RECEIVED
OCT 31 2016
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# _____ WDID# 2 1AP00001
C. ☐ Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name East Bay Municipal Utility District			
B. Mailing Address 375 11th Street			
C. City Oakland	D. County Alameda	E. State California	F. Zip 94607
G. Contact Person John Walter	H. E-mail address jwalter@ebmud.com	I. Title Environmental Compliance Specialist	J. Phone 866-403-2683

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: Reservoirs within EBMUD jurisdiction
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: Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, and all stuctures and water bodies within the watersheds of the reservoirs.

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

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: Algae, submerged, emergent, and floating aquatic vegetation

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

- Diquat dibromide (Harvester®, Littora®)
- Endothall (Aquathol K®, Teton®)
- Fluridone (Sonar®)
- Sodium carbonate peroxyhydrate (GreenClean®)
- Copper Sulfate Pentahydrate (Earthtec®)
- Copper Etylenediamine Complex (Komeen®)
- Copper Ethanolamine Complex (Captain XTR®)
- Copper Thiethanolamine (Nautique®)
- Imazamox (Raptor®)
- Tryclopyr (Garlon®)
- Lanthanum modified clay (Phoslock®)
- Glyphosate (Rodeo®,Aquaneat®)

C. Period of Application: Start Date November 1 End Date October 31, for life of permit

D. Types of Adjuvants Used: non-ionic surfactants may be used, including, but not limited to: Cygnet Plus®, vegetable oil concentrates, Cutrine Plus®, Southern Ag®, R-11®, D-limonene, methylated seed oils.

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: Chandra Johannesson

B. Signature: _____ Date: 10/14/2016

C. Title: Manager of Environmental Compliance

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 _____

Aquatic Pesticide Application Plan

East Bay Municipal Utility District Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot Reservoirs

Alameda, Amador, Calaveras, Contra Costa and San Joaquin Counties, California

Prepared For:
East Bay Municipal Utility District
c/o Chandra Johannesson
Manager of Environmental Compliance
375 11th Street
Oakland, California 94607

Prepared By:
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4585 Pacheco Blvd., Suite 200
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(925) 969-0750

Contact:
Dan Lohr, PG, Senior Project Geologist
dan.lohr@errg.com

Matt Osowski, Project Manager
osowski@wra-ca.com

Date:
October 2016

WRA Project Number:
25099

wra
ENVIRONMENTAL CONSULTANTS

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APPENDICIES

LIST OF ACROMYMS

%R	Percent Recovery
AHAL	Aquatic Herbicide Application Log
AF	Acre-feet
APAP	Aquatic Pesticide Application Plan
BG	Background monitoring sample
BMPs	Best management practices
CAL OSHA	California Occupational Safety & Health Administration
CDPR	California Department of Pesticide Regulation
COC	Chain of Custody
DO	Dissolved Oxygen
DPS	Distinct Population Segment
EBMUD	East Bay Municipal Utility
EPA	Environmental Protection Agency
Event	Event monitoring sample
FB	Field Blank
FD	Field Duplicate
FRWP	Freeport Regional Water Project
FSC	Folsom South Canal
FSCC	Folsom South Canal Connection Facilities
HCP	Habitat Conservation Plan
IPM	Integrated Pest Management
MB	Method Blank
MGD	Million gallons per day
MRP	Monitoring and Reporting Program
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety & Health Administration
PCA	Pest Control Advisor
PE	Post-event monitoring sample
QA	Quality Assurance
QAC	Qualified Applicator Certificate
QAL	Qualified Applicator License
QC	Quality Control
RPD	Relative Percent Difference
RWQCB	Regional Water Quality Control Board
SIP	State Implementation Plan
SWRCB	State Water Resources Control Board
USEPA	United States Environmental Protection Agency

USGS	United States Geological Survey
WDID	Waste Discharge Identification

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.

