

APPENDIX I

California Department of Food and Agriculture

Hydrilla Eradication Program

Best Management Practices

BEST MANAGEMENT PRACTICES

The California Department of Food and Agriculture (CDFA) Hydrilla (*Hydrilla verticillata*) Eradication Program's Best Management Practices are designed to ensure worker and public safety, environmental compatibility, protection of threatened and endangered species, and maximize treatment efficacy and efficiency.

WORKER SAFETY AND ENVIRONMENTAL COMPATIBILITY

Herbicide Use

All herbicide applications should take place only after local stakeholders have been notified. Planned applications may be reviewed by affected local government agencies.

The CDFA Hydrilla Eradication Program only uses herbicides, surfactants, and other adjuvants that are registered for use in an aquatic environment by the California Department of Pesticide Regulation.

In order to ensure proper aquatic herbicide applications, the CDFA Hydrilla Eradication Program requires that all applications be made under the supervision of an applicator certified for aquatic herbicide applications by the California Department of Pesticide Regulation (CDPR) (Qualified Applicator Certificate or Qualified Applicator License).

The CDFA Hydrilla Eradication Program requires that all applicators follow the herbicide label directions for personal protective equipment¹ when loading, mixing, or applying herbicides. At a minimum, all applicators will wear eye protection, gloves², long sleeve shirts, long pants, and shoes with socks.

In order to avoid inadvertent or accidental soil or water contamination with aquatic herbicides, the CDFA Hydrilla Eradication Program follows the storage, transport, and spill control procedures recommended by the CDPR and the United States Environmental Protection Agency.

In order to ensure the use of correct application rates, the CDFA Hydrilla Eradication Program follows all label directions as to application rates and timings. Surface acreages are determined using GPS/GIS technology. Water depths are determined by using depth meter sticks in shallow water and by calibrated weighted ropes or depth finder in deeper waters.

In order to ensure the use of correct application volumes, the CDFA Hydrilla Eradication Program routinely cleans and calibrates all herbicide application equipment.

In order to avoid spray drift, the CDFA Hydrilla Eradication Program follows all label directions and all CDPR guidelines as to acceptable application weather conditions. For instance, aqueous spray applications are not made in winds above 10 miles per hour, or in temperature inversions (unless they are applied through subsurface injection).

¹ Neither the Komeen[®] herbicide label nor the Sonar[®] SRP herbicide labels require the use of specific personal protective equipment.

² Eye protection and gloves required by California Code of Regulations, Section 6738 (b).

The CDFA Hydrilla Eradication Program obtains all applicable permits from the local County Agricultural Commissioner before any herbicide application. All applicable records are maintained, and all required reports are to be filed with the County Agricultural Commissioner (including the Monthly Pesticide Use report), as required.

All transport or shipment of herbicides and other chemicals by program personnel will be in compliance with California Department of Transportation, and United States Department of Transportation, laws, regulations, and guidelines. Packages containing herbicides and other chemicals, and vehicles transporting them will be properly labeled and/or placarded.

The enforcement of all state pesticide storage, transport, and application laws and regulations is under the direction of the local county agricultural commissioners, who have the right to inspect the CDFA Hydrilla Eradication Program for compliance at any time. In addition, the enforcement of all federal pesticide storage, transport, and application laws and regulations on federal property is the responsibility of the appropriate federal agency, who have the right to inspect the CDFA Hydrilla Eradication Program for compliance at any time (such as the United States Corps of Engineers at Eastman Lake). The CDFA Hydrilla Eradication Program cooperates with these inspections, and immediately corrects any deviations found.

Physical Removal Treatments

All applicable permits will be obtained from the California Department of Fish and Game, for streambed alteration, before dredging.

For hand removal of plants, all reasonable care will be made to extract the tubers and the plant crown from the hydrosol when the plant is removed.

All plant material will be disposed of in a manner that hydrilla cannot sprout and re-grow from tubers or other plant parts.

Only trained personnel will perform dredging and hand removal of plants.

THREATENED AND ENDANGERED SPECIES

In order to avoid inadvertent or accidental take of listed species, the CDFA Hydrilla Eradication Program consults on an annual basis with the California Department of Fish and Game's Natural Diversity Data Base and the local county agricultural commissioners as to the presence of any threatened and endangered species in or near the project areas. The CDFA also participates with Native American groups in a monitoring program for a fish species of special concern, the Clear Lake hitch, in Clear Lake.

