

Appendix 2A

**Attachment 5: Clifton Court Forebay Aquatic Weed
Management Standard Operating Procedures**

Clifton Court Forebay Aquatic Weed Management

Standard Operating Procedures

Environmental Compliance



Standard operating procedures (SOP) for aquatic weed management in Clifton Court Forebay (CCFB) are outline below. This SOP includes procedures that were developed during intra-agency group discussions and are intended to meet fishery protection regulations.

Project Description

DWR will apply herbicides and algaecides or will use mechanical harvesters on an as-needed basis to control aquatic weeds and algal blooms in CCFB. These procedures are to be followed during aquatic weed maintenance activities to prevent or minimize adverse effects on listed species.

Aquatic Herbicide and Algaecide Application Operating Procedures

Aquatic weed and algal bloom treatments will occur on an as-needed basis depending upon the level of vegetation biomass, the cyanotoxin concentration from the harmful algal blooms (HABs), or the concentration of taste and odor compounds.

Preferred Products

- Aquathol K, an endothall-based aquatic herbicide, applied at a concentration up to 3 ppm
- Copper-based compounds applied at a concentration up to 1 ppm
- Peroxide-based algaecides applied at a concentration up to 10.2 ppm hydrogen peroxide

Application Procedures

- Apply peroxide-based aquatic algaecides, as needed, year-round.

- Apply Aquathol K and copper-based aquatic pesticides, as needed, from June 28 to October 31. Treatments occurring between October 15 and October 31 will be associated with multi-day outages
- Apply Aquathol K and copper-based aquatic pesticides, as needed, prior to June 28 or after October 31, if the average daily water temperature within CCFB is greater than or equal to 25 C, and if Delta Smelt, salmonids, and green sturgeon are not at additional risk from the treatment, as confirmed by NMFS, USFWS and CDFW.
- Notify CDFW, NMFS, USFWS at least two-weeks prior to treatment.
- Monitor the salvage of listed fish at the Skinner Fish Facility prior to the application of the aquatic herbicides and algaecides in the CCFB.
- Prior to application of pesticides, the CCFB radial intake gates will be closed to allow fish to move out of the targeted treatment areas and toward the salvage facility and to prevent any possibility of aquatic pesticide diffusing into the Delta.
- For Aquathol K and copper compounds, the radial gates will remain closed for a minimum of 12 and up to approximately 75 hours after treatment to allow for the product-recommended duration of contact time between the aquatic pesticide and the treated vegetation or cyanobacteria in the forebay, and to reduce residual endothall concentration for drinking water compliance purposes. Radial gates may reopen after a minimum of 36 hours (24 hours pre-treatment closure plus 12 hours post-treatment closure).
- For peroxide-based algaecides, the radial gates may reopen immediately after the treatment, as the required contact time is less than one minute and there is no residual by-product of concern.
- Application will be made by a licensed applicator under the supervision of a California Certified Pest Control Advisor and will follow label restrictions.
- Herbicides will be applied in a manner consistent with the label instructions, with a target concentration dependent upon target species and biomass, water volume and the depth of the forebay.
- Application will be to the smallest area possible that provides relief to SWP operations or water quality. No more than 50 percent of the CCFB will be treated at one time.
- Applications by boat will use a subsurface injection system for liquid formulations and a boat-mounted hopper dispensing system or a helicopter for granular formulations. Applications will start at the shoreline and move systematically farther offshore, enabling fish to move out of the treatment area.
- Water quality samples will be collected before, during and after treatment to ensure concentrations do not exceed the application limit, per NPDES permit required procedures.
- No aerial spray applications will occur during wind speeds above 15 mph to prevent spray drift.
- A spill prevention plan will be implemented in the event of an accidental spill.

If for any reason, DWR needs to deviate in the conditions for the timing of herbicide application, herbicide product and intended application measures, potential for exposure of listed species, or implementation of described protective measures, DWR will provide a plan to USFWS, NMFS and CDFW copying Reclamation, identifying at a minimum:

- Conditions for the timing of herbicide application
- Herbicide product and intended application methods
- Potential for exposure of listed species
- Information on toxicity for listed species
- Additional protective measures to prevent or minimize adverse effects.

Upon receiving concurrence from USFWS, NMFS, and CDFW, which may include additional requirements, DWR may implement the plan. Upon completion of the plan, and no less frequently than annually, DWR will provide a letter to USFWS, NMFS, and CDFW, copying Reclamation, describing compliance with the plan and compliance with additional requirements imposed in the concurrence to the plan.

