AQUATIC PESTICIDE APPLICATION PLAN

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED CONTROL IN WATERS OF THE UNITED STATES

GENERAL PERMIT NO. CAG990005

WATER QUALITY ORDER NO. 2013-0002-DWQ

August 31, 2023

The Department of Water Resources

State Water Project Ecosystem Improvements Branch

3500 Industrial Blvd.

West Sacramento, California 95691

1. Description of Water System

The mission of California Department of Water Resources (DWR) is to manage various DWR properties in the greater Suisun Marsh and Western Delta in California. These properties are part of the Fish Restoration Program (FRP) and are part of greater effort to restore tidal habitat for endangered listed fish species and improve the ecological value of these habitats for native flora and fauna. Aquatic weed pests have the potential to cause serious environmental damage through native species displacement, degraded water quality, and clogged waterways, which in turn diminishes the ecological value and threatens to counteract the benefits gained from tidal habitat restoration.

The Tidal Habitat Restoration Section within the State Water Project Ecosystems Improvement Branch, Division of Integrated Science and Engineering at DWR works in partnership with other cooperating governmental agencies, private landowners, and non-government organizations to control invasive species infestations where possible. Water body types that may be present on the listed DWR properties include open shallow waters, tidal marshes, mudflats, and sloughs. All properties are designed to be open to tidal influence and are therefore at high risk of invasive plants spreading onsite. In addition, these tidal habitat restoration sites are more vulnerable to invasion while still establishing newly restored habitat. It is imperative to be able to detect and treat new invasions early before they can establish and threaten habitat ecosystem function.

2. Description of the Treatment Area

DWR manages properties designated as tidal habitat restoration sites. The use of aquatic herbicides is needed to control aquatic weed infestations. These aquatic weeds occur in the various types of water bodies described in the previous section. Responding early to weed infestations has the potential for eradication, reduced habitat disturbance, and less herbicide use in the future. Below is a table that lists the DWR properties where aquatic features are present and may require herbicide applications. For a map of these FRP properties, refer to Figure 1 in Appendix B.

Site Name	Location
Arnold Slough	Solano County, 38° 10' 45" N, 121° 54' 05" W
Bradmoor Island	Solano County, 38° 11' 27.0" N, 121° 55' 15.7" W
Chipps Island	Solano County, 38° 03' 21.6" N, 121° 54' 42.1" W
Decker Island	Solano County, 38° 05' 18.6" N, 121° 42' 53.5" W
Lookout Slough	Solano County, 38° 18' 18.1" N, 121° 42' 28.8" W
Lower Yolo Ranch	Yolo County, 38° 20' 54.9" N, 121° 40' 30.1" W
Prospect Island	Solano County, 38° 16' 23.3" N, 121° 39' 15.1" W
Tule Red	Solano County, 38° 07' 29.0" N, 121° 59' 16.3" W
Wings Landing	Solano County, 38° 13' 10.9" N, 122° 02' 20.4" W
Winter Island	Contra Costa County, 38° 02' 30.1" N, 121° 53' 2.99" W
Yolo Flyway Farms	Yolo County, 38° 22' 01.6" N, 121° 38' 34.4" W

Table 1. List of FRP properties that may require aquatic herbicide applications.

3. Description of Weeds and Algae to be Controlled

The DWR FRP tidal habitat restoration sites consisting of shallow open waters, open mudflats, and sloughs are prone to infestations by emergent, submerged, and floating aquatic weeds such as water primrose (*Ludwigia spp*.), water hyacinth (Eichhornia crassipes), perennial pepperweed (*Lepidium latifolium*), alligatorweed (*Alternanthera philoxeroides*), giant reed, (*Arundo donax*), and invasive common reed (*Phragmites australis*).

The presence of weeds, such as those listed, in the water systems identified can displace more desirable aquatic vegetation and affect physical environmental factors such as dissolved oxygen and reduce water quality. This can lead to undesirable conditions for native fish species that are using these sites as refugia for breeding and predation avoidance. Controlling invasive aquatic plants is crucial for the protection of these habitats for target fish species and other native flora and fauna.

4. Aquatic Herbicide and Algaecides to be Used, Known Degradation Byproducts, Application Methods and Surfactants

Table 2. Describes the various aquatic herbicides and compatible surfactants that may be employed by DWR.

Herbicide (active ingredient)	Degradation Byproducts	Application Method(s)	Surfactant
Imazapyr	Pyridine hydroxy-dicarboxylic acid, pyridine dicarboxylic acid, and nicotinic acid	Conventional spray rigs, rope wick, backpack sprayers, and UAV	Cygnet plus (or equivalent aquatic-labeled surfactants
Glyphosate	Aminomethyl phosphonic acid, carbon dioxide	Conventional spray rigs, rope wick, backpack sprayers, and UAV	Cygnet plus (or equivalent aquatic-labeled surfactants)
Imazamox	2,3,5-pyridine tricarboxylic acid, 2-carbamoyl-5-(ethoxy-methyl) nicotinic acid, 2-[(1-carbamoyl-1,2-dimethylpropyl)carbamoyl]-5-(methoxymethyl)nicotinic acid, 2-carbamoyl-3,5-pyradine dicarboxylic acid, 2-formyl-5- (methoxymethyl) nicotinic acid	Conventional spray rigs, rope wick, backpack sprayers, and UAV	Cygnet plus (or equivalent aquatic-labeled surfactants)

All herbicide applications are made according to product label specifications and PCA recommendations. When applicable to enhance the efficacy of an herbicide, surfactants labeled

for aquatic use are utilized. All applications are performed using best management practices by qualified applicators.

