENT 5-A

Mitigation for Chapter 5 Impacts

Introduction

This attachment is an excerpt from Chapter 6, Mitigation Measures, that presents all mitigation measures for impacts described in Chapter 5. Mitigation measures for PSM, PSU, and SU impacts identified in Sections 5.3 through 5.6 are presented under the respective environmental resource topic, such as Fisheries or Terrestrial Biological Resources. No PSM, PSU, or SU cumulative impacts related to WSIP water supply and system operations were identified (Section 5.7). All mitigation measures are numbered to correspond to the same impact numbers, although in some cases, the same measure would mitigate more than one impact and the numbering corresponds to the first impact identified and cross-referenced so that measures are not duplicated.

Mitigation Measures to Minimize Water Supply and System Operations Impacts

Plans and Policies (Section 5.2)

System Measures

None required.

Tuolumne River System and Downstream Water Bodies

Stream Flow and Reservoir Water Levels (Section 5.3.1)

System Measures

None required.

Geomorphology (Section 5.3.2)

System Measures

None required.

Surface Water Quality (Section 5.3.3)

System Measures

None required.

Surface Water Supplies (Section 5.3.4)

System Measures

None required.

Groundwater (Section 5.3.5)

System Measures

None required.

Fisheries (Section 5.3.6)

System Measures

Overview of Measures 5.3.6-4a, 5.3.6-4b, and 5.3.7-6

The SFPUC will attempt to implement Measure 5.3.6-4a as described below, which could mitigate both Impacts 5.3.6-4 and 5.3.7-6 to a less than significant level. Measure 5.3.6-4a involves some uncertainty because its implementation depends on the SFPUC negotiating and reaching agreement with MID/TID and possibly other water agencies. If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.6-4b to lessen fisheries impacts and Measure 5.3.7-6 to lessen impacts on riparian vegetation.

Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water

Measure 5.3.6-4a: The SFPUC will pursue a water transfer arrangement with MID/TID and/or other water agencies such that the water acquired is developed through actions that result in reduction of demand on Don Pedro Reservoir as a result of conservation, improved delivery efficiency, inter-agency transfer of conserved water, or use of an alternative supply such as groundwater. The TID and MID would deliver less water from Don Pedro Reservoir. The consequent increase in water storage in Don Pedro Reservoir would offset the reduction in inflow to Don Pedro Reservoir attributable to the WSIP. The release pattern from La Grange Dam would be the same or similar to the existing condition thus lessening or eliminating Impacts 5.3.6-4 and 5.3.7-6. The actions necessary to reduce demand for Don Pedro Reservoir water may themselves have environmental effects. See Section 6.5 for a review of potential environmental effects associated with the expected actions of this mitigation measure. Further environmental review would be undertaken prior to approving a specific water transfer agreement.

Fishery Habitat Enhancement

Measure 5.3.6-4b: If Measure 5.3.6-4a is not implemented, then the SFPUC will mitigate potential fishery effects on the lower Tuolumne River by implementing (or funding) one of

the following two habitat enhancement actions that are designed to sustain fishery resources under the river's flow regime, which are consistent with the Habitat Restoration Plan for the Lower Tuolumne River Corridor: gravel augmentation/habitat enhancement to provide salmonid spawning and rearing habitat, or isolating or filling a captured former gravel quarry pit along the river that provides habitat for salmonid predators.

The gravel augmentation/habitat enhancement project will be implemented to increase salmonid spawning success and to improve the survival of rearing salmonids in the reach of the river downstream of La Grange Dam. Spawning success will be improved by the addition of suitable gravel to the stream channel. Other habitat features will be created to provide cover for juvenile salmonids and to increase the availability of substrate for macroinvertebrates that would be used as food by rearing juvenile salmon and steelhead. The gravel augmentation/habitat enhancement project will involve the planning, design, permitting, purchase, placement, and monitoring of suitable gravel and associated habitat enhancements at three riffle locations within the spawning reach between Basso Bridge and La Grange Dam. The three locations will meet the criteria for suitable habitat as described in the Habitat Restoration Plan for the Lower Tuolumne River Corridor. The gravel will preferentially be rounded river rock of native origin that would be sized and pre-washed before placement into the river. The gravel augmentation/habitat enhancement project will also involve the addition of large woody debris and boulders to create increased habitat complexity and diversity at each of the three enhancement sites. After construction of the gravel augmentation/habitat enhancement project, it will be surveyed to establish its baseline condition. A survey of the three sites will be made at a minimum of five-year intervals by a qualified fisheries biologist. The fisheries biologist will determine whether the three sites continue to meet established criteria for salmonid spawning and rearing habitat. If the sites do not meet the criteria, as part of its long-term operations, the SFPUC will make the improvements necessary to return it to the baseline conditions.