The CDFA Hydrilla Eradication Program conducts annual training sessions for seasonal crews on threatened and endangered species. The training sessions are presented by personnel from the California Department of Pesticide Regulation, and include identification of threatened and endangered species in survey and treatment areas, and mitigation measures.

OUTREACH AND EDUCATION

Public awareness is essential to the CDFA Hydrilla Eradication Program in order to expand detection efforts to areas where CDFA staff may not be able to survey, and halt the spread of hydrilla. Survey efforts may be enhanced by door-to-door distribution of educational materials in "high-risk" areas near the focal point of an infestation.

In order to educate the public on the value of the CDFA Hydrilla Eradication Program, biologists from the CDFA and local county departments of agriculture give public speeches and presentations on hydrilla biology and control. The CDFA Integrated Pest Control Branch and other parties produce pamphlets that are distributed to public agencies and weed management area groups, to help the public identify hydrilla and know where to report its occurrence.

Communication with other agencies and experts; keeping abreast of new tools is an integral part of our CDFA Hydrilla Eradication Program. This may include new herbicides, herbicide formulations, herbicide application equipment or methods, biological control agents, physical and mechanical removal equipment and methods, and survey and assessment equipment and methods.

WORKING WITH THE PUBLIC

In order to maintain the best possible working relationship with private landowners and the public, local county departments of agriculture are consulted when hydrilla surveys are conducted within their jurisdiction. CDFA staff then work with the county departments of agriculture to develop a plan to address the survey findings, and perform any required eradication work.

In order to maintain the best possible working relationship with the public, CDFA staff makes it a policy to stop control activities in order to answer program related questions from interested or concerned citizens.

In order to maintain the best possible working relationship with private landowners, CDFA notifies landowners when hydrilla is detected on their property, and consent is sought for the CDFA staff to eradicate these plants from their lands.

In order to maintain the best possible working relationship with private landowners (and the public), efforts are made as a courtesy, to notify landowners when herbicide treatments are being conducted in nearby areas, adjacent to their lands.

TREATMENT EFFICACY AND EFFICIENCY

It is the policy of the CDFA Hydrilla Eradication Program to use the most appropriate eradication tools, or combination of tools, at each site. In order to adopt the appropriate tools, the following site characteristics are considered:

- 1) Site accessibility - the more difficult the access, the less weight and amount of equipment that can be safely carried to the site. In addition, it is more difficult to transport large volumes of plant matter away from the site for disposal. In this

situation, the use of pellet or liquid formulation of fluridone herbicide might be more appropriate due to their low toxicity and ease of portage.

- 2) Site location - a hydrilla infestation next to a river that can flood would require immediate action. This would favor burying, excavating, and fumigating as control methods.
- 3) Water clarity - only relatively clear water sites are appropriate for divers and diver assisted dredging.
- 4) Water depth - the deeper the water the more appropriate the use of pellet herbicide formulations or sub-surface injection of liquid herbicides. This would allow release of the herbicide directly on the plants and decrease the dilution factor.
- 5) Water Quality - the pH (acidity) and turbidity affect the choice of herbicide. Diquat is ineffective in turbid water, and alkalinity can affect the efficacy of copper aquatic herbicides. In addition, algae can obscure hydrilla from visual observation and effect herbicide uptake. Sometimes applications of algaecides, or physical methods such as raking, or high-pressure water injection, may be necessary to remove silt or algae from leaf surfaces prior to herbicide application for hydrilla eradication, to improve herbicide uptake.
- 6) Water uses - the use of the water in the water body has a major effect in determining the proper control method. For instance, if the water is used for irrigation of crops or potable water for humans or livestock, some herbicides may not be used or may require a specific holding time of the water prior to its use.
- 7) Water flow - the faster the water flow the more appropriate the use of copper aquatic herbicides applied through metering devices or gravity flow devices. Metering in the copper herbicide at low rates allows for longer exposure of the hydrilla plants to the herbicide and improves efficacy. Very slow water exchange or convection currents in large water bodies being partially treated might be more acceptable for the slow release pellet formulation of fluridone at low rates with periodic applications, as in Clear Lake.
- 8) Water control - in water bodies where the level of water can be easily controlled, the use of draw down to expose plants and tubers to drying and prevent further tuber formation can be used. Fumigation of soils can be considered when the water body is in draw down.
- 9) Hydrosol type - heavy clay soil makes dredging with a suction dredge difficult. In addition, organic, mucky soils affect the use of slow release pellet herbicides (they become buried in the soft soil, and the active ingredient inactivated by the organic matter). Use of an aqueous solution or a different faster release pellet formulation might be considered. In water bodies with hard, solid bottoms, such as asphalt or gunite, physical removal is very effective.
- 10) Weed size - large hydrilla plants or plant mats may require either hand pulling, mechanical control, or use of copper aquatic herbicides for rapid control before tubers can form. Large hydrilla plants can be treated with fluridone, but the

length of time required for control can be several weeks to months. Therefore, the use of copper aquatic herbicides to knock down top-growth followed by the use of fluridone, which works quickest at the new growing points on hydrilla, is often used in the program.