5. Factors Influencing the Decision to Use Aquatic Herbicides

DWR and partner agencies continuously monitor FRP properties to assess site health and detect invasive species early on. Certain species are highly invasive and necessitate immediate action upon detection. The decision to control aquatic vegetation is based on various factors, such as the impact on water conveyance systems, degradation of water quality or habitat, and displacement of native species. When aquatic vegetation exceeds a specific threshold, control methods are implemented, which may include mechanical, cultural, biological, or chemical approaches, chosen based on feasibility, efficacy, environmental impact, public considerations, and funding availability. In some cases, herbicide applications may be done preemptively, considering growth rates, historical trends, weather, and water flow. DWR also explores alternative control methods, which may be tested based on site and weed characteristics, though they may be more expensive, labor-intensive, less effective, and temporary water quality degradation may occur.

6. Gates and Control Structures

FRP tidal habitat restoration properties are tidally connected and there are no gates or control structures that are currently operated.

7. State Implementation Policy (Section 5.3) Exemptions

The proposed herbicides and surfactant are not priority pollutants, and therefore do not require an exemption from Section 5.3.

8. Monitoring Program

Monitoring will occur to characterize the efficacy of treatments tested, water quality impacts, and non-target impacts on nearby vegetation. Efficacy monitoring will occur regularly over the course of DWR's ownership of these properties, into perpetuity, and water quality monitoring will be strategically timed to capture pesticide overspray and fate/transport after each control method is applied. Water quality monitoring will be performed in compliance with the Monitoring and Reporting Program (MRP) for Water Quality Order NO 2013-0002-DWQ. See Table 3 below for MRP guidelines for sample collection.

Table 3. Monitoring Requirements per NPDES General Permit

Sample Type	Constituent/ Parameter	Units	Sample Method	Min. Samp. Freq.	Sample Type Requirement	Required Analytical Test Method
Visual	Monitoring area description	N/A	Visual Obs.	1	Background, event and post-event monitoring	N/A
Visual	Appearance of waterway (sheen, color, clarity, etc.)	N/A	Visual Obs.	1	Background, event and post-event monitoring	N/A
Visual	Weather conditions (fog, rain, wind, etc.)	N/A	Visual Obs.	1	Background, event and post-event monitoring	N/A
Physical	Temperature[2]	°F	Grab[3]	4	Background, event and post-event monitoring	5
Physical	pH[2]	Num.	Grab[3]	4	Background, event and post-event monitoring	5
Physical	Turbidity[2]	NTU	Grab[3]	4	Background, event and post-event monitoring	5
Physical	Electric Conductivity[2] @25°C	µS/cm	Grab[3]	4	Background, event and post-event monitoring	5
Chemical	Active Ingredient[6]	µg/L	Grab[3]	4	Background, event and post-event monitoring	5
Chemical	Nonylphenol[7]	µg/L	Grab[3]	4	Background, event and post-event monitoring	5
Chemical	Hardness (if copper is monitored)	mg/L	Grab[3]	4	Background, event and post-event monitoring	5
Chemical	Dissolved Oxygen[2]	mg/L	Grab[3]	4	Background, event and post-event monitoring	5

[1]All applications at all sites

[2]Field testing.

[3]Samples shall be collected at three feet below the surface of the water body or at mid water column depth if the depth is less than three feet.

[4]Collect samples from a minimum of 6 application events for each active ingredient in each environmental setting (flowing and non-flowing water) per year, except for glyphosate. If there are less than six application events in a year for an active ingredient, collect samples during each application event for each active ingredient in each environmental setting. If six consecutive sampling events show results of concentrations that are less than the applicable receiving water limitation or trigger in an environmental setting, sampling shall be reduced to one sample per year for that active ingredient in that environmental setting. If the annual sampling shows exceedances of the applicable receiving water limitation or trigger, then sampling shall return to six application events the following year for that active ingredient in each environmental setting, and thereafter until sampling may be reduced again. For glyphosate, collect samples from one application event from each environmental setting per year.

[5]Pollutants shall be analyzed using the analytical methods described in 40 C.F.R. part 136.

[6]Glyphosate, imazapyr, imazamox

[7]It is required only when a surfactant is used

a. Monitoring Frequency and Locations

Monitoring locations will be selected to best represent the treatment variations that occur, including aquatic herbicide use, hydrology, and environmental setting, conveyance, seasonal, and regional variations. Monitoring frequency will follow the schedule set forth by the NPDES general permit and is summarized below:

i. Background Monitoring

Background monitoring samples shall be collected upstream at the time of the application event, or in the application area just prior to (up to 24-hours in advance of) the application event.

ii. Event Monitoring

Event monitoring samples shall be collected immediately downstream of the treatment area in flowing waters or immediately outside of the treatment area in non-flowing waters, immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

iii. Post-event Monitoring

Post-event monitoring samples shall be collected within the treatment area within one week after application. One full set of three samples (Background, Event and Post-Event) will be collected during each treatment from the representative site(s) treated within FRP properties.

b. Sample Collection

For water depths of 6 feet or greater, the sample will be collected at a depth of three feet. If the water depth is less than six feet, the sample will be collected at the approximate mid-depth. A long-handled sampling pole may be used for locations that are difficult to access.

c. Field Measurements

In addition to the collection of water samples, visual parameters (water body description, appearance of waterway and weather conditions) and physical readings will be done at the sampling sites and recorded on a field data form and saved electronically. All field meters will be calibrated according to the manufacturer's specifications at the recommended frequency and checked with a standard prior to the start of the sampling season.

d. Sample Analysis

All laboratory analysis shall be conducted at a laboratory certified for such analysis by the California Department of Health Services. All analyses shall be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Guidelines), promulgated by the USEPA (Title 40 CFR Part 136). Hardness shall be determined by the titration method (SM 2340C).

e. Sample Preservation and Delivery

Samples will be collected in unpreserved containers. Should an analytical method require preservation, that will occur at the laboratory by the appropriate lab personnel. Once collected and labeled, samples will be immediately placed in a dark, cold (~4 C) environment, typically a cooler with ice. Delivery of samples to the laboratory will occur as soon as possible.

f. Annual Reporting

An annual report will be submitted to the appropriate Regional Water Quality Control Board (RWQCB) by March 1 of the year following treatment. If no aquatic herbicide treatments are done that year, a letter stating no applications have been done will be sent to the appropriate RWQCB in lieu of an annual report.

