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APR 08 2014
DIVISION OF WATER QUALITY

Attachment E – Notice of Intent

WATER QUALITY ORDER NO. 2013-0002-DWQ
GENERAL PERMIT NO. CAG990005

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item A. X New Applicator B. Change of Information: WDID# 2 28AP00003

C. ☐ Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name Napa County Flood Control and Water Conservation District			
B. Mailing Address 804 First Street			
C. City Napa	D. County Napa	E. State CA	F. Zip 94559
G. Contact Person Rick Thomasser	H. E-mail address richard.thomasser@countyofnapa.org	I. Title Watershed and Flood Control Operations Manager	J. Phone 707-259-8657

III. BILLING ADDRESS (Enter Information *only* if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. E-mail address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Algaecide and aquatic herbicides are used to treat (check all that apply):

1. ☒ Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
   Name of the conveyance system: various in the Napa River watershed, Putah Creek and Lake Berryessa watershed and Suisun Creek watershed
2. ☐ Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
   Owner's name: _____
   Name of the conveyance system: _____
3. Directly to river, lake, creek, stream, bay, ocean, etc.
   Name of water body: Napa River watershed, Putah Creek and Lake Berryessa watershed, Suisun Creek watershed

B. Regional Water Quality Control Board(s) where treatment areas are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): Region 2 and 5
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: ____

Arundo donax, tamarisk (tamarix spp.), Scarlet Sesbania (Sesbania punicea), Perennial Pepperweed (Lepidium latifolium), Himalayan blackberry (Rubus armeniacus [syn. Rubus discolor]) and water primrose (Ludwigia)

B. Algaecide and Aquatic Herbicide Used: List Name and Active ingredients

glyphosate (trade name: Rodeo Aquamaster®) and imazapyr (trade names: Habitat®, Polaris®)

C. Period of Application: Start Date June 15, for the life of the permit End Date Nov 15, with exceptions noted in GEN-1, for the life of the parlmt

D. Types of Adjuvants Used:

. Glyphosate requires use of a non-ionic surfactant, such as R-11™, LI-700™, Cygnet Plus™and Liberate™. Imazapyr requires use of an oil-based surfactant, such as Hasten™, Agri-Dex™, and Competitor™.

VI. AQUATIC PESTICIDE APPLICATION PLAN

Has an Aquatic Pesticide Application Plan been prepared and is the applicator familiar with its contents?
☒ Yes ☐ No

If not, when will it be prepared? _____

VII. NOTIFICATION

Have potentially affected public and governmental agencies been notified? ☐ Yes ☒ No

VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?
☒ YES ☐ NO ☐ NA

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the General Permit, including developing and implementing a monitoring program, will be complied with."

A. Printed Name: Richard Thomasser

B. Signature: [signature] **Date:** 4/2/14

C. Title: Operations Manager.

XI. FOR STATE WATER BOARD STAFF USE ONLY

WDID:	**Date NOI Received:**	**Date NOI Processed:**
Case Handler's Initial:	**Fee Amount Received:** $	**Check #:**
☐ **Lyris List Notification of Posting of APAP**	**Date** _____	**Confirmation Sent** _____

Napa County
Flood Control and Water Conservation District

Aquatic Pesticide Application Plan (APAP)
for the
Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications
Water Quality Order No. 2013-0002-DWQ
General Permit No. CAG990005

Prepared for:

Napa County Flood Control and Water Conservation District
804 First Street
Napa, CA 94559

Prepared by:

Horizon Water and Environment
180 Grand Avenue, Suite 1405
Oakland, CA 94612

Horizon Water and Environment. Napa County Flood Control and Water Conservation District Aquatic Pesticide Application Plan. March 2014. (HWE 10.004) Oakland, CA.

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List of Acronyms

asl	above sea level
BDR	Napa County Baseline Data Report
BMP	Best Management Practice
CDPR	California Department of Pesticide Regulation
COC	chain-of-custody
District	Napa Valley Flood Control and Water Conservation District
DNQ	detected, but not quantified
FDCF	field data collection form
FIFR	Federal Insecticide, Fungicide and Rodenticide Act
Flood Control Project	Napa River Flood Control Project
GIS	geographic information systems
GPS	global positioning system
MDL	minimum detection limit
ML	minimum level
ND	not detected
OHWM	ordinary high water mark
QAC	qualified application certificate
QAL	qualified application license
QAP	quality assurance plan
SWOA	South Wetland Opportunities Area
USEPA	United States Environmental Protection Agency
WIMS	weed information mapping system

1. Introduction

The Napa County Flood Control and Water Conservation District (District) is a special district of the County of Napa. Within its authority, the District provides maintenance for the flood control channels that it owns, as well as other channels for which the District has a maintenance agreement or easement. The District also provides discretionary maintenance in channels throughout the county, and responds to public requests for maintenance activities at other stream and channel locations (on an as-needed basis).

Vegetation management activities are conducted to maintain flow conveyance capacity, establish a canopy of riparian trees, and control invasive vegetation. Use of herbicides to control terrestrial and aquatic vegetation is relatively consistent from year to year, though locations change depending on recent growth and blockages. Herbicides may be applied on the banks of channels (above the Ordinary High Water Mark [OHWM]) and may include targeted spraying (such as to treat *Arundo donax*) and direct application (using a brush on stumps of trees that have been recently cut). Herbicides are also directly applied to submerged aquatic vegetation (below the OHWM) to maintain channel flow conveyance capacity. The District uses glyphosate and imazapyr for both terrestrial and aquatic herbicide applications.

This Aquatic Pesticide Application Plan (APAP) was developed in compliance with the *General NPDES Permit for Discharge of Aquatic Pesticides for Aquatic Weed Control (*Order No. 2013-0002-DWQ; NPDES No. CAG990005) (General Permit) that went into effect on December 1, 2013. This APAP covers application of aquatic herbicides throughout the entire Napa County. This includes the Napa River and Suisun Creek watersheds within Napa County which are under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board. Additionally, this APAP covers aquatic pesticide application in the Putah Creek/Lake Berryessa watershed within Napa County that is under the jurisdiction of the Central Valley Regional Water Quality Control Board.

The following sections of this plan describe aquatic pesticide application activities conducted by the District:

Section 2	Goals and Objectives
Section 3	Application Area
Section 4	Site Treatment Area
Section 5	Vegetation Management
Section 6	Aquatic Herbicides Applied
Section 7	Herbicide Use Alternatives
Section 8	Best Management Practices
Section 9	Monitoring Program
Section 10	Annual Reporting

2. Goals and Objectives

Habitat Management Goals

The District's long-term habitat restoration goals include enhancement of the Napa River and its major tributaries, and the creation and restoration of brackish emergent marsh (tidal), seasonal and emergent freshwater wetlands, tidal mudflats, riparian and native woodlands. The broader goal is to establish an ecologically self-sustaining mosaic of habitats. The District's stream management goals include ensuring that adequate flood conveyance capacity is provided, maintaining stable stream bank conditions, and enhancing instream ecological conditions.

The District's vegetation management and invasive species plant management efforts support countywide restoration goals by:

1. Preserving and restoring upland, wetland, tidal, and woodland habitats throughout the County by identifying, mapping, and eradicating invasive plant species;
2. Avoid disturbing native habitat and plants areas and enhancing those areas through planting of appropriate native species.

