6.3 BEST MANAGEMENT PRACTICE OPTIONS TO ADDRESS POTENTIAL EFFECTS OF MAINTENANCE ACTIVITIES

Potential BMPs to reduce potential effects of PCWA maintenance activities on natural resources are summarized in Table 6-11, and described below. The list of BMP options is not comprehensive; instead, it provides examples of BMPs that may be implemented to minimize particular potential effects of PCWA canal maintenance activities. Several BMP options for maintenance activities are similar to those for operations activities described in Section 5.3; therefore, are not described as thoroughly in this section.

6.3.1 Pre-Implementation Best Management Practices

Below are potential pre-implementation BMPs for reducing potential effects of PCWA maintenance activities on natural resources in the study area.

6.3.1.1 Improve Canal Bank Stability and Install Sediment Control Measures at Canal Outlets

Canal bank erosion along unlined canals may occur after canal flows are restored following dewatering activities associated with canal cleaning and lining activities. The following measures to improve canal bank stability are described in **Chapter 5**:

- Install velocity dissipaters at canal outlets
- Line banks below canal outlets

Additional BMP options to address potential effects of bank erosion below canal outlets and sediment loading in receiving waters from dewatering during maintenance activities are described below.

Install Erosion-Control Blankets in Areas of Soil Disturbance

Erosion-control blankets and turf reinforcement mats combine vegetative growth with synthetic materials to form a high-strength mat that prevents soil erosion in drainage areas and on steep slopes. Where applicable, PCWA may apply a geotextile blanket or biodegradable mat on graded slopes to minimize actively bared and easily eroded soils. These blankets also enhance vegetative growth and provide removal of particulates through sedimentation and soil infiltration (EPA 2005b). PCWA is already implementing this type of BMP, where possible.

Install Temporary Fiber Rolls in Areas of Soil Disturbance

Fiber rolls (also called fiber logs or straw wattles) are tube-shaped erosion-control devices filled with straw, flax, rice, coconut fiber material, or composted material (EPA 2008a). Temporary fiber rolls are typically made of rice straw, are contained in tubular black netting, and can be staked down along a sloped area. Rice straw is weed free and naturally biodegradable, which can enhance the soil and help vegetation become established. Each roll is wrapped with ultraviolet (UV)-degradable polypropylene netting for longevity or with 100 percent

biodegradable materials like burlap, jute, or coir. Fiber rolls are used on slopes to reduce runoff velocity and control or capture eroded sediment to prevent sediment loading in receiving water streams. On steep slopes, fiber rolls used in conjunction with a properly designed and installed erosion-control blanket may be very effective in reducing erosion and sedimentation.

Apply Spray-On Soil Binders in Areas of Soil Disturbance

Spray-on emulsion is often used as a temporary tackifier for hydroseeding or mulch, or a stand-alone, heavy-duty soil binder for erosion control. Plant-based, polymer, and cementious-based emulsions penetrate the topsoil and bind soil particles together. These agents form a protective, flexible film to strengthen the soil surface and provide bank stabilization and erosion control. Polymer emulsions may be applied with hydroseeders, water trucks, or other spraying devices. Spraying devices with a mechanical agitator or mixing apparatus or hydraulic recirculation are known to be most effective. These emulsions are best applied to low or moderate slopes, and best avoided in areas where the binder would likely be removed in the near future or in areas with high-volume sheet flow because it has a tendency to be washed away. Reapplication of soil binders may be necessary to effectively stabilize the soil throughout the season.

6.3.1.2 Avoid Potential Wet Weather Effects

Avoidance of potential adverse effects of PCWA maintenance activities during wet weather, when and where feasible, can be very effective. BMP options to avoid potential wet weather effects for PCWA maintenance activities are described below.

Plan and Design Projects to Minimize Land Disturbance

Scheduled maintenance activities, particularly canal and pipe repair, can be planned and designed with consideration in minimizing excavation and land disturbance. This BMP involves avoiding land disturbance during periods of high precipitation, and land disturbance in areas vulnerable to erosion. PCWA is already implementing this type of BMP, when possible.