9. How to Prevent Sample Contamination

Water quality sampling is conducted by trained DWR staff following established procedures designed to prevent contamination of samples. Sampling guidelines are contained in "Collection of Water Quality Samples for Laboratory Analysis" produced by DWR.

All samples will be collected in clean, glass bottles and properly labeled, including the date and time the sample is collected. Proper personal protective equipment will be worn, including disposable nitrile gloves, to prevent contamination. Samples will be collected without interference from any equipment or vehicles. Samples will be accounted for utilizing a standard "Chain of Custody" form supplied by the laboratory performing the analysis to ensure the integrity of the sample collection and transfer process. Samples will be stored on ice and transported to the lab within appropriate hold times for the required tests. Samples will be transported separately from the aquatic herbicides and application equipment on the day of the application event.

10. Description of BMPs to be Implemented

DWR has identified best management practices (BMPs) to be implemented in conjunction with the planned herbicide applications.

a. Aquatic Herbicide Spill Prevention and Containment

All herbicide applications will be supervised by a California Department of Pesticide Regulation-certified applicator who has received training specific to the herbicide and surfactant/adjuvant products and application methods to be used. Label language is followed to ensure safe handling and loading of herbicides. Application equipment is routinely maintained and checked to identify and/or minimize the possibility of leak development or failure that might lead to a spill. Tank mixing and filling will be done well away from all surface waters. In the unlikely event of an aquatic herbicide spill, the material will be prevented from entering any water bodies to the extent practicable. Label instructions will be followed and reporting as required by local, state, and federal laws will be done for all spills. Drift will be avoided by following pesticide label guidance specific to the product(s) applied and application method. When conducting aerial applications, sprayers will be properly calibrated according to the label and target species sensitivity. The largest nozzle size will be used that will ensure adequate coverage while also reducing drift, and tank mixes may also be amended with a drift control agent. Herbicide applications will not occur when winds are above 10 mph or when inversion conditions exist.

The property managers and/or their contractor(s) will adhere to the Spill Prevention and Control Plan (SCPC), provided in Appendix A, to minimize effects of spills of hazardous, toxic, or petroleum substances during study activities. The SPCP will be kept on site during spraying activities and will be made available upon request.

b. Appropriate Application Rate

- Herbicide applications will occur by an authorized and certified aquatic pest control applicator with experience in the Bay-Delta.
- Herbicides will be applied using precision methods by foliar spray with a backpack sprayer, small boom sprayer, rope wick applicator, or UAV.
- Herbicide label recommendations will be followed regarding tank mixture, application rate, and spray nozzle adjustments. Spray nozzles will be adjusted to the coarsest setting possible while maintaining efficacy, to minimize overspray.
- Herbicide treatment will not occur when wind speeds are greater than 10 mph.
- All herbicide applications will occur during low tide to maximize plant coverage and the non-wetted portion of the plant will be targeted to minimize water contamination.
- A water-safe dye will be added to the pesticide formulations to enhance the precision and evenness of pesticide applications.

c. Plan for Educating Applicators on Avoiding Adverse Effect from Pesticide Applications

All aquatic herbicide applicators will possess state certification for pesticide application and receive training on storage, mixing, transport, application, and spill response procedures according to USEPA and DPR rules, regulations, and label instructions. DWR will provide annual training on Water Quality Order No. 2013-0002-DWQ State General Permit and this APAP for all personnel applying herbicides and pesticides. Additionally, pesticide handlers, regardless of certification, must undergo an annual one-hour minimum safety training to ensure compliance with pest control regulations, best management practices, and safety requirements. Applicators with QACs or QALs must complete 20 hours of continuing education, including 4 hours of Laws and Regulations training, every 2 years, while PCAs must complete 40 hours of continuing education, including 8 hours of Laws and Regulations training, every 2 years to maintain their licenses.

d. Plan on Informing Landowners and Agencies Who Have Water Rights on the Receiving Waters

Water users potentially affected by any water use restrictions will be notified prior to an application being made, per the aquatic herbicide label. Aquatic herbicides will never be applied directly to flowing water. Aquatic herbicides will not be applied during any wet weather or 12 hours before or after a rain event. Aquatic herbicides will not be applied when wind speeds are greater than 10 mph.

e. Preventing Fish Kills

Aquatic herbicide applications at FRP sites are not expected to have any potential for fish kill. Several measures will be taken to limit the impact of the herbicides in water, for example, large swaths of aquatic weeds will be treated in phases to prevent dissolved oxygen depletion by decaying plant matter. Aquatic herbicides will never be applied directly to flowing water. Aquatic herbicides will not be applied during any wet weather or 12 hours before or after a rain event. Aquatic herbicides will not be applied when wind speeds are greater than 10 mph.