Management Philosophy and Prioritization: An Adaptive Management Strategy

Certain non-native invasive plant species may be tenacious and harmful, while others may restrict themselves to recently disturbed locations and be less invasive or harmful. Attempting to control all non-native invasive species present can be overwhelming and ultimately unsuccessful. Therefore, the District developed a strategy to ensure the efficient use of resources. The strategy is built upon the following principles:

1. Manage for the eradication and control of target non-native invasive species and maintain native habitat communities.
2. Assess species occurrences and assign treatment priorities based on the severity of the non-native species impacts to native habitat and rate of infestation. To accomplish this, non-native species are mapped using a global positioning system (GPS) and the Weed Information Mapping System (WIMS). The WIMS is a series of forms that allow the District to capture pertinent information about weed occurrences. District staff utilizes the WIMS system to identify and map non-native species in the field. WIMS data is then entered into a geographic information system (GIS) and queried to examine patterns and distributions on non-native species and develop treatment prioritization criteria.
3. Develop and consider appropriate methods for controlling non-native invasive species. Then, document these considerations in species specific control plans.
4. After the species specific control plan is implemented, results will be monitored to evaluate control method effectiveness. This information can be used to modify and improve priorities, control methods and plans, and prepare annual monitoring and treatment reports.
5. Repeat the planning, monitoring, and treatment cycle by re-establishing those methods that proved effective and modify control and management goals as necessary.

   In summary, the District has adopted an adaptive management strategy. An adaptive strategy is one that uses the lessons from previous seasons of work to mold future efforts.

3. Application Area

The Application Area is located in Napa County, California as shown in Figure 1 and described below by drainage area. The descriptions below are from the Napa County Baseline Data Report prepared in 2005 (Napa County 2005[1]).

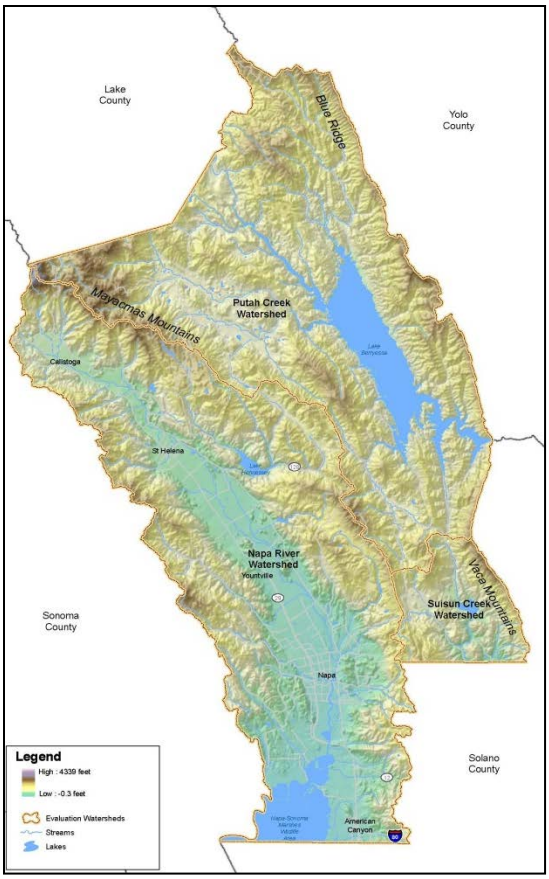

Figure 1: Napa River Watershed and Napa County
(Source: Napa County 2007)

Napa River Watershed

The Napa River drains an area of approximately 426 square miles and drains into San Pablo Bay, descending from an elevation of 4,344 feet (1,323 meters) in the Maycamas Mountains to sea level (Figure 1). Historically, the lower reaches of the Napa River supported a diverse number of habitats including tidal marshes, freshwater marsh wetlands, oak woodland, riparian forests, and grasslands that provided habitat for a myriad of plant and animal species. Today most of these habitats still exist but have decreased in area and quality and continue to be threatened and degraded by habitat loss, urban development, agricultural practices, and invasive species colonization.

Putah Creek/Lake Berryessa Watershed

East of the Napa River watershed is the Putah Creek watershed, which contains Lake Berryessa. This region consists of several small valleys, including the Pope and Capell Valleys, surrounded by topography that is generally mountainous and steep. Elevations in the Lake Berryessa watershed are generally higher than in the Napa Valley. To the east of the Napa Valley, hills rise to an elevation of approximately 1,500 to 2,000 feet asl, forming a divide between the Napa Valley and the adjacent Putah Creek watersheds.

Putah Creek is the largest river in the Lake Berryessa basin. It originates in Lake County to the north, flows into Napa County and into Lake Berryessa, and flows out of the County at Lake Berryessa's outlet (Monticello Dam) along the eastern border where it eventually flows into the Sacramento River. Other notable tributaries in the drainage include Pope Creek, Chiles Creek, Capell Creek, and Eticuera Creek.

Lake Berryessa is the largest body of surface water in Napa County, with a storage capacity of 1.6 million acre-feet. The primary uses of the lake are as a water supply for the irrigation of agricultural lands and municipal and industrial users, power generation, and recreation. The District does not conduct vegetation management activities in Lake Berryessa.

[1] Napa County. 2005. Napa County Baseline Data Report, Version 1. Prepared by Jones & Stokes/EDAW. November. Oakland, CA.
Napa County. 2007. Draft Environmental Impact Report for the Napa County General Plan. SCH # 200510288. Prepared by PMC. February. Sacramento, CA.

Suisun Creek Watershed

The Suisun Creek watershed lies to the south of Lake Berryessa and the Putah Creek watershed. Only the upper portions of the Suisun Creek watershed are located within Napa County; the flows to the south and into Solano County before discharging to Suisun Bay.

Lake Curry is a human-made reservoir created by the damming of Suisun Creek. It supplies water for municipal and industrial use in the City of Vallejo. The District does not conduct vegetation management activities in Lake Curry.

4. Site Treatment Areas

4.1 Napa River Restoration Projects

The District surveys and maps target non-native invasive species within the Napa River and its tributaries from Calistoga downstream to American Canyon. The purpose of the surveying and mapping is to support the eradication and management of target species and other ongoing river restoration projects. The District is responsible for the long-term maintenance of 15 miles of River Restoration on the Napa River from Rutherford Cross Rd. to Oak Knoll Avenue. The District recognizes that in order to effectively control target invasive species throughout the restoration reach it is necessary to manage and monitor invasive species in their source areas in the upper watershed.

The riparian corridor along the Napa River is generally narrow and fragmented with some interspersed late seral stage riparian forest. Through the restoration reaches there are some newly restored flood plain benches, alcoves and expanded riparian areas. Target species are treated in this reach from the top of the stream bank down to and below the OHWM, depending on the species and level of infestation. A typical treatment scenario includes a target species growing along the toe of the stream and overhanging the water. Herbicide is applied directly to the target species with a spray wand during the summer when flows are at the lowest level. When feasible the District cuts and removes the invasive vegetation prior to applying herbicide.

Herbicide treatments may occur along natural streams from the edge of the stream channel to the top of bank within the riparian zone. In the lower reaches of the Napa River herbicide treatments may occur in the intertidal zone. In an engineered flood control channel herbicide potentially could be applied to the surface of the water to treat *Ludwigia*. Herbicide treatment potentially could occur in a pond adjacent to a stream in an effort ot minimize the spread of a particular species.