- 11) Tuber bank (a section of hydrosol infested with hydrilla tubers, analogous to a "seed bank") - the most direct way to remove hydrilla tubers from a tuber bank is dredging. In addition, the number of tubers in the tuber bank can be slowly exhausted by persistent, frequent aquatic herbicide application. This will reduce the tuber population by controlling the germinated plants before they grow large enough to produce new tubers.
- 12) Size of infested area - small infestations can be controlled with hand or mechanical control methods; larger infestations tend to require herbicide use, or biological control methods, as are used in the Imperial Irrigation District canal with the triploid grass carp.
- 13) Plant density - the lower the density of plants, the more appropriate is physical removal (hand digging).
- 14) Dissolved oxygen - the use of aquatic herbicides to rapidly control a large mass of hydrilla (or any other aquatic vegetation) filling an entire water body can reduce the dissolved oxygen levels in the water body to levels unable to support fish and other aquatic organisms. Therefore, no more than (approximately) a third of the surface area of a given water body is treated with the use of rapid-action aquatic herbicides, such as copper, at a time.
- 15) Non-target plants - the more sensitive the non-target plants, the more care is taken in the selection of herbicides, herbicide rates, and timing of application, and the more consideration given to mechanical or other non-chemical control methods. A lower rate of an herbicide might control hydrilla without affecting non-target plants, or timing of the application after the non-target plant has reproduced or completed its life cycle may avoid plant damage.
- 16) Biological control methods - if the infested waterway is an area where the triploid grass carp can be used according to the California Fish and Game Code, and the waterway can be enclosed by screens and gates so that the triploid grass carp cannot escape into the wild, this biological control agent can be used. All applicable permits will be obtained from the California Department of Fish and Game before release. The stocking rates used in an eradication project, such as the CDFA Hydrilla Eradication Program, are much higher than those used in a classical biological control program. In addition, several other biological control agents, including a tuber eating weevil and a stem-mining fly, have been tested in the past on a small scale, under controlled and quarantine conditions, but proved to be ineffective as an eradication tool in California.

EFFICACY MONITORING

Visual Assessment. A visual assessment of beneficial and adverse effects will be conducted during surveys of treatment locations in order to assess treatment success, and adjust treatment methods as necessary. Photographs will be taken at the beginning

and end of each field season, where applicable, to document changes in plant density, size, maturity, and area coverage.

All hydrilla plant infestations will be mapped using GPS technology and references to landmarks.

GENERAL ADMINISTRATIVE PRACTICES

Daily Activity Log: Project personnel will fill in daily activity logs accurately describing their activities.

Equipment Maintenance Log: A logbook should be kept to record daily, weekly, and monthly maintenance, service or repairs of program equipment.

Calibration Log: A logbook will be maintained with the calibration of all herbicide application equipment.

APPENDIX II

Waterways Surveyed by the CDFA Clear Lake Hydrilla Eradication Program Crew in
Lake County and Surrounding Counties, other than Clear Lake.

Appendix II. Waterways surveyed by the CDFA Clear Lake Hydrilla Eradication Program Crew in Lake County and Surrounding Counties, other than Clear Lake.

| | |
|----------------------|---------------------------------------|
| Lake County | Adams Springs Golf Course (Hwy 173) |
| | Adobe Creek |
| | Adobe Reservoir |
| | Blue Lakes (2 Lakes) |
| | Buckingham Golf Course |
| | Burger Lake |
| | Eachaus Lake |
| | Hidden Valley Lake |
| | Hidden Valley Golf Course |
| | Highland Springs Reservoir |
| | Hill Road (3 Ponds) |
| | Hopland Road (Hwy 175) 2 Ponds |
| | Indian Valley Reservoir |
| | Kelsey Creek |
| | Lake Pillsbury |
| | Lakeport Sewage Ponds |
| | McGaugh Slough |
| | Middle Creek |
| | Peterson Lane (1 Pond) |
| | Putah Creek |
| | Rob Roy Golf Course |
| | Riveria Golf Course |
| | Scotts Creek |
| | Scotts Valley Road (1 Pond) |
| | Spring Lake |
| | Spring Valley Lake |
| | Sweetwater Creek |
| Letts Lake | |
| 40 Springs Reservoir | |
| Glenn County | Black Butte Lake |
| | East Park Lake |
| | Stony Gorge Lake |
| Sonoma County | Lake Sonoma |
| | Spring Lake See: (Aquatic Vegetation) |
| | Lake Raphine |
| | Russian River @ Town of Asti |