11. Evaluation of Alternative Control Methods

a. Other Management Options

DWR employs control measures based on an action threshold, taking action before significant impact on the water conveyance system, native habitat, species displacement, or water quality degradation occurs. DWR determines when control action is necessary, considering the presence of aquatic vegetation as an indicator of ecosystem health. Control methods, including mechanical, cultural, biological, and chemical options, are chosen based on feasibility, efficacy, environmental impacts, public considerations, and funding availability. An integrated approach

is used whenever possible. Herbicide applications may occur before threshold exceedance based on growth predictions, historical trends, weather, and water flow. Younger plants are targeted when appropriate, reducing the required herbicide amount.

b. No Action

When feasible, this option is utilized. Once a threshold is reached, however; consideration of other control methods needs to be initiated. This alternative would allow the continued spread of the pest species resulting in significant negative effects on native fish and wildlife species, including target state and federally listed species.

c. Prevention

Many aquatic weed infestations within the natural waterways on DWR properties are the result of infestations further upstream on private landowner or other governmental properties. Informing the upstream owners as to the presence of aquatic weed infestations on their properties and presenting eradication and/or control methods would help prevent future infestations. In addition, opportunities for coordinated and cooperative eradication efforts could be implemented in these situations. Cooperation between governmental properties and agencies will be pursued to help with education and prevention opportunities.

These properties are meant to be tidally influenced and restored to historical conditions, therefore adding any structures to influence flows would be counteractive to the goals and benefits of these restoration properties.

d. Mechanical Method

This alternative may provide some temporary control of the target species, but it cannot provide the desired long-term reduction of target species biomass, and therefore cannot accomplish the desired management goals. Further, this alternative will produce a large number of plant fragments that can rapidly spread infestations. Harvesting in dense stands also presents the risk of significant by-catch of non-target animals including fish and native wildlife species.

e. Cultural Methods

This method uses disturbance to tip the balance back toward a desirable community, for example targeted grazing, controlled burns, and active revegetation. Although goats, sheep and cattle are frequently used in terrestrial settings they would not be effective in controlling submerged or emergent vegetation in shallow open waters and mudflats; and the potential for degrading the water quality, makes this a poor option. There are currently no effective cultural control methods to remove invasive aquatic vegetation in tidally influenced habitats.

f. Biological Control

This method uses biological organisms, such as insects and pathogens, to reduce the number or density of pests within a given pest population. Natural predators of the aquatic weeds occur in their home environment and undergo extensive testing before being released in a non-native environment on the target weeds. Currently, there are no known biological agents that are effective.

g. Pesticide Control

The decision to use an aquatic herbicide is based on the recommendation of a qualified PCA. The selection of an appropriate aquatic herbicide, in additional to the inclusion of other control methods (mechanical, cultural, biological) will be based on feasibility, biological efficacy, environmental impacts and availability of fiscal resources. All herbicide applications will occur during low tide to maximize plant coverage and minimize water contamination.

h. Using the Least Intrusive Method of Weed Control

To prevent over application and excess herbicide runoff downstream, herbicides will be applied using precision methods by foliar spray with a backpack conventional spray rig. The decision as to which delivery system (backpack sprayers, trucks, all-terrain vehicles trailers, UAV etc.) will be based on terrain; the ability to hold, safely transport and properly apply herbicide, and lowest impact to the environment.

Several measures will be taken to limit the impact of the herbicides in water. Aquatic herbicides will never be applied directly to flowing water. Aquatic herbicides will not be applied during any wet weather or 12 hours before or after a rain event. Aquatic herbicides will not be applied when wind speeds are greater than 10 mph.

i. Applying a Decision Matrix Concept for Choosing the Most Appropriate Formulation

The qualified PCA will evaluate the area(s) to be treated prior to herbicide application to verify the presence and the extent of the target aquatic weeds. Aquatic herbicide labels will be checked for control efficacy, proper dosage and the required amount necessary for application. A written recommendation, which will include the rate of application and any warnings or conditions that will limit the application, will be rendered by the PCA. A recommendation to include an adjuvant/surfactant to enhance the efficacy of the aquatic herbicide may also be made by the PCA.

Appendix A

Spill Prevention and Control Plan

Description of the Proposed Action

The table below details the equipment used for all study actions and the duration of use.

Table 4. Summary of equipment used for the proposed herbicide applications

Equipment Type	# Used	Use	Use Duration
Amphibious Mower (83 hp diesel)	1	*Phragmites* mowing and pesticide application	10 days per year, 5-hour period each day
Pickup truck ¾ ton (300 hp gas or diesel)	1	Towing amphibious mower to site	10 days per year, operation on site will be minimal (< 1-hour per visit)
Dodge Ram, Ford F-250 gas or diesel, or equivalent	2	Site access for treatment and monitoring, also kayak and drone transport	30 days per year, operation on site will be minimal (< 1-hour per visit)
North River Boat, Sea Ark, Airboat, Jetboat, or equivalent	1	Site access for treatment and monitoring, also kayak and drone transport/support	30 days per year, 10-hour period maximum each day
UAV	1	Herbicide spraying, Vegetation monitoring	10 days per year, 5-hour period each day
Kayak	4	Water quality monitoring	30 days per year, 10-hour period maximum each day
ATV	1	Site access for treatment and monitoring	30 days per year, 10-hour period maximum each day

Herbicide treatments will include the aquatic glyphosate formulation (Rodeo or equivalent) individually, the aquatic formulation of imazapyr (Habitat or equivalent), and the aquatic formulation of imazamox (Raptor or equivalent). Treatment will begin in fall of 2023, between August and October. Herbicides will be mixed with water and a non-ionic or crop oil concentrate adjuvant, per label instructions, and will be applied using precision methods by foliar spray with a backpack sprayer, small boom sprayer, or UAV. All herbicide applications will occur during low tide to maximize plant coverage and minimize water contamination.

Spill Prevention and Control

Accidental spills are unlikely to occur at the site, and avoidance measures will be taken to further minimize any potential for spills or effects in the unlikely chance that a spill does occur. Measures included herein will minimize effects of spills of hazardous, toxic, or petroleum substances during management activities. This SPCP will be kept on site during aquatic herbicide application and monitoring activities.