Signed and Agreed:

Chandra Johannesson
Manager of Environmental Compliance
East Bay Municipal Utilities District

Dan Lohr
Senior Project Geologist
Engineering/Remediation Resources Group, Inc.

Matthew Osowski
Regulatory Permitting Specialist
WRA, Inc.

INTRODUCTION

In March 2001, the State Water Resources Control Board (SWRCB) prepared Water Quality Order #2001-12-DWQ which created Statewide General National Pollutant Discharge Elimination System (NPDES) Permit # CAG990003 for the discharges of aquatic herbicides to waters of the United States. The purpose of Order # 2001-12-DWQ was to minimize the aerial extent and duration of adverse impacts to beneficial uses of water bodies treated with aquatic herbicides. The purpose of the general permit was to substantially reduce potential discharger liability incurred for releasing water treated with aquatic herbicides into waters of the U.S.

The SWRCB in May 2004 adopted the statewide general NPDES Permit for Discharges of Aquatic Pesticides for Aquatic Weed Control in Waters of the U.S. #CAG 990005 after Order # 2001-12-DWQ expired in January 2004. Dischargers were required to have the general permit to perform aquatic herbicide applications.

The Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the U.S. from Algae and Aquatic Weed Control Applications (herein referred to as the "Permit") was adopted on March 5, 2013. The Permit requires compliance with the following:

- The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries in California, a.k.a. the State Implementation Plan. Or SIP (SWRCB 2005)
- The California Toxics Rule
- Applicable Regional Water Quality Control Board (RWQCB) Basin Plan Water Quality Objectives for Region 2 and Region 5 (RWQCBCV 2013, RWQCBSF 2015)

Coverage under the Permit is available to single dischargers and potentially to regional dischargers for releases of potential and/or actual pollutants to waters of the U.S. Dischargers eligible for coverage under the Permit are public entities that conduct resource or pest management control measures, including local, state, and federal agencies responsible for control of algae, aquatic weeds, and other organisms that adversely impact operation and use of drinking water reservoirs, water conveyance facilities, irrigation canals, flood control channels, detention basins and/or natural water bodies.

The Permit does not cover indirect or non-indirect source discharges, whether from agricultural or other applications of pesticides to land, that may be conveyed in storm water or irrigation runoff. The Permit only covers algaecides and aquatic herbicides that are applied according to label directions and that are registered for use on aquatic sites by the California Department of Pesticide Regulation (CDPR).

This Aquatic Pesticide Application Plan (APAP) is a comprehensive plan developed by the discharger, East Bay Municipal Utility District (EBMUD) to comply with the provisions of Water Quality Order No. 2013-0002-DWQ, Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applicators and General Permit No. CAG990005 adopted by the State Water Resources Control Board on March 5, 2013.

The APAP describes the EBMUD water bodies, canals, conveyances, reservoirs and related systems, aquatic plant and algae nuisances, aquatic pesticide products expected to be used, the monitoring program, and best management practices (BMPs) to be followed, as well as the other conditions addressed in the General Permit, Section VIII, Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan.

The application of aquatic pesticides is an undertaking necessary to control specific types of aquatic vegetation that have become a nuisance to the management of Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, the associated water conveyances and water bodies in the reservoir watersheds, and are impacting their health and beneficial uses.

EBMUD manages an Integrated Pest Management Plan (IPM) and a Habitat Conservation Plan (HCP). These plans will be implemented where appropriate to meet the terms of the Permit when discharging algaecides and aquatic herbicides.