Identify Areas Susceptible to Erosion for Future Canal Lining Activities

During maintenance activities, PCWA staff may identify segments of unlined canals or lined areas along the canal that are visibly disturbed and/or susceptible to bank erosion for future canal lining activities. Future lining of these segments typically reduces erosion and sloughing of canal banks. PCWA already implements this type of BMP.

Choose Canal Crossing Sites Where Erosion Potential is Low

Maintenance activities, such as canal lining and canal cleaning, may require hoses and/or other equipment to rest across the canal. Areas along canals with visible erosion or loose sediment should be avoided and equipment should be located along stable canal sections. PCWA is already implementing this type of BMP.

6.3.1.3 Protect Sensitive Species and Sensitive Species Habitat

Before conducting maintenance activities, special status species and sensitive species habitat can be protected by the following BMPs described in **Chapter 5**:

- Provide staff with species identification training.
- Evaluate sites with sensitive species and mark/protect sensitive species habitat.

In addition to options described in **Chapter 5** for the "Evaluate sites with Sensitive Species and Mark/Protect Sensitive Species Habitat" BMP option, a protective curtain can be placed around sensitive plant species and/or habitat near herbicide application areas to minimize the exposure of special status species and/or habitat to the potential toxic effects of herbicides. Types of protective curtains include tarps or a pesticide containment pad made of impermeable materials, such as synthetic liners.

6.3.1.4 Strategic Scheduling of Maintenance Activities

Maintenance activities can be scheduled, or BMPs implemented, at specific times of the year to avoid or minimize potential effects on terrestrial and aquatic biological resources. Activities can be planned to avoid species sensitive periods and to avoid wet weather erosion effects. For example, a project or activity can be scheduled to avoid periods during bird nesting and/or amphibian breeding seasons. Projects requiring equipment and machinery can be scheduled during a time of low erosion potential, such as the dry season. PCWA is already implementing this type of BMP, when possible.

6.3.1.5 Regulatory Compliance Management for Operations and Maintenance Activities

Before maintenance activity or project implementation, permits may need to be obtained and BMPs implemented to comply with rules and regulations. BMP checklists are available from many governmental resources as planning guides for environmental compliance. An example is EPA's "Managing Your Environmental Responsibilities: A Planning Guide for Construction and Development" that describes BMPs that should be implemented before, during, and after canal and pipe repair activities. In addition, there are several guidance documents online providing information on delegating specific tasks to employees for a construction project with an associated General NPDES Construction Stormwater Permit, such as a manager who would be responsible for knowing the location and ensuring implementation of a project SWPPP. Regulatory compliance activities include periodically updating documents, such as PCWA's Aquatic Weed Management Program, which is reviewed annually and updated, as needed.

6.3.2 Implementation Best Management Practices

The following sections identify potential BMPs to reduce potential effects associated with PCWA maintenance activities on natural resources within the PCWA raw water distribution area that should be considered during implementation of PCWA maintenance activities.

6.3.2.1 Protect Sensitive Species and Sensitive Species Habitat

Special status species and sensitive species habitat can be protected during implementation of some maintenance activities by applying the following BMP:

Stockpile Materials Away from Sensitive Species Habitat Areas

Before conducting canal cleaning or canal lining activities, PCWA may designate areas that should be avoided based on observed sensitive species or known sensitive species habitat areas. During canal cleaning or canal lining activities, PCWA personnel would stockpile any debris (i.e., vegetation, sediment, and/or gunite removed from canals) away from these known occurrences or areas of sensitive species habitat, or only in previously disturbed areas, to minimize potential effects of these materials on natural resources through physical damage to vegetation/species by deposition of material or constituent loading to receiving streams. PCWA is already implementing this type of BMP.

6.3.2.2 Avoid Sensitive Species Areas

During operations activities, PCWA personnel can do several things to prevent potential effects on terrestrial species and disturbance to terrestrial species habitat. Examples of BMP options follow. During maintenance activities, PCWA personnel can do several things to avoid potential effects on terrestrial species and disturbance to terrestrial species habitat. Several BMP options for PCWA maintenance activities are similar to those described in **Chapter 5** for operations activities, including:

- Avoid disturbance to sensitive species

An additional BMP option to avoid sensitive species during maintenance activity implementation is described below.