- All personnel involved in the use of hazardous materials shall be trained in emergency response and spill control. Diesel fuel and oil shall be used, stored, and disposed of in accordance with standard protocols for the handling of each hazardous material.

- Appropriate spill response materials and procedures shall be present on site to properly respond to a spill or contamination.
- Soil and water contaminated by any hazardous materials during construction shall be properly cleaned up and disposed of.

List of Contacts

In case of spill:

- DWR Supervisor: Dan Riordan, Tidal Habitat Restoration Section Manager, 916-802-4427 (Work cell)
- DWR Safety Engineer: Kylee Knox, Division of Integrated Science and Engineering Safety Engineer, 916-873-3301 (Work Cell)
- DWR Site Assessment: Kimberly Gazzaniga, Unit Manager: Hazardous Materials & Environmental Evaluations, (916) 203-5890 (Work Cell)
- Medical Facility: Sutter Fairfield Medical Campus, 2720 Low Ct, Fairfield, CA 94534, 707-427-4900
- Local poison control center at 800-222-1222 nationwide or the website for the American Association of Poison Control Centers at http://www.aapcc.org/dnn/Home/tabid/36/Default.aspx (AAPCC 2009).

- Chemical Transportation Emergency Center (CHEMTREC) (800) 424-9300 contacts the pesticide manufacturers who provide specific information regarding the handling of pesticide spills. If needed, a spill response team can be requested to assist in spill cleanup operations.

Herbicide Applications

INVENTORY OF PESTICIDES

Table 5. Complete list of all pesticides on hand with EPA registration numbers and manufacturer's name and address.

Product Name	**Manufacturer**	**Active Ingredient(s)**	**EPA Registration #**	**California Registration #**
Rodeo	Dow AgroSciences, 9330 Zionsville Road Indianapolis, IN 46268	Glyphosate Isopropylamine Salt	62719-324	62719- 324-ZB
Habitat	SePRO Corporation, 11550 N. Meridian St., Ste 600, Carmel, IN 46032	Imazapyr isopropylamine salt	241-426-67690	n/a

Agridex	Helena Agri-Enterprises, LLC 225 Schilling Blvd., Collierville, TN 38017	Heavy range paraffinic oil, Polyol fatty acid esters, and Polyethoxylated derivatives thereof	n/a	5905-50094-AA
Competitor	Wilbur-Ellis 345 California Street San Francisco, CA 94104	Ethyl Oleate, Sorbitan Alkylpolyethoxylate Ester, Dialkyl Polyoxyethylene Glycol	n/a	n/a
LI - 700	Loveland Products, Inc 917 Platte Rd, Greenville, MS 38703	Phosphatidylcholine, methylacetic acid and alkyl polyoxyethylene ether	n/a	n/a
Raptor	BASF Corporation 26 Davis Drive Research Triangle Park, NC 27709	Imazamox Ammonium salt	241-379	n/a
Cygnet Plus	Cygnet Enterprises 1860 Bagwell St Flint, MI 48503	Limonene, Methylated vegetable oil, alkyl hydroxypoly oxyethylene	N/A	1051114-50001

EPA Pesticide Product Information System (PPIS) - Contains information concerning all pesticide products registered in the United States. It includes registrant name and address, chemical ingredients, toxicity category, product names, distributor brand names, site/pest uses, pesticide type, formulation code, and registration status. The files can be downloaded at https://www.epa.gov/ingredients-used-pesticide-products/pesticide-product-information-system-ppis.

SPILL PREVENTION

1. Mix and load herbicides only in pre-designated areas, where a potential spill would be most easy to contain and will have the least impact.
    a. Mixing areas should have few native plants or other desirable species; not be susceptible to erosion or run-off; have easy access for containment and cleanup of spills; and be located away from water bodies.
    b. Use a basin or other container under the mixing containers to keep spills off the ground in the mixing area.
    c. Load spray equipment away from any body of water.
2. Add a marker dye to the herbicide mixture so workers can readily see any spills. Dye also helps workers see any drift or mis-application to nontarget plants, and to monitor where they have sprayed previously.
3. Carry a spill kit to contain and remove any spills immediately and train crews on procedures for doing so.

4. Carry soap and water to wash spills off of hands, feet and legs, and bring extra gloves.
5. Do not leave herbicides unattended. Herbicides (either concentrated or diluted) will be stored in locked enclosures or containers when unattended.
6. Triple-rinse emptied herbicide containers into the sprayer at the time of use and utilize these spray rinsates in areas allowed by the herbicide label.

From Cal-IPC. 2015. Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management. Cal-IPC Publication 2015-1. California Invasive Plant Council, Berkeley, CA. Available: www.cal-ipc.org

SPILL CONTROL AND EMERGENCY PROCEDURES

When a pesticide spill occurs, specific procedures should be followed for providing first aid, notifying proper authorities, and cleaning up and decontaminating the spill area. Personnel working with pesticides, or in areas containing pesticide chemicals, should be adequately trained for quick evacuation and proper spill prevention and emergency procedures as follows:

A. Identification

Determine the pesticide involved in the spill incident. Information such as the formulation, percent active ingredient, and manufacturer's name and address should be obtained from the Material Safety Data Sheet (MSDS).

B. Safety and First Aid

All persons working with pesticides should be well trained in basic first aid procedures. It must be emphasized that when managing any spill, the most immediate concern is for the health and well-being of persons in and around the immediate spill area.

First aid kits and personal protective equipment should be maintained at pest control shops and storage areas and carried on pest control vehicles. In addition to MSDSs, the telephone numbers of the local medical unit and poison control center should be posted in conspicuous locations and always carried by pest control personnel when on the job.