As an alternative to the gravel augmentation project, the SFPUC will remove from the lower river channel one of the former gravel quarry pits that has been "captured" by the river and acts as predator zones for fish such as largemouth and striped bass to prey on rearing and emigrating juvenile salmonids. Removal could be accomplished by filling the pit or installing a levee berm around the pit to isolate it permanently from the river channel. The SFPUC could implement this action directly or fund implementation by another entity involved in river restoration.

The performance standard for gravel pit removal would be an established permanent reduction in area of salmonid predator habitat. The SFPUC will monitor the pit removal project at five-year intervals. If floods have eroded the fil1 or damaged the levees in a manner that restores salmonid predator habitat, the SFPUC will make the necessary repairs. The SFPUC will continue periodic monitoring and repair as part of long-term system operations.

Terrestrial Biological Resources (Section 5.3.7)

System Measures

Controlled Releases to Recharge Groundwater in Streamside Meadows and Other Alluvial Deposits

Measure 5.3.7-2: To mitigate for potential WSIP effects on meadow resources along the Tuolumne River below Hetch Hetchy Reservoir, the SFPUC will manage releases from Hetch Hetchy Reservoir during the spring to recharge groundwater in the riverside

meadows in the Poopenaut Valley and streamside alluvial deposits. The goal of the release pattern will be to approximate conditions characteristic of most Sierra meadows, which are mainly wetlands or semi-wetlands supporting a cover of both emergent wetlands plants and upland vegetation (Ratliff, 1982), and which depend on precipitation and upslope flows to recharge the upper soil layers with water (Ratliff, 1985). The performance standard to be achieved by this measure is no net loss of the extent, diversity, and condition of the existing meadow and wetland vegetation types in the Poopenaut Valley.

The SFPUC will manage reservoir releases for this purpose by releasing the expected available volume of water in the reservoir in a pattern that provides flows of a magnitude that inundate the meadows and streamside alluvial deposits for as long as possible. For example, rather than making releases at a constant rate each day (e.g., releasing 1,000 cfs

for seven days), the SFPUC could release the same volume of water but with varying cfs rates, creating flow pulses to meet the objective.

As part of this measure the SFPUC will gather baseline data regarding the extent, species composition and condition of the existing meadow vegetation within the Poopenaut Valley. Some of these environmental baseline data may be available as a result of current study efforts in the Poopenaut Valley.[1] As needed, the SFPUC will augment this information by carrying out vegetation composition surveys in the meadow before implementing the WSIP and at 5 year intervals after WSIP implementation to assess the efficacy of mitigation releases in maintaining or improving the percentage cover of meadow species as described by Ratliff (1985). The basic methodology for baseline vegetation survey and subsequent mitigation monitoring will be generally accepted quantitative vegetation sampling methods to permit statistical comparison of vegetation composition over time, as well as mapping the meadow vegetation in the Poopenaut Valley. The SFPUC will retain the services of a qualified biologist to assist in shaping the releases from Hetch Hetchy Reservoir in consideration of baseline and future meadow vegetation data. If a significant decline in the extent or diversity of native meadow vegetation occurs, releases will be modified as needed to achieve the mitigating effect of sustaining the existing meadow communities.

Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water

See **Measure 5.3.6-4a** in the Fisheries section, above. This measure also addresses impact 5.3.7-6 Impacts on biological resources along the Tuolumne River below La Grange. The SFPUC will attempt to implement Measure 5.3.6-4a as described above, which could mitigate both Impacts 5.3.6-4 and 5.3.7-6 to a less than significant level. Measure 5.3.6-4a involves some uncertainty because its implementation depends on the SFPUC negotiating and reaching agreement with MID/TID and possibly other water agencies. If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.6-4b to lessen fisheries impacts and Measure 5.3.7-6 to lessen impacts on riparian vegetation.

Lower Tuolumne River Riparian Habitat Enhancement

Measure 5.3.7-6: To mitigate the WSIP effects on riparian vegetation, the SFPUC will both protect and enhance one mile of riparian vegetation along the contemporary floodplain of the lower Tuolumne River. This will include funding the acquisition of fee title to or a conservation easement over riparian land totaling one mile (consisting of one or multiple sites) in order to permanently protect that land, and also funding riparian enhancement and on-going vegetation management to maintain the enhanced riparian values in perpetuity along one mile of river. The enhancement and management may be carried out along one river mile either on the land acquired by the SFPUC as described above or on land already under the permanent management of a public agency or conservation organization.