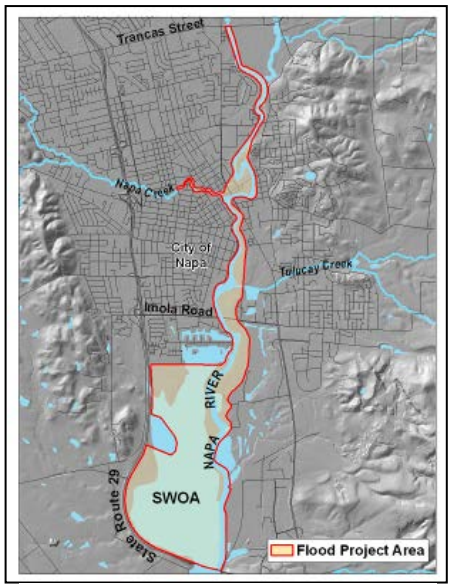

Figure 2: Napa River South Wetland Opportunity Area

4.2 Napa River Flood Project

The Napa River Flood Control Project (Flood Control Project), implemented by the U.S. Army Corps of Engineers and the District, was designed to provide protection from a 100-year flood event and enhance, restore, and create wildlife and wetland habitat within the flood plain of the Napa River. The Flood Control Project Area covers a 6.9-mile reach of the Napa River from Trancas Street in the City of Napa to State Route 29

(upstream to downstream, respectively), including an area solely for the purposes of habitat restoration known as the South Wetland Opportunity Area (SWOA), and encompasses over 1400 acres of land (Figure 2). The SWOA consists of intertidal marshes and sloughs, open mudflats, seasonal wetlands, and alluvial flood plains. A typical treatment area would be within the higher zones of the intertidal marsh. Target species are mapped within this zone and maintenance actions are prioritized based on the severity of the infestation.

4.3 Engineered/Modified Flood Control Channels

The District is responsible for providing routine maintenance along 13 miles of engineered and modified flood control channels. Examples of this channel type include the Yountville and Salvador Collector channels, which collect drainage from upstream smaller tributaries. Most of the channels the District maintains are constructed with a trapezoidal cross section with earthen banks and streambeds. However, some channels have sections with hardened banks and beds formed in rock or concrete. Invasive species management within these channels is implemented to maintain the hydraulic capacity of the flood control channel and to minimize flow obstructions. Target species and problematic reaches are mapped and prioritized based on the level of infestation. A typical treatment area in the flood control channels may be on or near the edge of the water depending on the target species and level of infestation. The purpose of invasive species management in these reaches is to maintain adequate flow conveyance while creating a diverse and complex native riparian canopy.

4.4 Natural Channels

The District targets non-native invasive species along water ways throughout Napa County. The District maps invasive plant species during annual stream surveys and develops management priorities based on the level of infestation. Channel conditions vary depending on the stream and reach but most are tributaries to the Napa River, which flow through agricultural and urban areas. Some of the natural channels are deeply incised with undercut and eroding stream banks. While other streams have mature riparian forests and well established bed forms. A typical treatment area in a natural channel would be from the toe of the stream to the top of bank.

4.5 Ponds

The District does not commonly conduct invasive management in ponds. However, there are many irrigation ponds near the mainstem of the Napa River and along tributaries where invasive plants species do grow. At times it is necessary for the District to work with private property owners to manage non-native invasive plants within irrigation ponds to minimize potential dispersal into natural waterways.

5. Vegetation Management

The primary invasive exotic weeds managed in the program area are *Arundo donax*, tamarisk (*tamarix spp.*), Scarlet Sesbania (*Sesbania punicea*), Perennial Pepperweed (*Lepidium latifolium*), and Himalayan blackberry (*Rubus armeniacus* [syn. *Rubus discolor*]). These species rapidly invade stream channels, often growing aggressively to the exclusion of other riparian species. The rapid and voluminous growth of these invasive plants can significantly reduce channel capacity. The management of other invasive aquatic plants including water primrose (*Ludwigia*) is also conducted by the District in a limited number of creeks such as Salvador Creek and the Yountville Collectors. Managing invasive vegetation is a continuous, routine, and on-going activity of the District's stream maintenance program.

5.1 Herbicide Application for Invasive Species Control

Herbicides can be toxic to people and wildlife if not handled properly. However, the safe use of herbicides is a critical method for vegetation management, especially to control invasive and exotic plants. All herbicide applications conducted by the District occur in accordance with federal, state, and local regulations. The District applies herbicides to control invasive and exotic plants in upland areas (vegetation growing along and on top of stream banks) and within water bodies.

Targeted spot spraying and hand painting of cut stumps are the primary methods of herbicide application. Foliar spraying may be conducted to control growth on larger plants such as exotic trees or large stands of pampas grass. Herbicide application is conducted when the climate is dry (between June 15 and November 15), wind is not above 5-10 mph, and no rain is forecast for the next 24 hours. The maximum average herbicide use is 5 to 8 gallons monthly. The average total area where herbicide is applied is approximately 3 to 5 acres annually. Typical herbicides used for control of invasive and exotic plants are glyphosate (trade name: Rodeo Aquamaster®) and imazapyr (trade names: Habitat®, Polaris®). Herbicides are used on a site by site basis and only when necessary, such as when hand and mechanical methods are unsuccessful. Further detail on the District's application methods are provided below.

5.2 Invasive Species Profiles

In the paragraphs below summary species profiles for the primarily invasive and exotic plants managed by the District are presented along with stream management considerations and approaches. Other invasive species, such as yellow star thistle, are also managed by the District. Management approaches for control of other species are the same as those described below.

Arundo donax removal by California Conservation Corps team

Giant reed *(Arundo donax)*
Priority: High (from top of bank to toe of stream channel). Arundo is a bamboo-like plant targeted by the District as a priority weed. This species reproduces vegetatively and does not produce viable seed. When established within stream channels, Arundo can quickly reduce channel capacity, increase hydraulic roughness, and increase the flood risk. The plant's shallow roots encourage mobility in high flow events. Dislodged Arundo pieces move downstream, often plugging culverts or creating debris blockages at bridge crossings. Upon settling, Arundo will

rapidly colonize at its new downstream location. In this manner, entire streams systems have been invaded in a relatively short time period. The dense lower stalks and root masses of Arundo are also effective at trapping fine sediment, whereby a positive feedback process occurs. Arundo settles, traps fine sediment, the channel bed elevates, more Arundo colonizes, more sediment is trapped, etc. Arundo favors stream beds and banks in full sun conditions. Developing a native riparian canopy that can shade the channel is an effective long-term strategy to reduce Arundo presence.

The District's approach to managing Arundo is to target removal activities by sub-watershed, beginning in upstream areas and eradicating Arundo colonies progressively downstream through each sub-watershed. Arundo is eradicated by either spraying the entire standing plant with herbicide or mechanically cutting the stalks and painting each stalk-stump by hand with herbicide. The District's standard Arundo herbicide mix includes glyphosate, a non-ionic surfactant, and ammonium sulfate. The herbicide mix is applied in the fall from September through early November. Dead canes are removed for fire safety in the fall (September or later) following herbicide application. Any bare soil remaining after cane removal is revegetated with native plants or seeds, such as the native species listed in Appendix A.

Perennial Pepperweed *(Lepidium latifolium)*
Priority: High (in wetland and brackish marsh areas). Perennial Pepperweed is scattered throughout seasonal wetland and wrack lines of brackish march areas within the Project Area and may interfere with primary habitat management and restoration goals. Plants are multiple stemmed and grow stiffly erect masses up to 5ft in height. The leaves are lanceolate, bright green to gray green, and entire or toothed. Basal leaves are stalked, up to 1 ft. long and 3 in. wide and have serrate margins. Flowing occurs from early summer to fall.