C. Care of Injured

It is recognized that pesticide spill emergencies will differ, but the immediate concern should be to minimize contamination of personnel. Although the sequence may vary, the following basic procedures should be accomplished as rapidly as possible. PRIOR TO ENTERING A CONTAMINATED AREA, DON PERSONAL PROTECTIVE EQUIPMENT (PPE).

1. Quickly assess the spill to determine if personnel are involved.
2. Eliminate all sources of ignition (e.g., pilot lights, electric motors, gasoline engines) in order to prevent the threat of fire or explosion from inflammable vapors (if present).
3. If personnel are involved, the rescuer should quickly don necessary protective equipment and remove the injured to a safe location upwind from the spill. If the spill occurs in an enclosed area, doors and windows should be opened to enhance ventilation of the area.

4. Remove contaminated clothing from the victim and/or rescuer, and wash affected areas of body with soap and water. Administer first aid as required by the symptoms/signs and label, which may include flushing contaminated eyes with clean water for 15 minutes.
5. Obtain medical assistance for injured or contaminated persons. Do not leave injured or incapacitated persons alone. Always instruct someone to stay with them until proper medical assistance is provided or a physician has been informed of the incident.

D. Site Security

Secure the spill site from entry by unauthorized personnel by roping off the area and posting warning signs. The boundary should be set at a safe distance from the spill. If necessary, obtain assistance from the base/installation's police or security unit.

E. Containment and Control

Spilled pesticides must be contained at the original site of the spill. The pesticide must be prevented from entering storm drains, wells, water systems, ditches, and navigable waterways by following these procedures:

1. Don appropriate protective equipment from a spill kit or the pest control shop.
2. Prevent further leakage by repositioning the pesticide container.
3. Prevent the spill from spreading by trenching or encircling the area with a dike of sand, absorbent material, or, as a last resort, soil or rags.
4. Cover the spill. If the spill is liquid, use an absorbent material appropriate to the type of material. If dry material, use a polyethylene or plastic tarpaulin and secure. NOTE: Use absorbent materials sparingly as they also must be disposed of as wastes.

F. Pesticide Spill Reporting

Spills will be reported to the DWR Supervisor, DWR Safety Engineer, and DWR Site Assessment Section Chief. The telephone numbers of contacts are at the beginning of this document and should be posted at the project site.

G. Cleanup

Adequate cleanup of spilled pesticides is essential in order to remove any health or environmental hazards. When cleaning up pesticide spills, it is advisable NOT TO WORK ALONE and to make sure the area is properly ventilated, and that appropriate protective equipment is used by all personnel. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses. However, if the release is not an incidental release, only qualified, trained emergency personnel should undertake cleanup operations.

1. Dry spills (dusts, wettable powders, granular formulations) should be picked up in the following manner:

(a) Immediately cover powders, dusts, or granular materials to prevent them from becoming airborne. This can be done by placing a polyethylene or plastic tarpaulin over the spilled material. Weight the ends of the tarp, especially the end facing into the wind. Begin cleanup operations by systematically rolling up the tarp while simultaneously sweeping up the spilled pesticide using a broom and shovel or dust pan. While sweeping, avoid brisk movements in order to keep the dry pesticide from becoming airborne. If indoors, a cover may not be necessary. When practical, a light sprinkling of water may be used instead of a cover.

(b) Collect the pesticide and place in plastic or metal containers. Heavy-duty plastic bags should be used as a last resort as many pesticides may eat through the plastic bags. Properly secure and label the bags, identifying the pesticide and possible hazards. Set the bags aside for later disposal.

2. Liquid spills should be cleaned up by placing an appropriate absorbent material (floor-sweeping compound, sawdust, sand, etc.) over the spilled pesticide. Work the absorbent into the spill using a broom or other tool to force the absorbent into close contact with the spilled pesticide. Collect all spent absorbent material and place into a properly labeled leakproof container.
3. Depending upon the spilled substance, contaminated soil may have to be removed to depths where no detectable amounts of the substance are evident. Residues may need to be placed in properly labeled leakproof containers. For this determination, contact the base/installation environmental engineer/coordinator.

H. Decontamination

Decontamination solutions can be used for decontaminating surfaces and materials where spills of dust, granular, wettable powder, or liquid pesticides have occurred. However, the bulk of the spilled pesticide should be cleaned up or removed before applying any decontaminant. After cleaning up the bulk material, apply the appropriate decontamination solution and allow one to six hours reaction time before using an absorbent material.

Depending on the location of the spill and the pesticide spilled, chlorine bleach, caustic soda (lye, sodium hydroxide) or lime can be used to effectively decontaminate most spill areas. Many pesticides, especially the organophosphate pesticides, decompose when treated with lye or lime. Fewer pesticides are decomposed by bleach (sodium hypochlorite).

Dry decontaminants should be spread thinly and evenly over the spill area. Then, using a watering can, lightly sprinkle the area with water to activate the decontaminant. Liquid decontaminants should be premixed and applied with a watering can to the spill area. Decontaminants should be applied in amounts no greater than 1.5 times the quantity of pesticide spilled.