Mechanical Harvester Operating Procedures

Boat-mounted aquatic weed harvesters are operated on an as-needed basis to remove aquatic weeds in the CCFB. Harvesters are needed year-round with peak use occurring in late summer and fall when aquatic weeds stands are most dense and during periods of hyacinth entrainment. Harvesting rates for a typical weed harvester range from 0.5 to 1.5 acres per hour or 4 to 12 acres per day. DWR implements protective measures during aquatic weed harvesting to avoid and minimize potential impacts on sensitive resources.

Procedures

- Aquatic weed harvesters may be operated on an as-needed basis, year-round.
- Weed harvesting areas include the Forebay and the intake channel upstream of the trash racks and louvers.
- All on-site personnel participate in environmental awareness training for special-status species with the potential to occur in the project area.
- If any wildlife is observed within the aquatic weed removal and disposal areas, work is halted immediately, and the wildlife are allowed to move out of the area on their own.
- Aquatic weed disposal and vehicle travel is contained within the established roadways and identified work area.
- The harvested aquatic weeds are stockpiled on land for transport to a commercial green waste facility or similar facility.

Background information on CCFB Aquatic Weed Management, Potential Effects on Listed Fish, and Protective Measures

DWR will apply herbicides and algaecides or will use mechanical harvesters on an as-needed basis to control aquatic weeds and algal blooms in CCFB. DWR anticipates aquatic weed treatments to occur twice per year, once in early summer (late June to early July) and again in fall (mid to late October). The annual frequency of algal bloom treatments is less predictable under changing climatic conditions and public safety regulations. Based on past conditions, algal treatments are likely to average less than once per year over the next 10 years and may range from 0 to 2 treatments per year. Algal bloom treatments may occur year-round but are most likely to occur during summer and fall months. Treatment areas are typically about 900 acres, and no more than 50% of the 2,180 total surface acres.

DWR strives to limit applications to the least harmful aquatic herbicides and algaecides available. Aquathol K, with active ingredient dipotassium salt of endothall, is a widely used herbicide to control submerged weeds, including pondweed species, by breaking down the cell structure and inhibiting growth. Endothall has low acute and chronic toxicity effects to fish. The LC50 for salmonids is 20-40 times greater than the maximum concentration allowed to treat aquatic weeds. A recent study (Courter et al. 2012) of the effect of Cascade® (same endothall formulation as Aquathol K) on salmon and steelhead smolts showed no sublethal effects until exposed to 9-12 ppm, that is, 2-3 times greater than the 5 ppm maximum concentration allowed by the EPA and about 4-6 times greater than the 2-3 ppm applied in past CCFB treatments. Based on the studies with salmonids, Aquathol K applied at or below the EPA maximum allowable concentration of 5 ppm poses a low to no toxicity risk to salmon, steelhead and other fish. No studies have assessed the exposure risk to green sturgeon. DWR monitors herbicide concentration levels during and after treatment to ensure levels do not exceed the EPA maximum concentration limit of 5 ppm.

Copper-based herbicides and algaecides include chelated copper products and copper sulfate pentahydrate crystals. Copper-based compounds are selected to control *E. densa* and algal blooms (cyanobacteria) that produce cyanotoxins or taste and odor compounds. Applications of copper herbicides for aquatic weed control will be applied at a concentration of 1 ppm with an expected dilution to 0.75 ppm upon dispersal in the water column. Applications for algal control will be applied at a concentration of 0.2 to 1 ppm with expected dilution within the water column.