ELEMENT 1: DESCRIPTION OF THE WATER SYSTEM TO WHICH ALGAECIDES AND AQUATIC HERBICIDES ARE BEING APPLIED

The Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs and reservoir watersheds are a part of the EBMUD water system which provides water to approximately 1.3 million people and services a 331 square-mile-area extending north to south from Crockett to San Lorenzo, and east to west from San Francisco to Walnut Creek in California (Figure 1). EBMUD will manage invasive aquatic species such as algal blooms, within the entire EBMUD water system and watershed lands. The Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs are the major elements of the water system to be managed along with the Folsom South Canal. The Briones, San Pablo, Lafayette, Upper San Leandro, Chabot reservoirs are located within the Berkeley/Oakland and San Leandro Hills just east of the cities of Berkeley and San Leandro, California (Figure 1). The Pardee, Camanche are located in the foothills of the Sierra Nevada Mountains near the city of Buena Vista, California (Figure 1). The Folsom South Canal is located in central Sacramento County running south from the Freeport Regional Water Facility pipeline to the Mokelumne Aqueduct. These water bodies are described in further detail below. The water system also includes waterbodies associated with the reservoir watersheds. This includes ponds and water bodies, both connected and separate from the reservoirs and water conveyance structures within the EBMUD reservoir water system and watershed lands.

Aquatic vegetation problems exist at one or more of the water bodies. Algal blooms in open reservoirs and ponds are common during periods of high temperatures. A combination of different water sources, more sunshine and less rain than usual is leading to greater algal growth in water reservoirs in California. Treatments will be needed in the short term and in future years depending on climatic conditions, reservoir levels and use of the water bodies.

1.1 RAW WATER RESERVOIRS

Pardee Reservoir:

Pardee Reservoir stores runoff from the 578 square mile Mokelumne River watershed and typically provides 90 percent of the District's water requirements. Water from Pardee Reservoir, which has a maximum storage capacity of 197,950 AF at spillway crest elevation, is conveyed nearly 92 miles southwestward to the EBMUD treatment and storage facilities in the East Bay area. Figure 2 shows the Pardee Reservoir and other unnamed water bodies within the watershed lands.

Camanche Reservoir:

Camanche Reservoir, located downstream of Pardee, functions jointly with Pardee to operate as an integrated system to achieve multiple objectives: providing high quality water supply for EBMUD's customers in the East Bay, providing downstream releases to support fisheries and other uses, providing the supply for the District's Camanche South Shore Recreation Area; and providing for downstream flood control mitigation. These objectives are achieved, while maintaining sufficient carryover storage for emergencies such as droughts or facility outages. Figures 3 to 5 show the reservoir and other named and unnamed water bodies within the watershed lands.

1.2 TERMINAL RESOURCES

Briones Reservoir:

Briones Reservoir contains both Mokelumne water and local runoff from the San Pablo Creek watershed. Briones Reservoir has a maximum capacity of 60,510 AF. The Briones Raw Water Pumping Plant can transfer up to 60 MGD from the Mokelumne Aqueducts to Briones Reservoir. Briones Reservoir releases flow to the Briones Aqueduct, where water can be diverted to supply the Orinda Water Treatment Plant for daily peak demands or spilled into San Pablo Creek, which drains into San Pablo Reservoir. Briones Reservoir can also feed Lafayette and Walnut Creek Water Treatment Plant and Upper San Leandro Reservoir via Moraga Pipeline Project and aqueduct, during planned shutdown or emergencies on the Mokelumne supply. Figure 6 shows the Briones Reservoir and other named and unnamed water bodies within the watershed lands.

Lake Chabot:

Lake Chabot is within the San Leandro Creek-Moraga Creek Watershed. Lake Chabot consists of local runoff and occasional releases from Upper San Leandro Reservoir (Figure 3). The Chabot Pumping Plant supplies untreated water from Lake Chabot for irrigation at a golf course and a separate pump supplies raw water to another golf course. Chabot Reservoir is operated as a standby source and requires infrastructure upgrades before water can be diverted for use as drinking water supply. Lake Chabot has a maximum capacity of 10,350 AF. Discharge from Chabot Dam enters lower San Leandro Creek, which flows out to San Francisco Bay. Figure 7 shows the lake and other named and unnamed water bodies within the watershed lands.