Avoid Active Raptor Nesting Areas

PCWA staff can avoid potential impacts to raptors through avoiding active raptor nesting areas during maintenance activities. PCWA may conduct raptor survey at locations of scheduled maintenance activities during the breeding season (generally March through August) to scan for active nests. If active nests are observed, the area should be avoided to the maximum extent possible. If activities do occur in the area, noise and other disturbance should be kept to a minimum. PCWA is already implementing this type of BMP for canal lining activities, when possible.

6.3.2.3 Prevent Degraded Water from Entering Streams After Operations and Maintenance Activities

Water flows restored to the canal system immediately following maintenance activities that involve canal dewatering may flush accumulate debris and sediment, along with associated constituents, to receiving streams. BMPs may be implemented to prevent or reduce the amount of degraded water from PCWA's canal system from entering streams. BMP options for maintenance activities previously described in **Chapter 5** include:

- Modify reservoir operations to gradually restore reservoir releases to canals at a slower rate

Additional BMPs that may prevent degraded water from entering streams after maintenance activities are described below.

Apply Sediment Trap at Storm Drains for Dewatering Before Canal Lining

For some types of maintenance activities that require complete dewatering of ponded water, such as canal lining, water remaining in canals is pumped out of a canal segment before preparing segments for canal lining. These waters may exhibit elevated concentrations of constituents and should not be discarded to receiving waters or storm drains. Temporary sediment traps can be installed at nearby storm drains to filter sediment and associated constituents from small volumes of water removed from canals.

Treat First Flush Flows to Reduce Downstream Water Quality Effects

Results from water quality monitoring associated with canal lining activities at locations below newly lined canal segments demonstrated pH values that were higher in comparison to sites upstream from newly lined segments. Water with elevated pH values may be treated to buffer potential changes to pH that may occur through geochemical interactions of ions in canal waters with newly lined gunite sections. Nontoxic solutions that may lower pH and neutralize potential effects of canal lining on pH would reduce potential water quality effects on receiving streams.

6.3.3 Ongoing or Post-Implementation Best Management Practices

Potential ongoing or post-implementation BMPs for maintenance include the following option described in **Chapter 5**:

- Implement PCWA BMP Program

Additional ongoing or post-implementation BMP options for maintenance activities are described below.

6.3.3.1 Avoid Potential Wet Weather Effects

Install Erosion- and Sedimentation-Control Measures After Land-disturbing Activities

If PCWA maintenance activities may disturb land during the wet season, loose sediment and/or material in the vicinity of the canal system should be contained using sediment-control measures, such as a tarp surrounded with fiber rolls, to protect the materials from being transported into downstream waterways. PCWA already implements this type of BMP, when possible.

6.3.3.2 Prevent Degraded Water from Entering Streams After Operations and Maintenance Activities

Implement an Aquatic Weed Management Program

PCWA currently implements an Aquatic Weed Management Program. As part of this program, PCWA completes an evaluation for each algaecide and herbicide application which includes water quality monitoring and treatment efficacy (PCWA 2003b). PCWA also routinely monitors

algaecide and herbicide product releases in an effort to identify suitable algaecides and/or herbicides for applications that may have lesser potential effects on natural resources.

6.3.3.3 Good Housekeeping Practices

Good housekeeping is practiced to maintain clean and orderly work sites and to prevent materials originating in the work site area from affecting natural resources. Good housekeeping practices include plans, procedures, and activities designed to prevent or minimize potential pollutant runoff into waterways. PCWA's Hazardous Materials Plan describes these practices in detail. Examples of good housekeeping BMPs are as follows:

Ensure Proper Handling of Materials and Wastes

Spill kits should be kept nearby and used to prevent further contamination if wastes are accidentally spilled. If a spill is large, the spill should be reported to the Office of Environmental Health Hazard Assessment (OEHHA). PCWA is already implementing this type of BMP.

Use Proper Cleanup Procedures After Material Use

PCWA staff should not wash excess gunite into canals following completion of canal lining activities. Once canal lining activities are completed, excess gunite should be contained and properly disposed. If equipment used for canal lining activities needs to be rinsed, wastewater should be captured, contained in a storage vessel, and exported to a disposal facility. PCWA is already implementing this type of BMP.