The preceding procedures must be repeated until all the spilled pesticide is removed. Clean all equipment used for spill cleanup with detergent and appropriate decontaminants. Collect all spent decontaminants and rinse water and place them in labelled leakproof containers. Clothing and gloves that cannot be decontaminated must be placed in leakproof containers for proper disposal. Additional procedures may be needed for particular surfaces:

1. Nonporous surfaces should be washed with detergent and water. The appropriate decontamination solution should be thoroughly worked into the surface using a long-handled broom, scrub brush, or other equipment as needed. Then the decontamination solution is soaked up using absorbent material. The spent absorbent material is then placed into a labelled leakproof container for disposal.
2. Soil. If pesticide containers have leaked or if pesticides have been spilled on a soil surface, depending upon the spilled substance, contaminated soil may have to be removed to depths where no detectable amounts of the substance are evident. Residues may need to be placed in properly labelled leakproof containers.
3. Porous materials such as wood may not be adequately decontaminated. If contamination is great enough to warrant, they must be removed and replaced with new materials.
4. Tools, vehicles, equipment, and any contaminated metal or other nonporous objects can be readily decontaminated using detergent and the appropriate decontamination solution (refer to Appendix B). However, smaller quantities of the decontamination solution may be required.

The decontamination solution can be applied to contaminated equipment by soaking the equipment in a pail filled with solution or using a scrub brush. All tools and surfaces must be thoroughly rinsed with sparing amounts of clean water. All rinse water and spent decontamination solution should be collected in drip pans or other suitable containers and transferred to a properly labelled leakproof drum for disposal.

I. Disposal

All contaminated materials, including cloth, soil, wood, etc., that cannot be effectively decontaminated as described in this guide must be removed and placed in a sealed leakproof container. All containers must be properly labelled and transported in accordance with Department of Transportation (DOT) 49 CFR Part 172 regulations by EPA-permitted hazardous waste haulers for disposal in a hazardous waste disposal facility (incinerator, landfill site, etc.) under current EPA or state permit.

POST-SPILL PROCEDURES

After the spill has been decontaminated, the following actions should be taken to ensure that decontamination has been adequate:

A. Sample Collection and Analysis

Representative samples of affected environmental areas (soil, water, sediment, etc.) should be collected and analyzed for pesticide content to ensure that decontamination was effective.

B. Investigation of Cause

An investigation into the cause of the spill and any contributing events should be undertaken in order to ascertain why the spill occurred. This information will be of benefit in making future spill prevention recommendations. In addition, the spill episode should be well documented for future reference.

C. Disposal

Contaminated materials should be properly disposed.

Appendix B: Map of FRP Properties

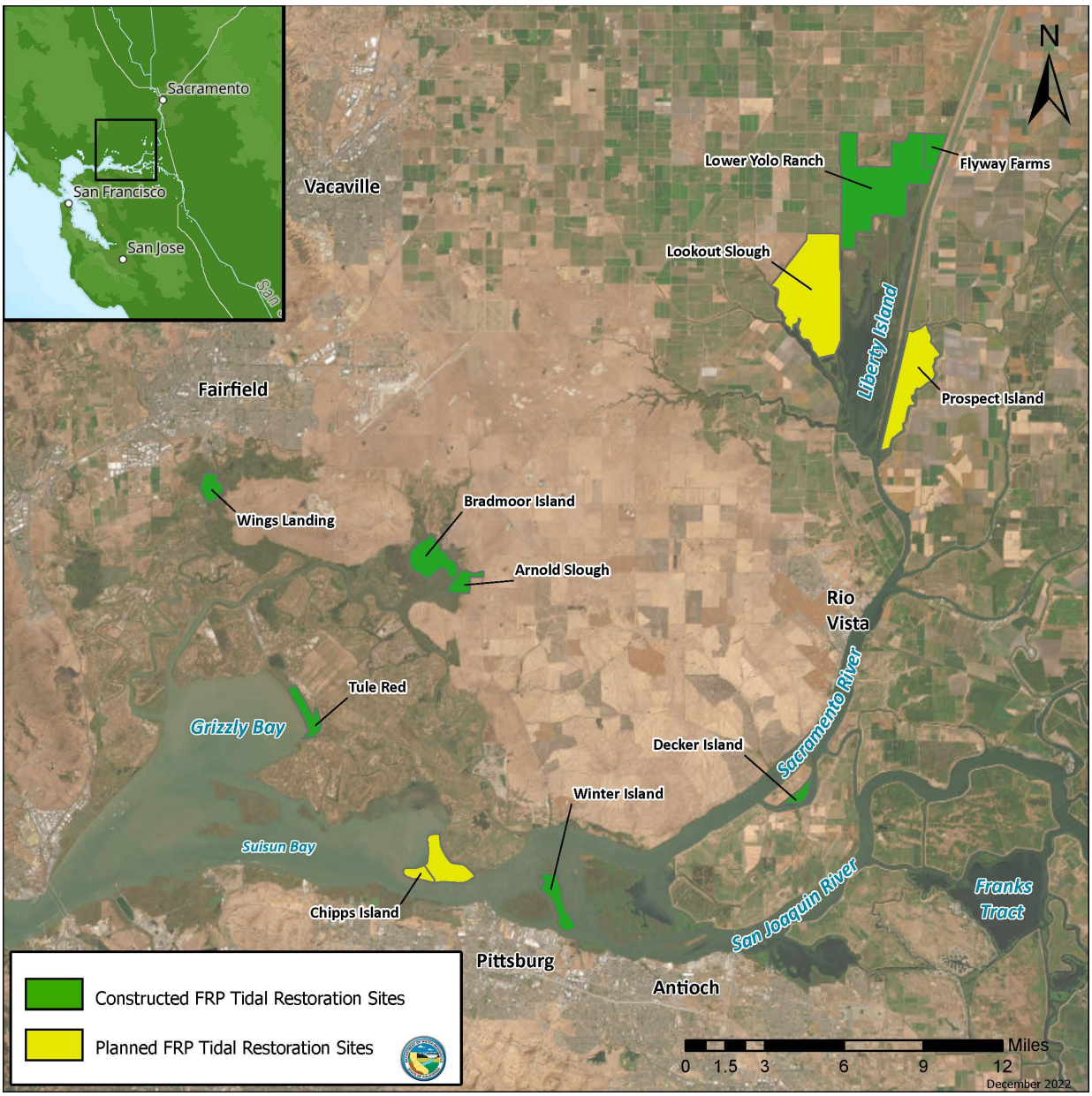

Figure 1. Map of Bay Delta and Suisun Marsh highlighting the 11 FRP properties where aquatic vegetation will potentially be treated with herbicide.