In general, it is assumed that populations are established and spreading, and complete eradicate is impossible. However, it is possible to control its spread with annual herbicide treatment, re-vegetation, and monitoring.

Water primrose (*Ludwigia peploides montevidensis*)
Priority: Moderate (on surface of water). *Ludwigia* is an invasive, exotic, aquatic weed found in apparently increasing occurrence on the west coast as well as nationally. The species occurs in tributaries to the Napa River, including Salvador Creek. Generally, winter streamflow rises above the *Ludwigia* patches or flushes the plants downstream. In most cases, *Ludwigia* patches are not problematic in conveying flood flows. However, accumulated *Ludwigia* is known to collect at downstream bridge piers where it can quickly grow, completely fill channels (as shown in the photo), and create flow blockages. *Ludwigia* also provides some beneficial functions similar to the native species (*Ludwigia peploides peploides*) including, bank toe stabilization, nutrient exchange and uptake, and cover for young fish and amphibians. While these functions may not be enough to support presence of *Ludwigia* in District flood control channels, it does provide sound reasoning for leaving it in a channel if there is no other emergent cover, or where the degree of *Ludwigia* present does not create a flow blockage.

Ludwigia in Yountville Outfall

Mechanical removal is the primary method to control *Ludwigia* and is generally conducted using a long-

reach excavator from maintenance roads adjacent to the project site channel. Where the channel is too wide, the excavator may occasionally travel partially down the bank in areas that will not impact existing native and riparian vegetation. The excavator will work from the mid-bank position, thus reducing the need for multiple trips along the bank slope by smaller equipment. The District anticipates the need to periodically manage *Ludwigia* between June 15th and October 31st.

Debris generated from invasive plant management activities are either left on site to decay and redistribute nutrients into the soil or, if plant and root clippings remain viable for regrowth, the debris it taken to the local landfill for disposal.

6. Aquatic Herbicides Applied

6.1 Types of Herbicides Used

Types of herbicides expected to be used and degradation byproducts.

Glyphosate (Aquamaster®, AquaNeat®, Refuge®, and others)
Glyphosate is a foliar-applied, systemic herbicide used to control vegetation near water bodies and several immersed weeds. Glyphosate carries from the treated foliage to underground storage organs (e.g, rhizomes). Its mode of action inhibits the synthesis of certain amino acids and other secondary metabolites. To be most effective it should be applied during a perennial weed's flowering or fruiting stage. On annual species it will be most effective when applied during active plant growth. An aquatically approved non-ionic surfactant should be used with glyphosates that do not contain a surfactant. If a rain event occurs within 4 to 6 hours of application, the effectiveness of glyphosate is reduced. Therefore, as required by BMP GEN-1, herbicides will only be applied when a 40% chance or higher chance of rain is forecast 48 hours prior to or after planned applications.

Glyphosate degradation is by microbial activity in soil, and by sunlight and water to a lesser extent. Tests have shown the half-life of glyphosate in water is 35 days or more, while the half-life of glyphosate in anaerobic soil conditions is 22 days[2].

Imazapyr (Habitat®, Polaris®, and others)
Imazapyr is a foliar-applied, translocated systemic herbicide used to control many floating and emergent weed species. It may be particularly effective on plants such as cattails and giant reed. Imazapyr works in meristematic tissue (i.e., rapidly growing and dividing) by inhibiting the synthesis of certain amino acids in protein production. A spray adjuvant must be used with imazapyr. Recommended spray adjuvants include non-ionic or silicone-based surfactants or methylated seed or vegetable oils. Imazapyr is quickly absorbed by plants. The growing plant tips usually yellow and die within 1-4 weeks after treatment.

The primary form of degradation in water is photodegradation with a half-life of approximately 2-5 days. Due to its rapid photodegradation by sunlight, water contamination by imazapyr is generally not of concern to people or the environment. Imazapyr is the primary herbicide used to control invasive

[2] California Department of Pesticide Regulation. 1998. Environmental Fate of Glyphosate. Prepared by Jeff Schuette. Environmental Monitoring & Pest Management. Sacramento, CA. Available: http://www.cdpr.ca.gov/docs/emon/pubs/fatememo/glyphos.pdf. Accessed, June 12, 2013.

Spartina cordgrass throughout the San Francisco Bay Estuary.

6.2 Surfactants

Surfactants are used to reduce the surface tension of the water and increase the conveyance of the chemicals to the target plants. Glyphosate requires use of a non-ionic surfactant, such as R-11™, LI-700™, Cygnet Plus™and Liberate™. Imazapyr requires use of an oil-based surfactant, such as Hasten™, Agri-Dex™, and Competitor™. These surfactants are considered practically non-toxic (LI-700, Hasten and Agri-Dex) to moderately toxic (R-11). Acidifying agents like LI-700 and oil-based agents like Hasten and Agri-Dex exhibit lower toxicity compared to R-11, especially to aquatic species (ENTRIX 2003[3]). However, all these surfactants are approved for aquatic herbicide applications. The County strives to implement the least impactful means for aquatic plant control. Where feasible, the least toxic surfactant will be used with glyphosate and imazapyr.

6.3 Methods of Application

Cut-Stump Treatment - This technique is used when managing an infestation below the OHWM. The method involves applying a high concentration of herbicide directly to the cut face of the stump. Applications occur through the use of a small paint brush or hand sprayer with a cloth tied around the nozzle. Because there is direct access to the cambium the amount of herbicide used on each stump is low. This method ensures that there are very few adverse effects associated with herbicide contacting other plants surrounding the treatment area or coming in contact with the water surface.

Foliar Spray - This technique involves applying herbicide directly to the foliage of the plant. The application will be carried out with a backpack sprayer or a spray rig carrying several gallons of diluted herbicide. The sprayer tank is kept pressurized through the use of generator in the case of the spray rig or through hand pumping a lever on the backpack sprayer. When using this method wind conditions are always monitored and applications will cease if wind gusts exceed 5-10 mph. To ensure that sufficient uptake into the target plants occurs it is necessary to completely and thoroughly cover the leaf area. In many cases the biomass of the targeted plant will first be cut and removed and the re-growth will be treated sometime later. This method minimizes the amount of herbicide used. The foliar spray method tends to be ineffective on plants that have leaves with thick waxy cuticles.

Wicking - This technique requires a hand or backpack sprayer with a wicking wand that has a sponge attached to the end, which is used to wipe herbicide onto the leaves of a plant or on to a cut stump. The method ensures that herbicide is only applied to the target plant and minimizes overspray and dripping.

Application Made According to Label - All aquatic herbicide application are made according to the manufactures label and in accordance with regulations of the USEPA, California Environmental Protection Agency, California Department of Pesticide Regulation, California Division of Occupational Safety and Health and the local Agricultural Commissioner. Precautions on the product label to prevent fish kill or other impacts to wildlife will be followed.

[3] Entrix, Inc. 2003. Ecological Risk Assessment of the Proposed Use of the Herbicide Imazapyr to Control Invasive Cordgrass (*Spartina spp.*) in Estuarine Habitat of Washington State. Washington State Department of Agriculture. Olympia, Washington. Available: http://www.spartina.org/referencemtrl/Washington%20ERA-Imazapyr.pdf. Accessed: June 12, 2013.