The SFPUC will implement this measure consistent with the Habitat Restoration Plan for the Lower Tuolumne River Corridor (McBain and Trush, 2000) and in coordination with the Tuolumne River Technical Advisory Committee. The SFPUC will also strive to

[1] In 2006 the SFPUC, National Park Service (and USFWS) began a collaborative study effort in the Poopenaut Valley. The effort has led to geomorphology test releases in May 2006, fieldwork in the channel in 2006 and 2007 to examine sediment transport and deposition relationships with flow. Two transects with ten recording piezometers have been installed across the meadow to measure groundwater recharge and drainage patterns. Supplementary stream staff gages have been installed to allow manual readings during high flows. Surveys have been done of the meadow to define the topography and the location and elevation of the piezometers. Infiltration of water from the stream to the meadow soils will be monitored during high flows to develop a better understanding of groundwater dynamics in the meadow so that reservoir operations, flow pulses, and minimum streamflow releases can be managed to improve meadow conditions within the constraints of water supply and facility limitations.

implement these projects in partnership with those groups currently working to restore riparian floodplains on the lower Tuolumne River.

The SFPUC may implement riparian enhancement in accordance with site locations and plans already developed as part of the Habitat Restoration Plan for the Lower Tuolumne River Corridor or on other appropriate sites along the river. For sites that haven't already had plans developed, a riparian enhancement plan will be prepared for each. The plan shall include, but not be limited to, the following:

- Clearly stated objectives and goals consistent with the Habitat Restoration Plan for the Lower Tuolumne River Corridor (McBain and Trush, 2000).
- Location, size, and type of mitigation actions proposed.
- Documentation of performance and monitoring standards.
- Performance and monitoring standards shall indicate success criteria to be met within 5 years for vegetation, removal of exotic species, etc. Adaptive management standards shall include contingency measures that shall outline clear steps to be taken if and when it is determined, through monitoring or other means, that the enhancement or restoration techniques are not meeting success criteria.
- Documentation of the necessary long-term management and maintenance requirements, and provisions for sufficient funding.

Recreational and Visual Resources (Section 5.3.8)

System Measures

None required.

Energy Resources (Section 5.3.9)

System Measures

None required.

Alameda Creek Watershed Streams and Reservoirs

Stream Flow and Reservoir Water Levels (Section 5.4.1)

System Measures

Diversion Tunnel Operation

Measure 5.4.1-2: The SFPUC will establish and implement written operational criteria for the Alameda Creek Diversion Dam that directs that the diversion dam and tunnel shall be operated to pass flows down Alameda Creek when diversion of those flows is not required to maintain desired levels in Calaveras Reservoir in order to provide the maximum possible days of winter and spring flows in Alameda Creek below the diversion dam.

This measure reinforces the way the SFPUC generally operates the diversion tunnel now: that diversion gates are closed in the spring once desired Calaveras Reservoir storage have been reached. However, at times additional flows have been diverted from Alameda Creek after reservoir storage levels have been achieved such that the "excess" water has subsequently been released from the reservoir to maintain the appropriate water level. This measure would formalize Alameda Creek diversion procedures to maintain flows in Alameda Creek to the extent they are not needed to achieve required reservoir storage. This measure would reduce the flow reduction impact but not to a level that is less than significant.

Geomorphology (Section 5.4.2)

System Measures

None required.

Surface Water Quality (Section 5.4.3)

System Measures

None required.

Groundwater (Section 5.4.4)

System Measures

None required.

Fisheries (Section 5.4.5)

System Measures

Minimum Flows for Resident Trout on Alameda Creek

Measure 5.4.5-3a: The SFPUC shall develop and carry out as part of the implementation of the Calaveras Dam Replacement (SV-2) project, an operational plan to implement minimum bypass flows when precipitation generates runoff into the creek below the diversion dam to the Calaveras Creek confluence from December 1 through April 30 to support spawning and egg incubation for resident trout as well as breeding habitat for other native stream-dependent amphibians. This is the period when winter precipitation typically would produce flows for spawning and egg incubation and breeding habitat for other native stream-dependent species. The operational plan will identify the specific minimum flow requirements to support resident trout spawning and egg incubation, and a detailed monitoring plan to survey and document trout spawning and egg incubation and any diversion facility modifications that are needed to implement the minimum stream flows. This measure will be implemented in conjunction with the proposed bypass flows at the diversion dam to meet the 1997 CDFG MOU flow requirements.