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|------------------|--|
| Mendocino County | 1041 Potter Valley Road 1 Pond |
| | 14411 Pillsbury Road 1 Pond |
| | 10751 Potter Valley Road - Iron Rock Vineyard |
| | MacGuire Hill Pond - Fort Bragg |
| | Lake Mendocino Survey North End and South |
| | Mild Creek |
| | Mill Creek (Ukiah) |
| | Russian River @ Old Hopland |
| | Russian Gulch |
| | Willits Ponds, 15 @ 25 Acres |
| | Pudding Creek Hwy 1 Fort Bragg |
| | Private Lake 11 Miles East of Ft. Bragg |
| | <i>Salvinia molesta</i> Pond 25250 Hwy 1 Cleone |
| | Skip Nails Vineyard Pond Main Street Potter Valley |
| | Fish Ponds 18000 Ocean Drive |
| | Wildlife Preserve MacKerricher State Park |
| | Botanical Gardens Ponds 18950 Hwy 1 |
| | Redwood Valley 2 ponds on Road B, 2 ponds On Road D, and 2- ponds on Road E |
| Napa County | Lake Berryessa Butts Canyon Road |

APPENDIX III

Appendix IIIa. Number of Waterways in Shasta County Surveyed by the CDFA Hydrilla Eradication Project Personnel that Lie Inside the Quarantine Zone.

Appendix IIIb. Number of Waterways in Shasta County Surveyed by the CDFA Hydrilla Eradication Project Personnel that Lie Outside the Quarantine Zone.

Appendix IIIa. Number of Waterways in Shasta County Surveyed by the CDFA Hydrilla Eradication Project Personnel that Lie Inside the Quarantine Zone.

| | |
|--|---|
| Anderson River Park | 5 |
| City Pond and Tenneys | 2 |
| Sheas Ponds | 1 |
| Raleys Ponds | 3 |
| Rothers Pond | 7 |
| Riverview Golf 1,2, and 3 | 7 |
| Sac River-Posse Grounds to Ball Ferry | 1 |
| Sac River-Balls Ferry to Jellys Ferry | 1 |
| Sac River- Red Bluff | 1 |
| River Bend Golf Course | 2 |
| Allens Golf Course | 2 |
| Churn Creek Golf Course | 2 |
| North Market Street (2 Ponds) | 1 |
| Lake Redding Golf Course | 1 |
| Civic Center Ponds | 2 |
| Island Drive Ponds | 1 |
| Canby Pond | 1 |
| Hatchcover Cove | 2 |
| Snyderhods Ski Ponds | 1 |
| Deschutes Bridge (Sac River) | 2 |
| Park Marina Ponds | 3 |
| Clear Creek | 1 |
| Lake California | 1 |
| Knighton Road Pond | 1 |
| Channel Between Island Drive and Sac River | 6 |

Appendix IIIb. Number of Waterways in Shasta County Surveyed by the CDFA Hydrilla Eradication Project Personnel that Lie Outside the Quarantine Zone.

| | |
|---------------------------|---|
| Mary Lake | 1 |
| Colema Forebay | 2 |
| Anna Road Pond | 1 |
| Ross Ponds | 1 |
| Shasta Lake | 1 |
| Whiskeytown Lake | 1 |
| Keswick Dam | 1 |
| Simpson College Ponds | 1 |
| Shadow Ranch Lakes | 1 |
| Seven Lakes Lodge | 1 |
| Kilar Reservoir | 1 |
| Crace and Norg Lake | 1 |
| Lake McCumber | 1 |
| Rhyolite Pond | 1 |
| Battle Creek | 1 |
| Sac R.V. Park Pond | 1 |
| Reading Island | 1 |
| Bonnyview Boat Ramp | 1 |
| Cow Creek | 1 |
| Bear Creek | 1 |
| Stillwater Creek | 1 |
| The Vineyard Ponds | 1 |
| McConnel Foundation Ponds | 1 |
| Panorama Ponds | 1 |
| Arbus Ponds | 1 |
| Dutch Girl | 6 |