San Pablo Reservoir:

San Pablo Reservoir receives runoff from its 24-square-mile San Pablo Creek watershed and water spilled into San Pablo Creek from the Mokelumne Aqueducts or from Briones Reservoir. The reservoir, which has a maximum capacity of 38,600 AF, can supply Sobrante and San Pablo WTPs. Discharge from San Pablo Dam enters lower San Pablo Creek, which flows northward to San Pablo Bay. Figure 6 shows the San Pablo Reservoir other named and unnamed water bodies within the watershed lands.

Lafayette Reservoir:

Lafayette Reservoir has a maximum capacity of 4,250 AF. Its one-square-mile Las Trampas Creek Watershed is owned entirely by the District (Figure 8). This reservoir has not been used for drinking water supply since 1969 and is now operated as a standby source. Upgrades to infrastructure would be required to divert water from Lafayette Reservoir for use as drinking water supply. Discharge from the dam flows to Lafayette Creek, which empties into Walnut Creek and then into San Francisco Bay at the Carquinez Strait.

Upper San Leandro Reservoir:

Upper San Leandro Reservoir is within the San Leandro Creek-Moraga Creek Watershed. The reservoir receives runoff from its 30-square-mile watershed and is supplied with Mokelumne Aqueduct water through the Moraga Aqueduct and Pumping Plant. Operational pumping is limited by the discharge structure to approximately 70 MGD. The reservoir, which has a maximum capacity of 37,960 AF, supplies Upper San Leandro Water Treatment Plant via a 1.3-mile tunnel through the Oakland Hills. Discharge from the dam is released along with flows from Miller Creek into San Leandro Creek, which then flows into Lake Chabot. Figure 7 shows Upper San Leandro Reservoir and other named and unnamed water bodies within the watershed lands.

Folsom South Canal:

EBMUD has a contract with the U.S. Bureau of Reclamation for a supplemental water supply from the Sacramento River. EBMUD has rights to water from the Sacramento River in dry years. When needed, the water is conveyed through the Freeport Regional Water Project (FRWP) jointly owned by EBMUD and Sacramento County. The FRWP is located in Sacramento and San Joaquin counties and consists of an intake on the Sacramento River at Freeport and two conveyance systems. EBMUD owns and operates Segment 3 (Gerber Pipeline) and the Folsom South Canal Connection Facilities (FSCC) portion of the FRWP.

Folsom South Canal is a concrete-lined canal with a carrying capacity, as built, of 3,500 cubic feet per second. The total length of the two completed reaches encompasses 26.7 miles with a bottom width of 34 feet, and a maximum water depth of 17.8 feet. EBMUD receives FRWP water via the pipeline that begins at the Freeport Regional Water Authority intake facilities on the Sacramento River and extends east through portions of the City and County of Sacramento to a terminal facility at the Folsom South Canal (FSC), located in central Sacramento County. Water is discharged from the pipeline into the FSC, where it flows south in the canal to a new pipeline at the terminus of the FSC. From the terminus of the FSC, the water is pumped to EBMUD's

Mokelumne Aqueducts for transport. The canal extends southward to supply water for irrigation and municipal and industrial use in Sacramento and San Joaquin Counties. Water from the canal is also used for cooling water by the Rancho Seco Nuclear Powerplant.

The Gerber Pipeline is approximately 20,000 ft. of 72-inch pipeline that runs east along Gerber Road, and then cross-country to the FSC just north of Grant Line Road in Sacramento County. The FSCC consists of two pumping plants and approximately 20 miles of 72-inch diameter pipeline which transports water from the southern end of the Folsom South Canal (FSC) to the Mokelumne Aqueduct system for delivery to EBMUD's service area. Figure 9 shows the FSC system.