Minimum flow requirements to support resident trout spawning and egg incubation vary depending on stream reach conditions. Although site-specific studies are needed to determine an appropriate minimum flow requirement for each specific creek reach, based on the general size and characteristics of the Alameda Creek channel immediately downstream of the diversion structure it has been suggested that a minimum flow on the

order of 10 cfs may be needed to support trout spawning and egg incubation. The SFPUC's Natural Resources Division will complete the site-specific studies needed to determine the appropriate minimum stream flow for this reach of the creek; studies may show that the minimum flow requirement is more or less than 10 cfs. This minimum flow requirement would be met when precipitation would naturally generate runoff in the creek (below the diversion dam) under unimpaired conditions between December 1 and April 30. When precipitation generates runoff in the creek, the SFPUC shall provide for bypass of flow up to the required minimum flow amount. The operational plan will allow for adapting minimum flow amounts to support resident trout spawning and egg incubation and other native stream-dependent species based on the monitoring results and best available scientific information.

The monitoring plan will be provided to appropriate resource agencies for review and comment and will subsequently be implemented by the SFPUC's Natural Resources Division staff. Monitoring results shall be provided to the resource agencies as requested. Monitoring shall occur for a minimum of five years and a maximum of ten years following completion of the Calaveras Dam Replacement project. At the completion of the monitoring period the SFPUC shall produce a draft comprehensive report describing the methods, data collected, and results used to assess the performance of the minimum streamflow in providing suitable habitat for resident trout spawning and egg incubation.

The Alameda Creek Fisheries Restoration Workgroup is currently overseeing collaborative studies to better characterize the flow-habitat relationships for trout spawning within Alameda Creek, and the SFPUC is providing staff and funding to support this effort. Information from these studies will also be used in developing the specific range of minimum stream flows needed to support suitable habitat within the reach below the diversion dam to the Calaveras Creek confluence.

This measure addresses two areas of impact to the resident trout fishery in Alameda Creek below the diversion dam. First, it addresses the decrease in flow below the diversion dam that would occur under the WSIP as a result of re-instituting flow diversions to Calaveras Reservoir once the dam is replaced (WSIP Project SV-2) and current DSOD storage capacity restrictions are removed. Second, it addresses the loss of fish from the lower creek system that would result from fish entrainment through the unscreened diversion tunnel to Calaveras Reservoir. Providing for minimum stream flows in Alameda Creek below the diversion dam, as required by the mitigation measure, would support resident trout spawning and egg incubation and it is expected that this measure would be sufficient to sustain the trout population in this reach of the creek. This would fully address/mitigate for both areas of WSIP impact to the resident trout fishery below the diversion dam. If monitoring indicates that this measure is adequate to sustain the resident trout population below the diversion dam, then no additional mitigation action would be required. If monitoring indicates that this measure does not sustain the resident trout fishery in this reach, then the SFPUC shall either modify the minimum stream flow to enhance downstream habitat conditions to fully meet the mitigation requirement or also implement Measure 5.4.5-3b Diversion Restrictions or Fish Screens.

Alameda Diversion Dam Diversion Restrictions or Fish Screens

Measure 5.4.5-3b: If, after 10 years of monitoring results for Measure 5.4.5-3a, Minimum Flows for Resident Trout in Alameda Creek, indicate that the measure does not sustain the resident trout population in Alameda Creek below the diversion dam, then the SFPUC shall also implement additional measures as follows: either implement seasonal restrictions on Alameda Creek diversions to Calaveras Reservoir to protect the downstream resident trout fishery during the critical spawning period (December 1 through April 30) or install and operate a fish passage barrier to "screen" the diversion facility (screening could consist of a behavioral barrier, such as electrical or sound barrier that deters fish, or a physical barrier – such as a screen facility).

SFPUC shall consult with the appropriate resource agencies, including CDFG, to first review the monitoring results for Measure 5.4.5-3a and determine the need for any further mitigation actions. If needed, SFPUC will consult with the appropriate resource agencies to develop appropriate seasonal restrictions on diversions. This could involve establishing a set annual time period for diversion restrictions or annual monitoring of fishery conditions that would then trigger implementation of diversion restrictions.

Alternatively, the SFPUC will implement a fish passage barrier if determined to be feasible. During the 10-year monitoring and evaluation period for Measure 5.4.5-3a, the SFPUC will evaluate the feasibility of installing and operating a fish passage barrier. The feasibility study will include an engineering evaluation of the existing site and diversion structure, access for construction and power supplies to the site, the application of various alternative designs, and identification of a preferred design if determined to be feasible. If it is determined that a fish passage barrier is needed to protect resident trout at the diversion structure then engineering design will be completed and be sufficiently detailed to allow permitting and completion of construction within a period of 24 months after the date that the additional mitigation is determined to be required.