Implement Onsite Debris and Trash Management Practices

During PCWA maintenance activities, PCWA should (1) keep debris and trash under cover either in an enclosed trash container, (2) prevent waste materials to accumulate on the ground, and (3) inspect maintenance sites daily for litter and debris. If feasible, construction and demolition debris such as wood, metal, and concrete, should be recycled. PCWA is already implementing this type of BMP.

Store Materials Under a Roof or Covering with a Secure Tarp

Proper storage of pollutant materials, such as fuel, oil, concrete, and other hazardous liquids, should be considered for materials used for maintenance activities. When pollutant materials must be stored on site, they should be stored in a secure, covered location with secondary containment provisions. Additional options include designating specific areas on site for material delivery and storage, location of material storage areas away from waterways and storm drain outlets, installation of containment berms between stored materials and site drainage system, proper labeling of materials and containers, and keeping material containers tightly sealed after use. Maintenance site supervisors should check for leaching or spreading of contaminants from areas where potentially hazardous materials are stored. PCWA already implements this type of BMP.

6.4 SUGGESTIONS FOR FURTHER STUDIES

Based on results of NRMP studies, PCWA maintenance may affect natural resources conditions within the study area. Higher concentrations of trace metals, particularly aluminum and copper, were observed at sites monitored within the PCWA canal system compared to stream sites for sampling events associated with PCWA's maintenance activities that involved dewatering of canal segments. These data may inconclusively suggest that the PCWA canal system is a source for loading of some constituents to study area streams.

Additional water quality monitoring should be conducted at sites to characterize potential effects of PCWA maintenance activities on water quality conditions. Water quality monitoring sites for maintenance event-based monitoring should include:

- Canal sites immediately upstream and downstream from the maintenance activities within the PCWA canal system
- End of canal outlets downstream from maintenance activities
- Stream sites upstream and downstream from canal system contributions

Nearby routine water quality monitoring sites within the same watersheds as the maintenance sites should also be included during maintenance event-based water quality monitoring to characterize effects of maintenance activities. One of the focal points for additional studies should be to evaluate aluminum and copper inputs to study area streams from the PCWA canal system. During algaecide application events, additional and more frequent water quality monitoring at select canal outlets downstream from Clover Valley and Mammoth reservoirs during and after algaecide applications. Water quality results for these events, coupled with flow data at algaecide application points and canal outlets, would provide PCWA with the data to calculate the mass balance for copper and estimate mass loading of copper to study area streams during algaecide applications. Water quality monitoring should also be conducted upstream and downstream from BMPs implemented by PCWA to reduce potential impacts to water quality to evaluate BMP effectiveness. Sample timing for all maintenance event-based water quality monitoring should be determined based on hydrologic conditions at each site to characterize potential constituent loading to study area streams following maintenance activities.

As described in **Chapter 5**, additional sediment quality monitoring at numerous sites exhibiting variable soil conditions along the canal system and study area streams may help to determine potential sources of trace metals in PCWA canals and study area streams. Soil sampling for representative soil types should be coordinated with maintenance event-based water quality monitoring. Soil samples should be collected from sediments removed from canals during canal cleaning and canal lining activities, and from undisturbed sites of representative soil types, as characterized by PCWA (2005), near and upstream from canal and stream water quality monitoring sites within watersheds of Clover Valley Creek, Antelope Creek, Secret Ravine, and Miners Ravine.

Additionally, effects of canal lining activities on wetlands and/or trees, including oak trees, located adjacent to canals are not clearly understood. Further studies should be conducted to evaluate potential effects of canal lining on wetlands and/or trees adjacent to canals. Studies may include evaluating potential changes to moisture and geochemical conditions of soils near potentially affected wetlands and/or trees before and after canal lining activities.