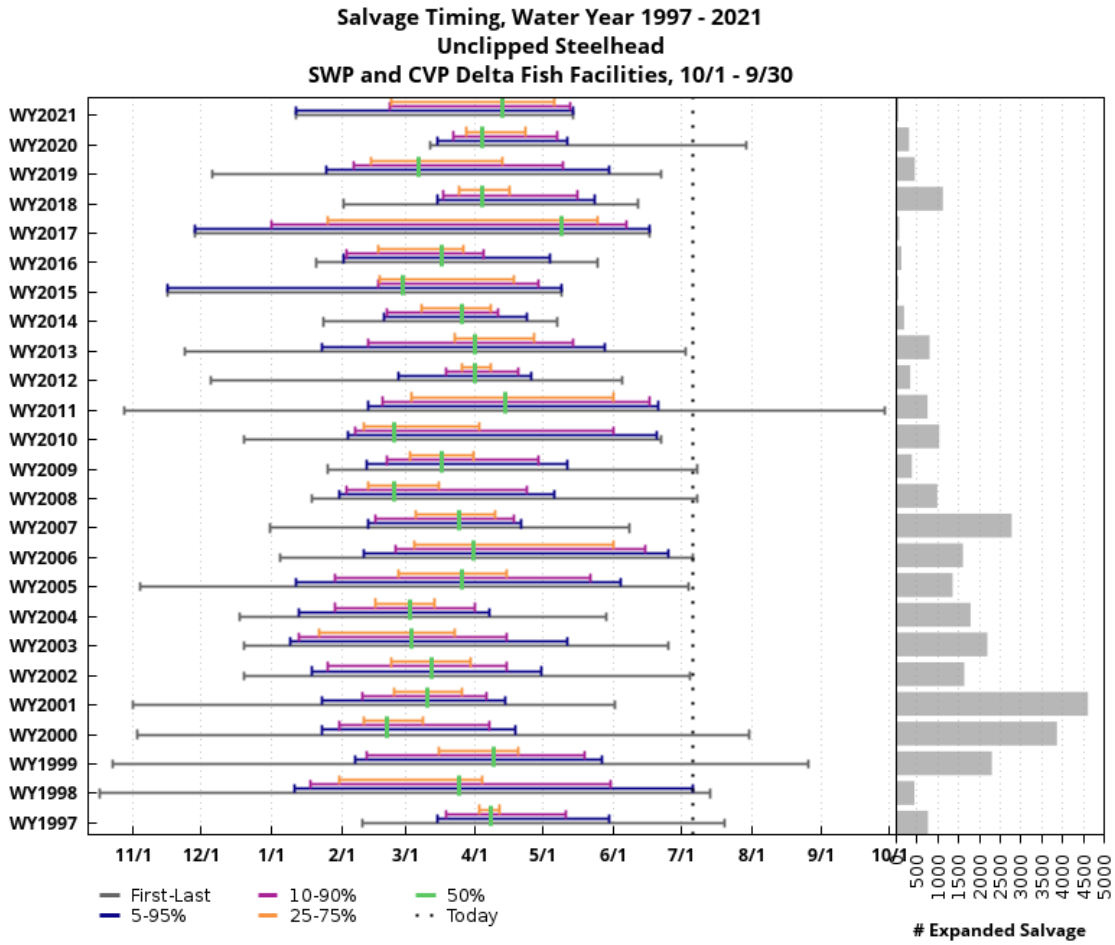
When both pondweeds and *E. densa* are present in similar abundance, a combination of low doses of Aquathol K (1.25 ppm) and copper herbicide (0.75 ppm) is used to suppress all weeds.

With peroxide-based algaecides, an oxidation reaction occurs immediately upon contact with the water destroying algal cell membranes and chlorophyll. There is no contact or holding time requirement, as the oxidation reaction occurs immediately, and the

byproducts are hydrogen peroxide and oxygen. There are no fishing, drinking, swimming, or irrigation restrictions following the use of peroxide-based algaecides. Peroxide-based algaecides will be applied in a manner consistent with the label instructions, with permissible concentrations in the range of 0.3 to 10.2 ppm hydrogen peroxide.

Aquatic weed and algae treatments would occur on an as-needed basis. The timing of application is an avoidance measure and is based on the life history of Chinook Salmon and steelhead in the Central Valley's Delta region and of Delta Smelt. Green Sturgeon are present in the area year-round. Migrations of juvenile winter-run Chinook salmon and spring-run Chinook salmon primarily occur outside of the summer period in the Delta. Central Valley steelhead have a low probability of being in the South Delta during late June, when temperatures exceed 77°F (25°C), through the first rainfall flush event, which can occur as late as December in some years (Grimaldo 2009). Based on the salvage data of unclipped steelhead at Skinner Fish Facility (WY 1997-2021) (see figure below), wild steelhead entered CCFB later and in lower abundance in the last 10 years under the more protective Delta operations. As such, wild steelhead will not be harmed by aquatic weed treatments occurring in late October. Delta Smelt are not expected to be in the CCFB during this time period. Delta Smelt are not likely to survive when water temperatures reach a daily average of 77°F (25°C), and they are not expected to occur in the Delta prior to the first flush event. Therefore, the likelihood of herbicide exposure to Chinook Salmon, Central Valley Steelhead, and Delta Smelt during the proposed herbicide treatment time frame in the CCFB is negligible.

Additional protective measures will be implemented to prevent or minimize adverse impacts from herbicide applications. Applications of aquatic herbicides and algaecides will be contained within the CCFB. The radial intake gates to the CCFB will be closed prior to, during, and following the application. The radial gates will remain closed during the recommended minimum contact time based on herbicide type, application rate, and aquatic weed or algae assemblage. In addition, following the gate closure and prior to the applications of Aquathol K and copper-based pesticides, the water is drawn down in the CCFB via the Banks Pumping Plant. This drawdown helps facilitate the movement of fish in the CCFB toward the fish diversion screens and into the fish protection facility, lowers the water level in the CCFB to decrease the total amount of herbicide needed to be applied per volume of water, and aids in the dilution of any residual pesticide post-treatment.



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