Terrestrial Biological Resources (Section 5.4.6)

System Measures

Compensation for Impacts on Terrestrial Biological Resources

Measure 5.4.6-1: This measure mitigates for water supply and systemwide operation effects on resources within the Alameda Creek watershed. These impacts would occur primarily through operation of the Calaveras Dam Replacement project (SV-2).

The SFPUC will compensate for sensitive wetland, riparian and upland habitats and habitats which support key special-status species or other species of concern lost as a result of WSIP system operation. Similar habitat will be identified, protected, restored, enhanced, created and managed off-site[2] to ensure no net loss of habitat extent or function. A qualified biologist will quantify the magnitude and extent of impacts to wetlands, sensitive habitats, and key special-status species and other species of concern, and the SFPUC will develop and implement mitigation and compensation plans that meet the appropriate regulatory requirements and permit conditions with respect to compensation ratios, other

[2] Off-site means the compensatory action is located other than within the project construction footprint, but could be on lands already under SFPUC ownership. Measure 4.6-2 addresses compensatory actions to be taken within the construction footprint.

conservation measures and management requirements to mitigate project impacts to less than significant levels.

The SFPUC will obtain required permits and comply with applicable environmental regulations addressing sensitive habitats and species. Compensatory lands—including those restored or enhanced as well as those acquired or designated as protected as part of program mitigation--will be established in perpetuity with a commitment that such lands will not be used for any purpose that conflicts with the primary purpose of maintaining intact wildlife and plant habitat.

One alternative for implementing such habitat compensation is the Habitat Reserve Program (HRP) currently being developed by the SFPUC. The purpose of the HRP is to provide a comprehensive, coordinated approach to mitigation and related regulatory compliance for WSIP projects and operations. This related SFPUC project is described further in Chapter 3.0, Section 3.12.3. Under the proposed HRP, the SFPUC would proceed as soon as possible with identifying, securing (through designation, management agreement, conservation easement, or acquisition of fee title) and improving lands to be used for habitat compensation so that mitigation is underway concurrent with habitat loss related to WSIP program activities, further ensuring no net loss of resources. The proposed HRP is scheduled for CEQA environmental review in 2007 and is targeted for implementation as soon as possible thereafter. Once the HRP is approved and implemented, the SFPUC will use this as one vehicle or method for implementing the mitigation requirements for individual WSIP projects. Otherwise, where appropriate and necessary, the SFPUC will develop and implement appropriate habitat compensation mitigation for individual WSIP projects and their associated operational impacts.

Operational Procedures for Calaveras Dam Releases

Measure 5.4.6-3: During project-level CEQA review on the Calaveras Dam Replacement project (SV-2), the SFPUC will develop operational procedures for managing planned releases from Calaveras Dam to minimize habitat impacts on amphibians, their egg masses, and tadpoles. The goal of such releases, apart from benefits to fish, is to mimic a more natural pattern of hydrology regime as much as possible. The procedures will specify the minimum amount and frequency of planned releases and the rate of the increase and decrease of any individual release event. One of the specific goals of such releases would be to reduce the risk of mortality to breeding amphibians. Such operational procedures will be developed prior to completion of construction of the Calaveras Dam Replacement project. In addition, instream flow releases required under CDFG agreement with SFPUC (see Table 5.4.1-9) would begin upon completion of construction.

Recreational and Visual Resources (Section 5.4.7)

System Measures

None required.

San Francisco Peninsula Streams and Reservoirs

Stream Flow and Reservoir Water Levels (Section 5.5.1)

System Measures

None identified.

Geomorphology (Section 5.5.2)

System Measures

None required.

Surface Water Quality (Section 5.5.3)

[Paragraph has been deleted per responses to comments or staff-initiated text changes (Vol. 7, Chapter 16).]

System Measures

Low-head Pumping Station at Pilarcitos Reservoir

Measure 5.5.3-2a: The SFPUC shall install a permanent low-head pumping station at Pilarcitos Reservoir which would enable the SFPUC to access and use an additional 350 acre-feet of water from Pilarcitos Reservoir. In years when the WSIP would cause releases from Pilarcitos Reservoir to Pilarcitos Creek to be reduced to reservoir inflow earlier in the summer than under the existing condition (about 25 percent of years in the hydrologic record), the SFPUC will use the pumping station to augment flow in Pilarcitos Creek with water from the reservoir. The pumping station will draw water from the cool pool of water below the thermocline during times when the reservoir is stratified. The pumping station outlet will be designed to ensure that water discharged to the creek is adequately aerated.