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CHAPTER 7.0
POTENTIAL EFFECTS, REGULATORY FRAMEWORK, AND BEST MANAGEMENT PRACTICES FOR INTERRELATED PCWA OPERATIONS AND MAINTENANCE ACTIVITIES

This chapter provides an overview of the potential effects of interrelated PCWA O&M activities on natural resource conditions in the study area, the regulatory framework for effects, and potential BMPs to reduce effects of interrelated PCWA O&M activities on natural resources.

7.1 POTENTIAL EFFECTS OF INTERRELATED PCWA OPERATIONS AND MAINTENANCE ACTIVITIES ON NATURAL RESOURCES

This section describes potential effects of PCWA O&M activities that, when combined, may increase adverse effects to natural resources. Interpretations of the potential effects of interrelated PCWA activities are based on the potential effects of operations activities discussed in **Chapter 5** and potential effects of PCWA maintenance activities discussed in **Chapter 6**. Potential interrelated effects associated with canal or pipe repair, however, are not addressed in this chapter. As described in **Chapter 6,** canal repair and pipe repair activities should require project-specific environmental resources analyses to assess the potential effects of the activity on natural resources, and an evaluation to determine measures to minimize potential negative effects.

7.1.1 Yearly Outages

PCWA operations during the PG&E yearly outages in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects are anticipated on natural resources during PCWA operations related to yearly outages and:

- Seasonal delivery schedule changes
- Seasonal flood management practices
- Maintenance related to physical removal of vegetation along PCWA's raw water distribution system
- Maintenance related to herbicide applications along PCWA's raw water distribution system

The following summarizes potential effects of PCWA operations during yearly outages that may be interrelated to potential effects observed during other PCWA O&M activities:

- Routine Operations – During routine PCWA operations, the PCWA canal system provides direct contributions to flows within study area streams through regulated releases to streams used for conveyance to customers, unregulated releases from canal

outlets, and indirect contributions through customer return flows (USACE and PCWA 2008). These canal system contributions to streamflow have a positive effect on hydrologic conditions in study area streams, creating and sustaining suitable habitat conditions for many aquatic species during the dry season. These positive effects on natural resources, when combined with potential negative effects on hydrological conditions associated with PCWA's operations during the outages, likely result in interrelated effects to natural resources. Potential interrelated effects to biological resources, including wetlands supported by canal contributions, Central Valley steelhead, and Chinook salmon, are representative of historic conditions within the study area.

- Canal Cleaning – Removal of debris and sediment from the canals during canal cleaning activities potentially reduces adverse interrelated effects of PCWA operations during yearly outages on water quality conditions in study area streams. PCWA's canal cleaning activities remove much of the unconsolidated sediment, organic material, and associated copper from algaecide applications that may settle in canals when canals are dewatered during the outage.

- Weed and Brush Control – Algaecide Application: Interrelated effects of PCWA operations during yearly outages and PCWA's algaecide applications were observed during water quality monitoring events for yearly outages, particularly within the Secret Ravine watershed. Measured copper values at canal and stream sites in the Secret Ravine watershed during the October 2007 sampling event increased after flows were restored to the canal system. The higher copper values observed during the yearly outages were likely attributed to mobilization of copper associated with fine sediment and organic material remaining within the canals after canal cleaning activities, or that had accumulated and settled when canals were dewatered during the outage. The affects on water quality from these interrelated activities likely result in adverse effects on terrestrial and aquatic biological resources.

- Canal lining – Removal of debris and sediment from the canals during canal preparation for lining activities, along with improved canal bank stability when canals are lined, likely decreases potential adverse effects of PCWA operations during PG&E yearly outages on water quality conditions in study area streams.

7.1.2 Seasonal Delivery Schedule Changes

No interrelated effects are anticipated on natural resources during PCWA operations related to seasonal delivery schedule changes in combination with other PCWA O&M activities.