6.4 Application Training

District staff are trained annually on proper herbicide handling and use. Staff are trained by a District or County staff with a current State Department of Pesticide Regulation-Qualified Applicator Certificate (QAC). Staff with the QAC are required to complete 20 hours of continuing education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

Annual trainings will be held with District staff and District contractors to review best management practices, target species, biological resources of concern, monitoring procedures and spill prevention and response procedures. Training will include a review of relevant invasive plant management literature and field training to ensure that District staff and Contractors are operating in accordance with the APAP.

The District commonly contracts herbicide application work to other companies. Prior to application, a Pest Control Advisor (PCA) licensed by DPR, makes a positive identification of pest(s) present checks applicable product label(s) for control efficacy, and in collaboration with District staff, the PCA prepares a written recommendation, including rates of application, notes any conditions that may limit the application to ensure that non-target flora and fauna are not adversely impacted. The District ensures that contractors conducting the application are properly trained in handling and use of herbicides, have a current Qualified Applicator Certificate (QAC), or Qualified Applicator Licenses (QAL). A QAC/QAL must complete 20 hours of continuing education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

7. Herbicide Use Alternatives

The prioritization of treatment for non-native invasive species occurrences by the District is presented here as a guide which can be applied adaptively and modified as needed. The District established these priorities in the hope of minimizing the total, long-term workload based on available resources and management goals, and maximizing the potential environmental benefit for habitat protection and enhancement. A range of factors were developed to assign management priorities. District overall priorities are to:

1. Assign highest priority to fastest growing and most disruptive infestations that affect the most highly valued native habitat type(s) within the Project Area.
2. Consider the difficulties of control, giving higher priority to infestations most likely to be able to be controlled with available technology and resources.
3. Consider species, which are not yet problematic, but could become problematic if they spread throughout the District's general maintenance area, for priority treatment. The invasive species management program includes regularly monitoring the District's maintenance area for these species in order to quickly detect and eliminate them if they ever do appear.

Once a management area is identified, actions taken include the following alternatives. Some methods are applied simultaneously. For example, at a creek reach (say from one road crossing to the next), vegetation may be left alone in one area, trees may be planted to provide future shading in another area, grass may be mowed, and herbicides may be used to control cattail growth until the trees get tall enough to provide shading.

No Action. If the vegetation is not currently a threat, it is left alone and reevaluated the next season.

Prevention - The District implements preventative methods to discourage vegetation from growing in the channels. For example, the District plants trees to shade creek channels and prevent invasive aquatic plants like cattails from growing. This preventative method requires many years (5 to 10, or more) for the trees to grow tall enough to provide the shade needed to discourage cattail growth.

Mechanical or Physical Methods - The District controls vegetation growth by mowing aquatic vegetation or breaking up floating piles to encourage them to pass downstream. These methods only temporarily alleviate the flood threat and must be conducted on a regular basis.

Cultural Methods - The District has a long-standing program to plant native vegetation along channels in an effort to prevent growth of exotic, invasive vegetation. This is a long term process and requires a substantial maintenance effort to ensure successful growth of native vegetation.

Biological Control Agents - Biological control have not been used and no such controls have been identified as a viable alternative for controlling the species of concern.

Grazing - This option is most suitable for emergent and terrestrial weeds. There are potential impacts such as water quality from animal feces, nutrients, increase turbidity, and bank erosion, and impacts to desirable native plant species. The lack of adequate fencing, site access, and presence of vehicle traffic make this option unfeasible in some cases. Grazing will be considered as an alternative control where feasible.

Aquatic Herbicides - Aquatic herbicides are a key component of the District's vegetation management program. In order to successfully enhance native aquatic and wildlife habitat, while protecting the public and property in Napa County, the District needs to use a small amount of aquatic herbicides. If herbicides are not utilized for vegetation management, people and property could be at risk due to flooding. Only the least impactful herbicides are used and application of the minimum amount necessary for effective control, consistent with product label requirements, is conducted.

Native Species Establishment - After the successful removal of non-native invasive species, the introduction and re-colonization of native species has been successful along streambanks or margins of streams and rivers. This methodology provides competition for non-native species, creates, habitat, increases native plant diversity, and may reduce the need for future aquatic weed abatement. Limitation to this approach include lack of infrastructure for irrigation, ongoing access to private property, availability of labor to plant native species, and the high cost of ongoing site maintenance to ensure successful reestablishment. This approach is expensive, takes many years and requires long term access to private property. The District attempts to integrate this technique into all invasive plant management sites.

Tilling or Disking - This option is not a suitable alternative for controlling aquatic or riparian vegetation because tilling or disking exposes erodible soils which impact water quality. The District generally avoids tilling and disking in and around its flood control system, natural water ways, and wetlands so as not to encourage erosion of banks and sedimentation.

8. Best Management Practices

The following BMPs will be implemented prior to and during herbicide application events. The purpose of these BMPs is to avoid and minimize impacts on people, the environment, and Beneficial Uses of waters of the U.S. and state.

BMP Number	BMP Title	BMP Description
GEN-1	Work Windows and Weather Considerations	▪ Herbicide applications will occur between June 15 and November 15, with an extension through December 31 or until the first occurrence of any of the following conditions; whichever happens first: o Local rainfall greater than 0.5 inches is forecasted within a 24-hour period from planned application events; or o When salmonids begin upmigrating and spawning, as determined by a qualified biologist (typically in November/December) ▪ Check weather service prior to application and DO NOT make application if rain (40% chance or higher) is forecast 48 hours prior to or after planned applications. ▪ DO NOT make spray applications if wind speeds are less that 3 mile per hour or over 10 miles per hour. ▪ Avoid spraying during stable (inversion) conditions (early morning and early evening) when there is little or no vertical mixing of the air. These conditions generate concentrated drift clouds and increase the chance of drift fallout. ▪ Monitor wind direction and do not spray when there are sensitive areas/crops immediately downwind. ▪ Keep records of air temperature, wind speed, and wind direction for aerial applications.
GEN-10	Spill Prevention and Response	The District will prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels following these measures: 1. To the extent practicable, algaecides and aquatic herbicides will be mixed and loaded in the District or District Contractors yard before leaving for the application site(s). 2. New District field personnel will be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills. 3. Equipment and materials for cleanup of spills will be available on site and spills and leaks will be cleaned up immediately and disposed of according to manufacturer's label. 4. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means. 5. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel will be advised of these locations. 6. Application equipment will be regularly checked and maintained to identify and minimize

BMP Number	BMP Title	BMP Description
		the likelihood of leads developing or equipment malfunction that would lead to a spill. 7. District staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. 8. Applicators will report spills as required by County policy and in a manner consistent with local, state, and federal requirements. *Spill Response Measures:* For small spills on impervious surfaces, absorbent materials will be used to remove the spill, rather than hosing it down with water. For small spills on pervious surfaces such as soil, the spill will be excavated and properly disposed rather than burying it. Absorbent materials will be collected and disposed of properly and promptly.
VEG-4	Standard Herbicide Use Requirements	▪ Only herbicides and surfactants that have been approved for aquatic use by the U.S. Environmental Protection Agency (USEPA) and are registered for use by the California Department of Pesticide Regulation (CDPR) will be used for aquatic vegetation control work. ▪ Herbicide application will be consistent with Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) label instructions and use conditions issued by the USEPA, CDPR, and the Napa County Agricultural Commissioner. ▪ Conduct an annual search for Material Safety Data Sheets (MSDS) and Label updates or revisions for herbicides to be used. ▪ The least persistent and lowest toxicity pesticide and the lowest recommended application rate to achieve the desired control. ▪ Herbicides will not be mixed adjacent to storm drain inlets, culverts, or water courses. Mix herbicides in areas where spillage, if it occurs, can be easily contained. ▪ Mix only as much herbicide as necessary for the application. ▪ Use low pressure application equipment. ▪ Conduct spot treatment when applicable. ▪ Use spotters to avoid accidents and aide in preventing spraying in non-target areas.
VEG-5	Properly Maintain Application Equipment	▪ Calibrate spray equipment per manufactures specifications. ▪ Conduct equipment screening tests and tank sampling. ▪ Dedicate specific equipment for specific products. ▪ Clean equipment regularly following the manufactures specifications and the pesticide label directions. ▪ Select the appropriate nozzle to ensure proper coverage.