Aeration System at Pilarcitos Reservoir

Measure 5.5.3-2b: The SFPUC shall install a permanent aeration system at Pilarcitos Reservoir. The SFPUC will operate the aeration system as necessary to avoid anoxic conditions and maintain good water quality conditions at the reservoir.

Groundwater (Section 5.5.4)

System Measures

None required.

Fisheries (Section 5.5.5)

System Measures

Create New Spawning Habitat Above Crystal Springs Reservoir

Measure 5.5.5-1: The SFPUC will survey the extent and quality of fish spawning habitat that could potentially be lost due to inundation and, if feasible, create new spawning habitat at a higher elevations. The specifics of this mitigation measure will be determined as part of project-level CEQA review for the Lower Crystal Springs Dam Improvements project (PN-4).

Establish Flow Criteria, Monitor and Augment Flow

Measure 5.5.5-5: The SFPUC shall develop a monitoring and operations plan for Stone Dam to ensure WSIP-related flow reductions downstream of Stone Dam do not impair steelhead passage and spawning during the winter months of normal and wetter hydrologic years. This operational plan will provide for minimum stream flows to support existing adult steelhead passage and spawning downstream of Stone Dam, in the reach between Stone Dam and the confluence with the tributary at Albert Canyon, approximately 3.5 miles downstream. Downstream of Albert Canyon, WSIP flow reductions are unlikely to cause a significant impact to steelhead migration and spawning due to contributing flows from numerous downstream tributaries being sufficient to maintain adult upstream passage and spawning conditions within the creek. Monitoring and implementation of the operational plan will occur when precipitation generates runoff into Pilarcitos Creek below Stone Dam from December 1 through April 30 of normal and wetter years. This monitoring and operations plan will be established within five years of the approval of the PEIR.

Specific instream flows needed to support anadromous steelhead downstream of Stone Dam have not yet been identified. Suitable instream flows for steelhead passage on Pilarcitos Creek may be defined as providing a water depth of at least 0.6 feet over 25 percent of the total wetted channel cross-sectional area with 10 percent being contiguous. In cooperation with CDFG and NMFS, the SFPUC will identify up to five critical riffles, downstream of Stone Dam and upstream of Albert Canyon that may cause a passage impediment/barrier to steelhead migration at reduced flows as defined by the water depth criterion above. Such habitat types will be selected for survey because they represent the shallowest habitat type and thus would most likely represent low flow passage barriers under WSIP-related reduced flow scenarios. This monitoring plan will survey and document the critical riffles identified to determine physical conditions (e.g., depth, velocity, and top width of the channel) present at various flow levels. The SFPUC will measure the stage-discharge relationship at each of the five critical riffles and identify the minimum stream flow that meets the steelhead passage criterion at the most restrictive of the five riffle locations.

The SFPUC will calibrate and validate the flow measurements made at the existing flow monitoring gage (USGS Gage 11162620) located immediately downstream of Stone Dam. The SFPUC will then develop a statistical relationship between the flow measurements at the existing gage and the flow at the most restrictive critical riffle downstream of Stone Dam to establish minimum average daily flows necessary to meet steelhead passage criterion. The SFPUC will monitor average daily flows at the stream flow gage during the period from December 1 through April 30 each year. If average daily flow, as measured at the gage, indicates that the minimum stream flow at the downstream critical riffle is not met, the SFPUC will release bypass flows from Stone Dam at a rate sufficient to meet the minimum stream flow for steelhead passage at a release rate up to, but not exceeding, the average daily inflow into Pilarcitos Reservoir as determined by SFPUC operators.

The SFPUC's Natural Resources Division will complete the site-specific studies needed to determine the appropriate minimum stream flow for the most restrictive critical riffle identified during monitoring. This minimum flow criterion will be met when WSIP diversions occur between December 1 and April 30 of normal and wetter hydrologic years. The operational plan will allow for adapting minimum flow amounts to support steelhead migration based on the monitoring results and best available scientific information. Monitoring and flow management will be continued for a minimum period of five years

and a maximum period of ten years, at which time the SFPUC will prepare a technical report describing results of the stream flow monitoring, identifying whether or not operation of Stone Dam reduced passage flows below the minimum criteria, and identifying, if needed, an appropriate bypass flow for future operations at Stone Dam (a minimum flow below which water could not be diverted to storage between December and April 30). The technical report will be provided to CDFG and NMFS.