7.1.3 Seasonal Flood Management Practices

PCWA operations during seasonal flood management practices in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects

are anticipated on natural resources during PCWA operations related to seasonal flood management practices and:

- Yearly outages
- Seasonal delivery schedule changes
- Routine operations
- Maintenance from physical removal of vegetation along PCWA's raw water distribution system
- Maintenance from herbicide applications along PCWA's raw water distribution system

The following summarizes potential effects of PCWA operations during seasonal flood management practices that may be interrelated to potential effects observed during other PCWA O&M activities:

- Canal Cleaning – Removal of debris and sediment from the canals during canal cleaning activities potentially reduces adverse interrelated effects of PCWA operations during seasonal flood management practices on water quality conditions in study area streams. PCWA's canal cleaning activities remove much of the unconsolidated sediment and organic material that accumulates in canals and may be flushed from canals during seasonal flood management practices. These effects are likely similar to conditions generally exhibited across study area streams during periods of high precipitation runoff.

- Weed and Brush Control – Algaecide Application – Flood management practices have the potential to cause adverse effects to natural resources when combined with algaecide applications along PCWA's raw water distribution system. Potential adverse effects may occur through loading of copper remaining within the canals after canal cleaning activities to wetlands and streams, and accumulation of copper in wetland and stream sediments may affect biological resources.

- Canal Lining – Within sections of the canal system that are lined or recently lined before PCWA seasonal flood management practices, canal lining activities potentially result in reduced adverse interrelated effects from PCWA operations during seasonal flood management practices. Removal of debris and sediment from the canals during canal preparation for lining activities, along with improved canal bank stability when canals are lined, potentially decreases adverse effects of PCWA operations during seasonal flood management practices on water quality conditions in study area streams, similar to conditions generally exhibited across study area streams during periods of high precipitation runoff.

7.1.4 Routine Operations

Routine PCWA operations in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects are anticipated on natural resources during PCWA operations related to routine operations and:

- Seasonal delivery schedule changes
- Seasonal flood management practices
- Routine operations
- Canal cleaning along PCWA's raw water distribution system
- Physical removal of vegetation along PCWA's raw water distribution system
- Herbicide applications along PCWA's raw water distribution system

The following summarizes potential effects of PCWA operations during routine operations that may be interrelated to potential effects observed during other PCWA O&M activities:

- Yearly Outages – When combined with operations during PG&E yearly outages, negative effects on hydrological conditions associated with PCWA's routine operations during the yearly outages may increase adverse effects to natural resources. These potential interrelated effects are summarized above in the section describing interrelated effects associated with PCWA operations during PG&E yearly outages. As described in **Chapter 5**, flow contributions associated with PCWA routine operations have an overall positive effect on hydrologic conditions in study area streams.
- Canal Lining – Removal of debris and sediment from the canals during canal preparation for lining activities, along with improved canal bank stability when canals are lined, likely decreases potential adverse effects of routine operations on water quality conditions in study area streams.

7.1.5 Canal Cleaning and Flushing

PCWA operations during canal cleaning in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects are anticipated on natural resources during PCWA operations related to canal cleaning and:

- Seasonal delivery schedule changes
- Routine operations
- Physical removal of vegetation along PCWA's raw water distribution system

- Herbicide applications along PCWA's raw water distribution system
- Canal lining along PCWA's raw water distribution system

The following summarizes potential effects of PCWA operations during canal cleaning that may be interrelated to potential effects observed during other PCWA O&M activities:

- Yearly Outages – As described above, removal of debris and sediment from the canals during canal cleaning activities likely decreases potential adverse effects of PCWA operations during yearly outages on water quality conditions in study area streams.
- Seasonal flood management practices – As described above, removal of debris and sediment from the canals during canal cleaning activities likely decreases potential adverse effects of PCWA operations during seasonal flood management practices on water quality conditions in study area streams.
- Weed and Brush Control – Algaecide Application – PCWA's canal cleaning activities, when combined with algaecide applications along PCWA's raw water distribution system, likely have adverse interrelated effects to natural resources. Water quality data collected during canal cleaning activities, summarized in **Chapter 6**, show increased concentrations of copper at study area stream sites immediately following canal cleaning. Increased concentrations of copper are likely the result of the mobilization of copper associated with fine sediment and organic material remaining within the canals after canal cleaning activities or that had settled within upstream and/or downstream canal sections that were dewatered for canal cleaning. Copper loading to wetlands and streams, and accumulation of copper in wetland and stream sediments may affect biological resources.