BMP Number	BMP Title	BMP Description
		▪ Maintain and equipment log to track calibration, cleaning and repairs. ▪ Conduct visual inspection of equipment prior to use. Check all equipment for leaking hoses, connections and nozzles. ▪ Monitor the operation of the nozzles during the application. ▪ DO NOT use any equipment that appears to be damaged. ▪ Discontinue use immediately in the event of an equipment malfunction. ▪ Ensure all staff are trained to clean up spills
VEG-6	Proper Handling, Storage, and Disposal of Herbicides	▪ Clean equipment and dispose of rinse water per label directions: a. Rinse equipment according to manufacturer's label instructions. b. Discharge rinse water only in areas that are part of the application site or at a certified waste treatment facility. c. Dispose of container rinse water and spray tank rinse water as a product over a target treatment site. c. Dispose of surplus chemical and containers according to label instructions, and County Agricultural Commissioner guidelines. ▪ Herbicide Storage a. All pesticides are stored at District/County facilities in original containers. b. All pesticides removed from original container for use are sealed within a service container. c. All service containers are sealed within a tool box inside the bed of a modified truck. d. Tool boxes are supervised when not locked. ▪ Pesticides that have reached their expiration date shall be disposed of.
BIO-3	Protection of Sensitive Fauna Species from Herbicide Use	Approved herbicides and adjuvants may be applied in habitat areas for sensitive wildlife species (including salmonids, California red-legged frog, western pond turtle); all applications will occur in accordance with federal and state regulations. For sprayable or dust formulations: when the air is calm or moving away from sensitive wildlife habitat, applications will commence on the side nearest the sensitive habitat and proceed away from the sensitive habitat. When air currents are moving toward sensitive habitat, applications will not be made within 200 yards (600 feet) by air or 40 yards (120 feet) by ground upwind from sensitive habitat. However, these distances may be modified for the control of invasive species on salmonid streams if the following measures are implemented:

BMP Number	BMP Title	BMP Description
		▪ A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). ▪ A qualified fisheries biologist will review proposed herbicide application methods and locations. The fisheries biologist will conduct a pre-application survey (and any other appropriate data research) to determine whether the proposed herbicide application would adequately prevent against fish kills, and prescribe measures to ensure adequate protection of biological resources.
BIO-4	Avoid and Minimize Impacts to Special-Status Plant Species and Sensitive Natural Vegetation Communities	If there are known occurrences of special status plant species near the project site a qualified botanist, arborist, or resource specialist will identify special status plant species and sensitive natural vegetation communities and clearly map or delineate them as needed in order to avoid and/or minimize disturbance, using the following protocols: 1. A desktop audit of the CNDDB, vegetation maps, soils maps, and aerial photos to identify if suitable habitats for special status plants and sensitive natural vegetation communities are potentially located within or near work areas. 2. In the event that an area is identified as potentially having sensitive natural communities will be conducted by a qualified person prior to commencement of work. 3. Surveys will be conducted during the appropriate time of the year to adequately identify plants. 4. District staff will ensure avoidance and minimize impacts by implementing one or more of the following, as appropriate, per the botanist's recommendation: a) Flag or otherwise delineate in the field the special status plant populations and/or sensitive natural community to be protected; b) Allow adequate buffers around plants or habitat; the location of the buffer zone will be shown on the maintenance design drawings and marked in the field with stakes and/or flagging in such a way that exclusion zones are visible to maintenance personnel without excessive disturbance of the sensitive habitat or population itself (e.g., from installation of fencing). c) Time construction or other activities during dormant and/or non-critical life cycle period; d) Store removed sediment off site; and e) Limit the operation of maintenance equipment to established roads whenever possible.

BMP Number	BMP Title	BMP Description
		5. No herbicides, terrestrial or aquatic, will be used in areas identified as potential habitat for special status plants species or containing sensitive natural communities, until a qualified botanist has surveyed the area and determined the locations of special status plant species present. 6. If special status plant species are present and maintenance cannot avoid impacts to the species, then a qualified botanist will determine the ecologically appropriate minimization measures for the species. Minimization measures may include transplanting, seed collection, or both, depending on the physiology of the species. 7. The District will not conduct maintenance activities that would result in the reduction of a plant species range or compromise the viability of a local population.
APAP-1	Applicator Training	District staff that handle and apply herbicides will be trained annually on proper herbicide handling and use. Staff will be trained by a District or County staff with a pesticide applicator certificate obtained from the State Department of Pesticide Regulation. Training will include review of the BMPs included in this document, with particular focus on target and non-target plants, environmental impact avoidance measures, and herbicide label requirements. The District will ensure that applicators are properly trained in handling and use of herbicides, have a current QAC, or QAL. A QAC/QAL must complete 20 hours of continuing education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.
APAP-2	Planning and Coordination	When a site is selected for application of herbicides, adjacent and downstream water users (farmers and agencies with water rights diversions) will be notified to ensure their water supply is not impacted during the aquatic herbicide treatment period. The District will post an annual work plan on the District website. Property owners adjacent to a project site will be notified of the work that is being planned and given information regarding project objectives and management strategy.

9. Monitoring Program

This monitoring program was developed to answer the following two questions, as required in Attachment C, *Monitoring and Reporting Program*, of the General Permit.

1. Does the residual aquatic herbicide discharge cause an exceedance of receiving water limitations?
2. Does the discharge of residual aquatic herbicide, including active ingredients, inert ingredients, and degradation byproducts, in any combination cause or contribute to an exceedance of the "no toxics in toxic amount" narrative toxicity objective?

The District will comply with the monitoring provisions and reporting requirements stated in Attachment C of the General Permit. The questions above will be addressed and documented as described below.

9.1 Monitoring Locations

Samples collected and analyzed will be representative of the area affected by applied herbicides. The sampling sites will vary annually depending on the sites maintained that year. At a minimum, samples will be collected in similar hydrologic conditions (flowing and non-flowing conditions) within 5 to 15 feet from the treatment area. This is an appropriate distance away from the application site because in general, areas treated in Napa County are along the stream bank, within the riparian corridor of the channel. When herbicides are applied directly in a creek or river channel, samples will be collected 10 to 15 feet downstream of the treatment area. In a pond or body of standing water, samples will be collected 5 to 10 feet away from the treatment area.

Applications typically occur from the OHWM to the top of bank with a small portion of the application occurring over the edge of the channel and below the OHWM. In lower reaches that are tidally influenced the treatment may occur at the edge of the receding tide line and continue to the top of bank or outer edge of the infestation on the landward side.

Treatment types are summarized in Table 1.