Appendix C: Pest Control Advisor (PCA) Recommendations

LakeTech, inc. Pest Control Recommendation — Recommendation #: DWR003 *(EXPIRATION 12/31/2023)*

Operator: California Department of Water Resources / California Department of Fish and Game **Contact:** Dan Riordan, (916) 802-4427

Location: Programmatic - DWR Fish Restoration Program **County:** Multiple **Permit/ID#:** To be reported by manager

Site Type: Aquatic Habitat Restoration **Acres:** Variable-Spot Treatments & Low Volume Broadcast **Pests:** Emergent Vegetation

Application Method: conventional spray rigs and backpack sprayers **Active Ingredient:** Imazapyr & Glyphosate

Application Timing: Spring and/or when weeds are actively growing or senescing **Applicator:** Department staff or licensed contractors

Material	Mix Ratio for Spot Spray	Rate per Acre for Broadcast	Volume of Carrier per Acre Broadcast
Cygnet plus (surfactant)	1% to 2% v/v	<5% of the finished spray volume	
Ecomazapyr/Habitat (herbicide)	0.5% to 5%	Up to 6 pints	>20 gals but <100
Roundup Custom/ Glyphosate 5.4 (optional)	1% to 5%	Up to 8 gallons	>20 gals but <100
Indicator dye (optional)	Recommended		

HAZARDS AND OR RESTRICTOINS:

- OBTAIN REQUIRED PERMITS AND ID NUMBERS FOR EACH SITE PRIOR TO APPLICATION
- OBSERVE ALL LABEL PRECAUTIONS, RESTRICTIONS AND DAWN ALL PPE REQUIRED PER THE LABEL
- RE-ENTRY WHEN SPRAY HAS DRIED
- SHOULD ONLY BE APPLIED WHEN THE POTENTIAL FOR DRIFT TO ADJACENT SENSITIVE AREAS IS MINIMAL- SEE LABEL SECTOINS "SPRAY DRIFT MANAGEMENT" OR "MANAGING OFF-TARGET M OVEMENT" FOR DETAILS

COMMENTS:

Spot spray, broadcast low pressure or wick applications. Apply product as a foliar spray to target susceptible species, such as: phragmites, water primrose, alligator weed, perennial pepperweed (try to treat pepperweed when flower buds appear in early spring). Applications may be made using conventional spray equipment mounted on a vehicle, vessel, or amphibious vehicle.

I hereby certify that alternatives and mitigation measures that would substantially lessen any significant adverse impact on the environment have been considered and, if feasible, will be adopted.

Criteria for determining need for treatment: ☐Pest is Present, ☐ Site History, ☐ Mitigation Criteria, ☐ Invasive/Non-Native

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LakeTech, inc. Pest Control Recommendation — Recommendation #: DWR002 *(EXPIRATION 12/31/2023)*

Operator: California Department of Water Resources / California Department of Fish and Game **Contact:** Dan Riordan, (916) 802-4427

Location: Programmatic - DWR Fish Restoration Program **County:** Multiple **Permit/ID#:** To be reported by manager

Site Type: Aquatic Habitat Restoration **Acres:** Variable-Spot Treatments & Low Volume Broadcast **Pests:** Emergent Vegetation

Application Method: conventional spray rigs and backpack sprayers **Active Ingredient:** Imazamox

Application Timing: Spring and/or when weeds are actively growing or senescing **Applicator:** Department staff or licensed contractors

Material	Mix Ratio for Spot Spray	Rate per Acre for Broadcast	Volume of Carrier per Acre Broadcast
Cygnet plus (surfactant)	1% to 2% v/v	<5% of the finished spray volume	
Clearcast/Imox (herbicide)	1% to 5%	½ gallon up to 1 gallon	>20 gals but <100
Roundup Custom/ Glyphosate 5.4 (optional)	1% to 5%	Up to 8 gallons	>20 gals but <100
Indicator dye (optional)	Recommended		

HAZARDS AND OR RESTRICTOINS:

- OBTAIN REQUIRED PERMITS AND ID NUMBERS FOR EACH SITE PRIOR TO APPLICATION
- OBSERVE ALL LABEL PRECAUTIONS, RESTRICTIONS AND DAWN ALL PPE REQUIRED PER THE LABEL
- RE-ENTRY WHEN SPRAY HAS DRIED
- SHOULD ONLY BE APPLIED WHEN THE POTENTIAL FOR DRIFT TO ADJACENT SENSITIVE AREAS IS MINIMAL- SEE LABEL SECTOINS "SPRAY DRIFT MANAGEMENT" OR "MANAGING OFF-TARGET M OVEMENT" FOR DETAILS

COMMENTS:

Spot spray, broadcast low pressure or wick applications. Apply product as a foliar spray to target susceptible species, such as: phragmites, water primrose, alligator weed, perennial pepperweed (try to treat pepperweed when flower buds appear in early spring). Applications may be made using conventional spray equipment mounted on a vehicle, vessel, or amphibious vehicle.

I hereby certify that alternatives and mitigation measures that would substantially lessen any significant adverse impact on the environment have been considered and, if feasible, will be adopted.
Criteria for determining need for treatment: ☐Pest is Present, ☐ Site History, ☐ Mitigation Criteria, ☐ Invasive/Non-Native

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