7.1.6 Weed and Brush Control – Physical Removal of Vegetation

No interrelated effects are anticipated on natural resources during physical removal of vegetation in combination with other PCWA O&M activities.

7.1.7 Weed and Brush Control – Algaecide Application

Algaecide applications along PCWA's raw water distribution system in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects are anticipated on natural resources during algaecide applications and:

- Seasonal delivery schedule changes
- Routine operations
- Physical removal of vegetation along the PCWA canal system

- Herbicide applications along PCWA's raw water distribution system

The following summarizes potential interrelated effects of PCWA algaecide applications when combined with other PCWA O&M activities:

- Yearly Outages – PCWA's algaecide applications, when combined with operations during yearly outages, will likely result in adverse interrelated effects to natural resources. As described above, higher copper concentrations observed at sites during yearly outage water quality monitoring events were likely attributed to mobilization of copper associated with fine sediment and organic material that had settled when canals were dewatered during the outage. Copper loading to wetlands and streams, and accumulation of copper in wetland and stream sediments may affect biological resources.

- Seasonal Flood Management Practices – Algaecide applications along PCWA's raw water distribution system have the potential to cause adverse effects to natural resources when combined with seasonal flood management practices. Potential adverse effects may occur through copper loading to wetlands and streams, and accumulation of copper in wetland and stream sediments may affect biological resources.

- Canal Cleaning – As described above, PCWA algaecide applications, when combined with canal cleaning activities, likely result in adverse interrelated effects to natural resources. Increased concentrations of copper in study area streams following canal cleaning activities are likely the result of the mobilization of copper from algaecide applications associated with fine sediment and organic material that had settled when canals were dewatered for canal cleaning. Accumulation of copper in wetland and stream sediments may affect biological resources.

- Canal Lining – Similar to potential interrelated effects associated with algaecide applications and canal cleaning activities, PCWA algaecide applications, when combined with canal lining activities, likely cause adverse interrelated affects to natural resources. Measured copper values in study area streams following canal lining activities were marginally higher compared to routine operations. The higher values result from the mobilization of copper from algaecide applications associated with fine sediment and organic material that had settled when canals were dewatered for canal lining.

7.1.8 Weed and Brush Control – Herbicide Application

No interrelated effects are anticipated on natural resources during PCWA herbicide applications in combination with other PCWA O&M activities.

7.1.9 Canal Lining

PCWA canal lining activities in combination with other PCWA O&M activities may increase adverse effects to natural resources. No interrelated effects are anticipated on natural resources during PCWA operations related to canal lining and:

- Yearly outages
- Seasonal schedule delivery changes
- Seasonal flood management practices
- Canal cleaning along PCWA's raw water distribution system
- The physical removal of vegetation along PCWA's raw water distribution system
- Herbicide applications along PCWA's raw water distribution system

The following summarizes potential effects of PCWA operations during canal lining that may be interrelated to potential effects observed during other PCWA O&M activities:

- Routine Operations – Similar to conditions for seasonal flood management practices and described above, removal of debris and sediment from the canals during canal preparation for lining activities, along with improved canal bank stability when canals are lined, likely decreases potential adverse effects of routine operations on water quality conditions in study area streams.
- Weed and Brush Control – Algaecide Application – As described above, canal lining activities, when combined algaecide applications, likely have adverse interrelated effects to natural resources. Higher concentrations of copper observed in study area streams following canal lining activities were likely due to the mobilization of copper from algaecide applications associated with fine sediment and organic material that had settled when canals were dewatered for canal lining. Accumulation of copper in wetland and stream sediments may affect biological resources.

7.2 REGULATORY FRAMEWORK FOR POTENTIAL EFFECTS OF INTERRELATED PCWA OPERATIONS AND MAINTENANCE ACTIVITIES

The regulatory framework for potential effects of PCWA operations activities described in **Chapter 5**, along with the regulatory framework for potential effects of PCWA maintenance activities described in **Chapter 6**, apply to the potential interrelated effects described in this chapter. The regulatory framework for each of the potential interrelated PCWA O&M activities described that may have adverse effects on natural resources when combined with other O&M activities is summarized in **Tables 5-3** and **6-11**. The following sections provide an overview of

the Federal and State regulations, and local requirements and considerations applicable to the potential effects of interrelated O&M activities described above.