Table 1: Treatment Types

Treatment Site Type	Water Conditions	General Application Area Description
Napa River	- Flowing - Standing pools within the channel bank	Non-tidal reaches of the Napa River mainstem may be treated. Herbicides may be applied to standing pools within the channel or onto vegetation on the banks. Vegetation will typically be treated from the toe of the stream up to the top of bank, however, applications may also occur below the OHWM and over the surface of the water.
Napa River Flood Project	- Flowing – tidal	Treatment will occur in the tidal zone along the edge of the channel.
Engineered/Modified Channels	- Flowing (seasonally) - Stagnant pools - Dry channel	Treatment within flood control channels may be applied to the surface of the water, along the edge of the channel below OHWM, and along the banks up to the top of bank.
Natural Channels	- Flowing (seasonally) - Stagnant pools - Dry channel	Treatment will occur from the toe of the stream to the top of bank. Applications may occur near or below the OHWM.
Ponds	- Non-flowing	Occasionally, water storage or stormwater detention ponds may be treated. Treatment may occur along the edge of the pond or over the surface depending on the species of concern.

9.2 Monitoring Types

Sample Type:

- Background or pre-treatment monitoring – Samples will 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.
- Treatment 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.
- Post-event monitoring – Post-event monitoring samples shall be collected within the treatment area within one week after application.

Table 2 describes the monitoring activities will occur annually at Background, Event, and Post-Event Monitoring locations identified in Table 1.

Table 2: Monitoring Requirements

Sample Type	Parameter	Method	Frequency
Visual	▪ Water Body Description ▪ Appearance of water ▪ Weather Conditions ▪ Flow Conditions	Visual	All Applications, All Sites
Physical	▪ Temperature (degF) ▪ pH ▪ Turbidity (NTU) ▪ Electrical Conductivity @ 25degC (µmhos/cm)	Grab	6 events for Imazapyr in each environmental setting[1] per year 1 event for Glyphosate from each environmental setting[1] per year
Chemical	▪ Active Ingredient (µg/L) ▪ Dissolved Oxygen (mg/L)	Grab	6 events for Imazapyr in each environmental setting[1] per year 1 event for Glyphosate from each environmental setting[1] per year

1. Flowing and non-flowing water

9.3 Visual Monitoring

Visual observations of the water body will be noted on a sampling field data sheet log for each water sampling site chosen. Observations will include:

- Water Body Description (pond, lake, channel, creek, stream, etc.)
- Appearance of water (sheen, color, clarity, etc.)
- Weather Conditions (rain, wind, fog, etc.)
- Flow Conditions (stagnant, flowing, tidal inflowing or outflowing)

Attention will be given and noted to the presence of:

- Floating or suspended matter
- Discoloration
- Bottom deposits
- Aquatic life
- Visible films, sheens, or coatings
- Fungi, algal slimes or objectionable growths
- Potential nuisance conditions

See the example Field Data Collection Form (FDCF) in Appendix B.

9.4 Physical Monitoring

Physical measurements will be made during surface water sampling events to provide additional data for characterizing water quality. Measurements will be recorded on a sampling field data sheet. A YSI-650 MDS meter or equivalent will be used to measure pH, conductivity, temperature, turbidity, and dissolved oxygen. The meter will be calibrated according to the manufacturer's instructions prior to use.

Physical readings will be made "in-stream" by inserting the probe directly into the water, just downstream from the point where a water sample will be extracted. Readings from the probe should 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.

A field data sheet will be used to record visual observations, water quality measurements, and water sample collection information. See the example FDCF in Appendix B.

9.5 Chemical Monitoring and Analysis

Sampling Design

The sampling events are designed to characterize the potential risk involved with herbicide applications relative to adjacent surface waters. Consistent with permit requirements, the monitoring program includes background/pre-treatment sampling up to 24 hours prior to the application, application event monitoring immediately post-treatment, and one-week post-application event monitoring (a total of three samples per event). During background sample collection, the sampling point will be recorded using a GPS unit to aid staff in locating the point for future sampling events.

The application event samples will be collected after sufficient time has elapsed such that treated water will have entered the adjacent area. In tidal areas, herbicides will be applied on a low or receding tide. Thus, application event samples will be taken 0.5-5 hours post-treatment when the tide has again flooded the site. Finally, the one-week post-treatment monitoring will be conducted when sufficient water is present at the site on the seventh day after the application. See Section 9.1 above for further discussion of sampling locations.

Field Sampling Procedures

Water samples will be collected using a sampling rod and pre-cleaned amber glass 1-liter bottles provided by the laboratory. To collect the sample, the bottle is attached to the sampling rod with a clamp, extended out over the water at the application site, and lowered to approximately three feet below the surface of the water body, or at mid-water column depth if the depth is less than three feet. When the bottle is full it is pulled back out of the water and the cap is affixed to the mouth of the bottle. The sample is labeled in permanent ink with the sample ID number, date, time, and initials of the sampler.

The sample ID number is determined by the following protocol: a four-letter code unique to the site, followed by the site visit number (e.g., -01 for pre-treatment, -02 for treatment, or -03 for one-week post-treatment), followed by the time since the application (e.g., “pre” for the baseline sample, the number of hours since the application for the treatment sample, or “1w” for the one-week post-treatment). For example, “SAL3-01-pre-1h” would mean: Salvador Creek, site 3, pre-treatment sample, 1 hour prior to application.

To help assess contamination from field equipment, ambient conditions, sample containers, transit, and the laboratory, one field blank will be collected and submitted to the lab for analysis on a regular basis. It is standard for the lab to include blanks as part of their quality control, but additional trip blanks consisting of distilled water will be submitted as a quality assurance measure. These will be added to either the treatment event or post-treatment event sample batches since the herbicide levels in the pre-treatment samples are usually ND (not detected). Field blank samples will be prepared by pouring distilled water into a pre-cleaned sampling container at the sampling point.

Sample Shipment

Following collection, water samples will be stored in a cooler with ice packs and shipped for priority overnight delivery to the laboratory. If samples are not shipped until the following day, they will be stored in a cooler on ice until they can be transferred to a refrigerator, and subsequently transferred back into a cooler for shipping.

Field Data Sheets

At each sampling location, the sample ID number, the time of the sampling, the sample depth, and the water temperature, pH, dissolved oxygen, conductivity, and salinity measurements, will be entered on a FDCF. Also recorded on the FDCF will be site information, including the site ID number, the station location (application point, upstream, downstream), station type (reference, treated), wind conditions, tidal cycle, water color, and the type of herbicide and surfactant that might be present. Any other unusual conditions or concerns will be noted, and any fish, birds, or other wildlife present will be recorded. The FDCFs will be dated and numbered consecutively for each site on that date. Data from these field forms will be entered into an electronic spreadsheet for processing, and the FDCFs will be compiled into a data log and kept for at least 5 years in the District’s office. An example FDCF is included in Appendix B.

A Chain-of-Custody (COC) form will be completed and sent with the samples to the laboratory. COC procedures ensure the custody and integrity of the samples through transport, delivery to lab, data gathering, and reporting. The following will be documented on the COC form:

1. Quantity and identification by name of samples transported
2. Name and signature of person transporting samples, date, time and purpose
3. Name and signature any subsequent person transporting samples, date, time and purpose
4. Name and address of laboratory performing analysis
5. Name of persons at laboratory receiving samples and the receipt date
6. Condition of samples when received at lab

Laboratory Analysis

Samples will be analyzed for the active ingredients used and the most appropriate EPA-approved analytical method. Analyses will be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants," promulgated by the USEPA in title 40 CFR Part 136. Note that the approved methods listed in 40 CFR Part 136 do not include test procedures for imazapyr. However, other methods approved by the USEPA will be used for imazapyr. The proposed analytical methods for glyphosate and imazapyr are shown in Table 3 below.