Terrestrial Biological Resources (Section 5.5.6)

System Measures

Habitat Monitoring and Compensation

Measure 5.5.3-2c The SFPUC shall compensate for reduced productivity and diversity of San Francisco garter snake (SFGS) and California red-legged frog (CRLF) wetland habitat which could occur as a result of greater variability, extent and duration in drawdowns at Pilarcitos Reservoir as a result of implementation of Revised Measure 5.5.3-2a (Low-head Pumping Station at Pilarcitos Reservoir). To offset the potential loss of habitat quality, the SFPUC will develop an adaptive management plan for managing and maintaining freshwater marsh and other wetlands around the periphery of Pilarcitos Reservoir. This adaptive management plan would include pre- implementation monitoring and post-implementation monitoring for up to 10 years to ensure that habitat is sustained at Pilarcitos Reservoir, to achieve no net loss of habitat and value for SFGS and CRLF habitat and document changes (if any) in extent or quality of the habitat attributable to operation of the low-head pumping station.

In the event that habitat is reduced, one alternative for implementing such habitat compensation is the Habitat Reserve Program (HRP) currently being developed by the SFPUC. The purpose of the HRP is to provide a comprehensive, coordinated approach to mitigation and related regulatory compliance for WSIP projects and operations. The HRP is described further in the PEIR, Chapter 3.0, Section 3.12.3. Under the proposed HRP, the SFPUC would proceed as soon as possible with identifying, securing (through designation, management agreement, conservation easement, or acquisition of fee title) and improving lands to be used for habitat compensation so that mitigation is underway concurrent with habitat loss related to WSIP program activities, further ensuring no net loss of resources. The proposed HRP is undergoing CEQA environmental review in 2008 and 2009 and is targeted for implementation as soon as possible thereafter. Once the HRP is approved and implemented, the SFPUC will use this as one vehicle or method for implementing the mitigation requirements for WSIP-related activities. Otherwise, where appropriate and necessary, the SFPUC will develop and implement appropriate habitat compensation mitigation for WSIP system operational effects on Pilarcitos Reservoir, independent of the HRP.

Adaptive Management of Freshwater Marsh and Wetlands at Upper and Lower Crystal Springs Reservoirs

Measure 5.5.6-1a: To offset the loss of wetlands, a qualified professional will develop an adaptive management plan for managing and maintaining freshwater marsh and other wetlands around the periphery of Upper Crystal Springs, and Lower Crystal Springs Reservoirs. This adaptive management plan may include the following:

- Gradually raise the reservoir elevations at appropriate times of year to maintain continuous freshwater marsh and riparian habitat along the shorelines to reduce potentially adverse effects to San Francisco garter snakes and California red-legged frogs.

- Identify feasible measures to help to moderate the effects of reservoir drawdown, increase the extent of reservoir margins with the potential to support freshwater

marsh vegetation, and investigate the effectiveness for the management and control of predatory aquatic species such as largemouth bass and bullfrogs.

- Perform monitoring and review to ensure that habitat is sustained at Upper and Lower Crystal Springs Reservoirs and elsewhere, as appropriate, to achieve no net loss of habitat and value for freshwater marsh, wetlands, and special-status species.

- Observe all appropriate protective measures to avoid "take" of San Francisco garter snake. In the event that the mitigation measures above cannot be followed, the SFPUC will prepare a sensitive species relocation plan, which would be approved by both the CDFG and USFWS. Such a plan would detail how underground refugia would be excavated, identify suitable relocation areas, etc.

Compensation for Impacts on Terrestrial Biological Resources

Measure 5.5.6-1b: This measure mitigates for water supply and systemwide operation effects on resources within the Peninsula watershed. These impacts would occur primarily through operation of the Upper and Lower Crystal Springs Reservoir facilitated by the Crystal Springs Dam Improvements project (PN-9).

The SFPUC will compensate for sensitive wetland, riparian and upland habitats and habitats which support key special-status species or other species of concern lost as a result of WSIP system operation. Similar habitat will be identified, protected, restored, enhanced, created and managed off-site[3] to ensure no net loss of habitat extent or function. Similarly, in the event of the loss of large, mature oaks and oak woodland, creation and/or restoration of oak woodland elsewhere will be implemented to compensate for the loss of these common upland habitats. A qualified biologist will quantify the magnitude and extent of impacts to wetlands, sensitive habitats, other upland habitats, and key special-status species and other species of concern, and the SFPUC will develop and implement mitigation and compensation plans that meet the appropriate regulatory requirements and permit

[3] Off-site means the compensatory action is located other than within the project construction footprint, but could be on lands already under SFPUC ownership. Measure 4.6-2 addresses compensatory actions to be taken within the construction footprint.

conditions with respect to compensation ratios, other conservation measures and management requirements to mitigate project impacts to less than significant levels.