7.2.1 Federal Regulations

Federal laws and regulations associated with the potential effects of interrelated PCWA O&M activities are described in **Chapters 5** and **6**, and listed below:

- CWA
- ESA
- Magnuson-Stevens Fishery Conservation and Management Act and the 1996 Sustainable Fisheries Act
- MBTA

7.2.2 State Regulations

Laws and regulations governed by the State of California and associated with the potential effects of interrelated PCWA O&M activities are described in **Chapters 5** and **6**, and listed below:

- CEQA
- Porter-Cologne Water Quality Control Act
- California ESA
- California Fish and Game Code-Fully Protected Species
- California Fish and Game Code Section 1602 – Lake and Streambed Alteration Program
- California Native Plant Protection Act

7.2.3 Local Requirements and Considerations

The following local requirements and considerations are associated with the potential effects of interrelated PCWA O&M activities are described in **Chapters 5** and **6**:

- PCCP
- Placer County SWMP
- Placer County Code, Tree Preservation Ordinance

- Placer County Oak Woodland Management Plan

7.3 BEST MANAGEMENT PRACTICE OPTIONS TO ADDRESS POTENTIAL EFFECTS OF INTERRELATED PCWA OPERATIONS AND MAINTENANCE ACTIVITIES

The BMPs to address potential effects of PCWA operations activities described in **Chapter 5**, along with the regulatory framework for potential effects of PCWA maintenance activities described in **Chapter 6**, also apply for the potential interrelated effects described in this chapter. Potential BMPs to reduce potential effects of interrelated PCWA O&M activities on natural resources are summarized in **Tables 5-3** and **6-11**, and listed below. The list of BMP options is not comprehensive; instead, it provides examples of BMPs that may be implemented to minimize particular potential effects of interrelated PCWA O&M activities.

7.3.1 Pre-Implementation Best Management Practices

Below are potential pre-implementation BMPs for reducing potential effects of interrelated PCWA O&M activities on natural resources in the study area.

- Improve canal bank stability and install sediment traps at canal outlets
    - Install velocity dissipaters at canal outlets
    - Line banks at canal outlets
    - Install erosion-control blankets in areas of soil disturbance
    - Install temporary fiber rolls in areas of soil disturbance
    - Apply spray-on soil binders in areas of soil disturbance
- Avoid potential wet weather effects
    - Patrol canals and remove potential obstructions to prevent erosion and propery damage
    - Minimize amount of water purchased from PG&E during periods of high precipitation
    - Distribute flood releases from canal system by releasing flows at numerous intermediate outlets
    - Plan and design projects to minimize land disturbance
    - Install erosion and sedimentation control measures after land-disturbing activities
    - Identify areas susceptible to erosion for future canal lining activities
    - Choose canal crossing sites where erosion potential is low
- Protect sensitive species and sensitive species habitat

  - Provide staff with species identification training
  - Evaluate sites with sensitive species and mark/protect sensitive species habitat
  - Stockpile materials away from sensitive species habitat areas
- Strategic scheduling of maintenance activities

7.3.2 Implementation Best Management Practices

The following sections are implementation BMPS to reduce potential effects of PCWA maintenance activities on natural resources:

- Avoid sensitive species areas
  - Avoid disturbance to sensitive species
  - Avoid active raptor nesting areas
- Prevent degraded water from entering streams after O&M activities
  - Modify canal operations to gradually restore reservoir releases to canals at slower rate
  - Apply sediment trap at storm drains for dewatering before canal lining
  - Treat first flush flows to reduce downstream water quality effects

7.3.3 Ongoing or Post-Implementation Best Management Practices

The following are ongoing post-implementation BMPs to reduce the potential interrelated effects of PCWA O&M activities on natural resources:

- Regulatory compliance management for O&M activities
- PCWA Best Management Practice Program
- Good housekeeping
  - Ensure proper handling of materials and wastes
  - Use proper cleanup procedures after material use
  - Implement onsite debris and trash management practices
  - Store materials under a roof or covering with a secure tarp

CHAPTER 8.0
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