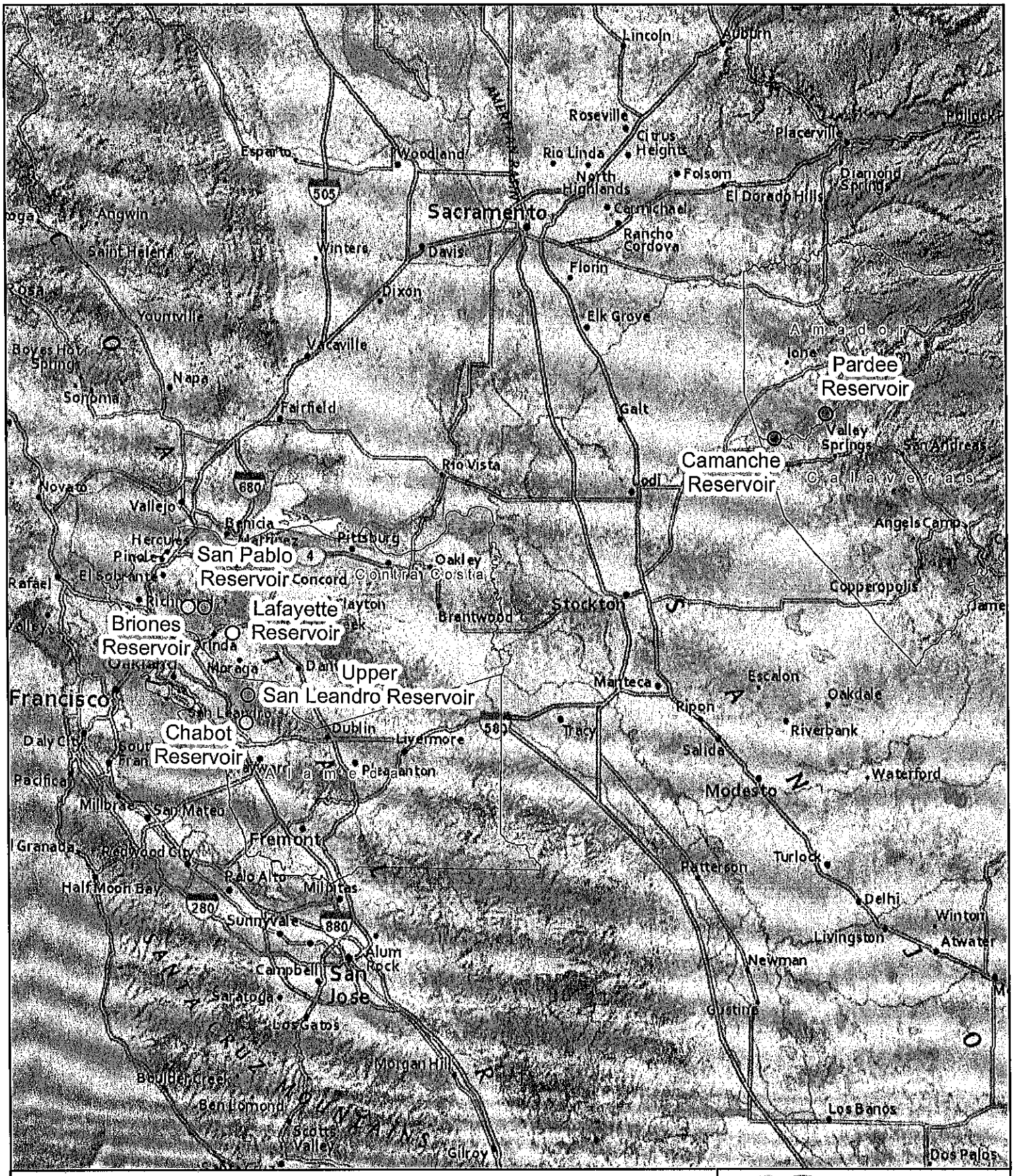

Figure 1. Location Map Overview
EBMUD Aquatic Pesticide Application Plan

Alameda, Amador, Calaveras,
Contra Costa, Counties, California

0 5 10 20 Miles

wra
ENVIRONMENTAL CONSULTANTS

Map Prepared Date: 10/16/2015
Map Prepared By: fhourigan
Base Source: National Geographic World Map
Data Source(s): WRA