The SFPUC will obtain required permits and comply with applicable environmental regulations addressing sensitive habitats and species. Compensatory lands—including those restored or enhanced as well as those acquired or designated as protected as part of program mitigation--will be established in perpetuity with a commitment that such lands will not be used for any purpose that conflicts with the primary purpose of maintaining intact wildlife and plant habitat.

One alternative for implementing such habitat compensation is a Habitat Reserve Program (HRP) currently being developed by the SFPUC. The purpose of the HRP is to provide a comprehensive, coordinated approach to mitigation and related regulatory compliance for WSIP projects and operations. This related SFPUC project is described further in Chapter 3.0, Section 3.11. Under the proposed HRP, the SFPUC would proceed as soon as possible with identifying, securing (through designation, management agreement, conservation easement, or acquisition of fee title) and improving lands to be used for habitat compensation so that mitigation is underway concurrent with habitat loss related to WSIP program activities, further ensuring no net loss of resources. The proposed HRP is scheduled for CEQA environmental review in 2007 and targeted for implementation as soon as possible thereafter. Once the HRP is approved and implemented, the SFPUC will use this as one vehicle or method for implementing the mitigation requirements for individual WSIP projects. Otherwise, where appropriate and necessary, the SFPUC will develop and implement appropriate habitat compensation mitigation for individual WSIP projects and operational effects.

Compensation for Serpentine Seep-Related Special Status Plants

Measure 5.5.6-1c: The SFPUC will develop and implement a plan to protect, create, and restore habitat for plant species adapted to serpentine seeps, particularly fountain thistle, around Upper and Lower Crystal Springs Reservoirs. The plan will also include control of pampas grass and any other invasive plant species within the serpentine seep habitat.

Recreational and Visual Resources (Section 5.5.7)

System Measures

None required.

Westside Groundwater Basin Resources (Section 5.6)

System Measures

Groundwater Monitoring to Determine Basin Safe Yield

Measure 5.6-1: The SFPUC will continue ongoing studies, including the existing groundwater and lake level monitoring programs, to determine the safe yield of the North Westside Groundwater Basin in order to avoid overdraft and associated effects including adverse effects on surface water features and seawater intrusion. Using this data, the SFPUC will develop and implement a plan identifying appropriate pumping patterns to

avoid overdraft and the undesirable effects associated with overdraft. The plan will establish both a regular (average annual) and an intermittent (dry year or emergency) yield as well as a strategy for modifying pumping patterns such that the pumping levels can be sustained as an ongoing reliable water supply without depletion of groundwater storage or degradation of water quality.

Implementation of a Lake Level Management Plan

Measure 5.6-2: The SFPUC will develop and implement a lake level management plan identifying strategies for altering pumping patterns or lake augmentation to maintain Lake Merced water levels within the desired long-term range should monitoring conducted under Measure 5.6-1 indicate the potential for adverse effects on lake levels due to groundwater pumping. The SFPUC will coordinate the implementation of this measure with Measure 5.6-1.

Drinking Water Source Assessments for Groundwater Wells

Measure 5.6-5: As required by the California Department of Health Services and incorporated as part of the WSIP, the SFPUC will prepare drinking water source assessments for groundwater wells constructed under the Local and Regional Groundwater Projects (SF-2) and will update these assessments every five years. If the assessment indicates no potential for contamination, then no mitigation is required. However, for wells that are considered vulnerable to contamination on the basis of the drinking water source assessment, the SFPUC will develop and implement a source water protection program specifying actions and a program to be implemented to prevent contamination of the drinking water source.

The source water protection program could include nonregulatory components such as watershed restoration, stormwater monitoring, groundwater monitoring, and public education to protect drinking water quality. Land use planning, permitting, and possibly more restrictive regulatory methods may also be implemented by the local municipality where a threat to drinking water quality is indicated, and management of potential sources of microbiological or direct chemical contamination to eliminate or reduce the risk of contamination of the water supply may be considered. The SFPUC will encourage public participation in the development of the program and will update the program every five years along with the drinking water source assessments.

Cumulative Projects and Impacts Related to WSIP Water Supply and System Operations (Section 5.7)

Cumulative System Measures

None required.

References

See Chapter 6 for references.