Table 3: Required Sample Analysis

Herbicide Active Ingredient	CAS Registration Number	EPA Test Method and Reporting Limit	Sample Collection Comments
Glyphosate	1071-83-6	547 0.5 µg/L	Two 40mL VOA No chemical preservative 14 days hold time
Imazapyr	81334-34-1	8321B (LC/MS/MS detection) 100 ug/L	1 liter amber glass No chemical preservative 7 days hold time

Analysis of residual active ingredients in samples will be conducted by a laboratory certified by the California Department of Public Health in accordance with California Water Code section 13176. The name and contact information for the laboratory will be included in all monitoring reports. Each season, the contracted analytical laboratory is required to provide a Quality Assurance Plan (QAP) that meets USEPA standards prior to initiating analysis. The lab plan must specify the method of analysis to be used, and describe any variations from a standard protocol.

Laboratory results will be reported as follows:

1. Each sample result will be reported with the applicable Minimum Level (ML) and the current Minimum Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.
2. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample.)
3. Sample results less than the Report Limit, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.
4. For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened

to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (plus a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

5. Sample results less than the laboratory's MDL shall be reported as "<" followed by the MDL.
6. The laboratories will establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the laboratory to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.
7. Multiple Sample Data: If two or more sample results are available, the District will compute the arithmetic mean unless the data set contains one or more reported determinations of DNQ or ND. In those cases, the District will compute the median in place of the arithmetic mean in accordance with the following procedure:
    a. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.
    b. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

10. Annual Reporting

The District will prepare and submit an annual report to the Regional Water Quality Control Board Executive Officer by March 1st. The report will clearly state whether discharge of aquatic herbicides, their residues, or their degradation by products occurred.

The annual report will contain the following information:

1. An executive summary discussing compliance or violation of the General Permit and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with aquatic pesticide applications.
2. A summary of aquatic herbicide application events conducted in the past year, including map of application and treatment areas, types and amounts of aquatic herbicides used, and all information used to calculate dosage and quantity of each herbicide used.
3. A summary of monitoring data, including chemical analysis results. All reported data will be arranged in a summary table. The data shall be summarized to clearly illustrate whether the aquatic herbicide applications were conducted in compliance with effluent and receiving water limitations.
4. Identification of BMPs and their effectiveness in meeting permit requirements. Additionally, the report will include a discussion of proposed BMP modifications or improvements.
5. Proposed changes to the APAP, BMPs, and monitoring program, as necessary to further ensure compliance with the General Permit.

Appendix A. Sample District Planting Palettes

COMPREHENSIVE PLANT PALETTE BY SPECIES AND CONTAINER SIZE

Container / Pole / Plug Plantings Acreage Total x.xx ac

	Biological Name / Common Name	Container	Quantity Required
Trees	*Acer macrophyllum* / Big Leaf Maple	Treepot 4	XX
	Aesculus californica / California Buckeye	Seed	XX
	Alnus rhombifolia / White Alder	Treepot 4	XX
	Fraxinus latifolia / Oregon Ash	Treepot 4	XX
	Juglans californica var. hindsii / California Black Walnut	Treepot 4	XX
	Populus fremontii / Fremont's Cottonwood	Pole	XX
	Populus fremontii / Fremont's Cottonwood	Treepot 4	XX
	Quercus kelloggii / Black Oak	Treepot 4	XX
	Quercus agrifolia / Coast Live Oak	Treepot 4	XX
	Quercus lobata / Valley Oak	Treepot 4	XX
	Salix laevigata / Red Willow	Pole	XX
	Salix lasiolepis / Arroyo Willow	Pole	XX
	Salix lutea / Yellow Willow	Pole	XX
	Umbellularia californica / Bay Laurel	Treepot 4	XX
		Total Trees	0
Shrubs	*Achillea millefolium* / Yarrow	Deepot 40	XX
	Baccharis pilularis / Coyote Bush	Deepot 40	XX
	Baccharis salicifolia/ mule fat	Deepot 40	XX
	Calycanthus occidentalis / Western Spice Bush	1-Gallon	XX
	Heteromeles arbutifolia / Toyon	Treepot 4	XX
	Physocarpus capitatus/ Ninebark	1-Gallon	XX
	Ribes californicum/ California gooseberry	1-Gallon	XX
	Rosa californica / California Wild Rose	1-Gallon	XX
	Sambucus mexicana/ Elderberry	1-Gallon	XX
	Symphoricarpos albus / Snowberry	1-Gallon	XX
		Total Shrubs	0
Vines	*Lonicera hispidula* / Honeysuckle	1-Gallon	XX
	Aristolochia californica/ Pipe vine	1-Gallon	XX
		Total Vines	0
Herbaceous	*Bromus carinatus* / California Brome	Plug	XX
	Carex barbarae / Santa Barbara Sedge	Super Stubby (L6)	XX
	Carex praegracilis / California Field Sedge	Super Stubby (L6)	XX
	Elymus glaucus / Blue Wildrye	Plug	XX
	Elymus triticoides /Creeping Wildrye	Plug	XX
	Euthamia occidentalis / Western Goldenrod	Liner	XX
	Festuca idahoensis / Idaho Fescue	Plug	XX
	Juncus balticus /Baltic Rush	Plug	XX
	Juncus effusus var. brunneus / Common Rush	Super Stubby (L6)	XX
	Muhlenbergia rigens / Deergrass	1-Gallon	XX
	Symphyotrichum chilense / Common Aster	Plug	XX
		Total Grasses and Forbs	0

Sample District Seeding Palette

VEGETATION MANAGEMENT & DISTURBED AREA SEEDING

Seeding Acerage Total x.xx ac

	Habitat Type: Disturbed Area		**0.5 ac**
	Biological Name / Common Name	**Seeding Method**	**Qty**
Herbaceous	*Bromus carinatus* / California Brome	Broadcast Seed	X
	Elymus glaucus / Blue Wildrye	Broadcast Seed	X
	Elymus triticoides /Creeping Wildrye	Broadcast Seed	X
	Festuca idahoensis / Idaho Fescue	Broadcast Seed	X
	Festuca microstachys / Small Fescue	Broadcast Seed	X
	Hordeum brachyantherum / Meadow Barley	Broadcast Seed	X

Appendix B. Field Data Collection Form

Page ___ of ___ on this date

Field Data Collection Form

Site ID (XXXX) (eg. SAL3): _____ Date: _____ Collected By: _____

Station Location (circle): at application point upstream downstream Station Type (circle): Reference Treated

Wind (circle): low high Tidal Cycle (circle): high low slack Water Color (circle): green green-brown brown blue (dye)

Herbicide:_____ Surfactant (if applicable): _____ Gallons tank mix applied _____ Application Time (Start/Finish): _____/_____

Field Measurements

Water Depth	pH	Dissolved Oxygen	Water Temp	Conductivity	Salinity	Meter Used
Meters		mg/L	^{o}C	mS	ppt	

Samples Collected

Sample ID (XXXX-YY-Ab)*	Time	Sample Depth (m)	Notes

* **XXXX-YY-Ab** (eg. SAL3 -01- pre - 0.5h) = **XXXX** Site No., **YY** site visit number (01- first , 02- second, 03 -third), **A:** time to application (either pre, increments thereafter in half hours – 0.5), **b:** time increment (h=hour, w=week (for 1 week post-treatment))

Additional Notes or Comments: _____

Wildlife presence: _____