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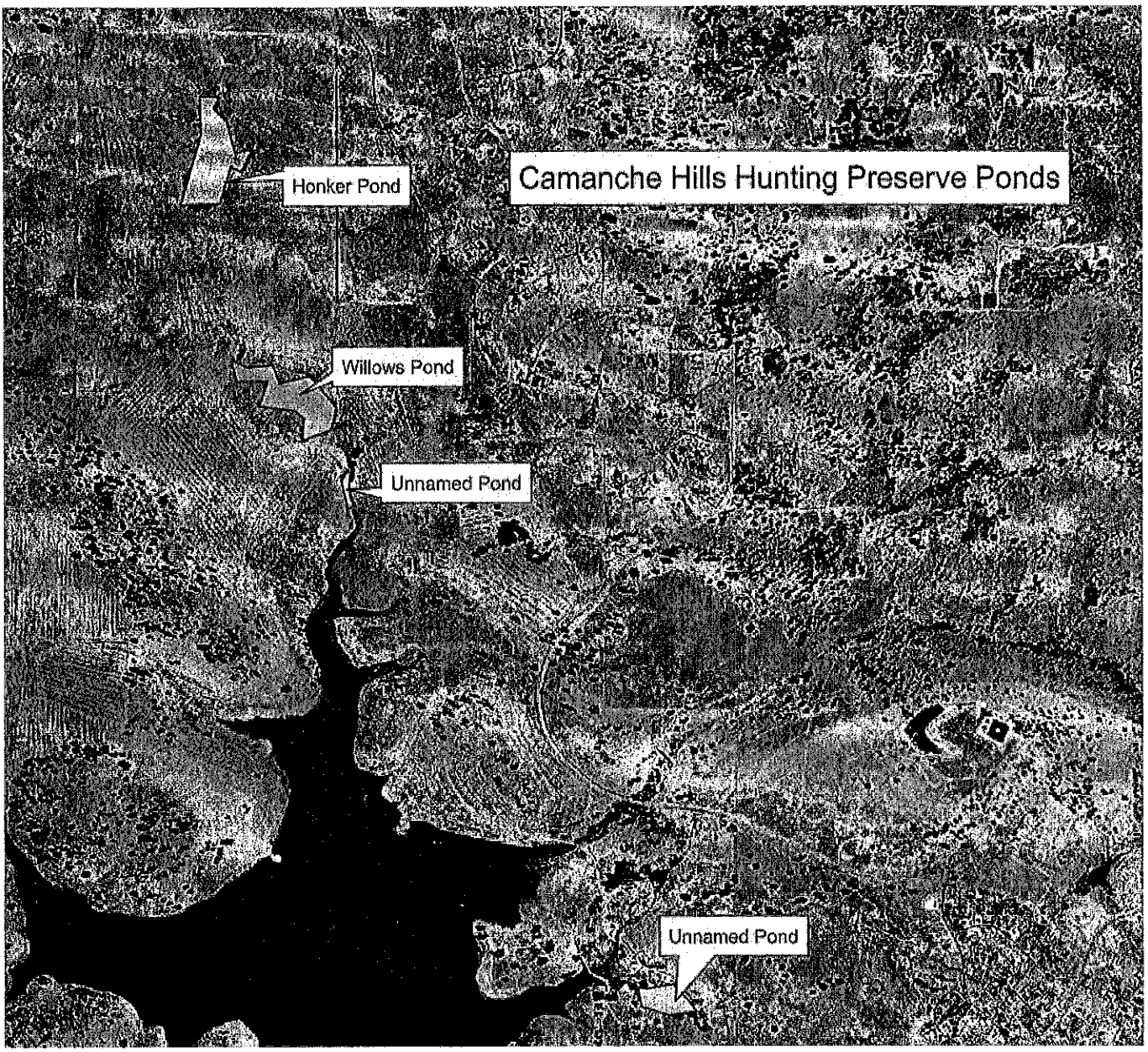

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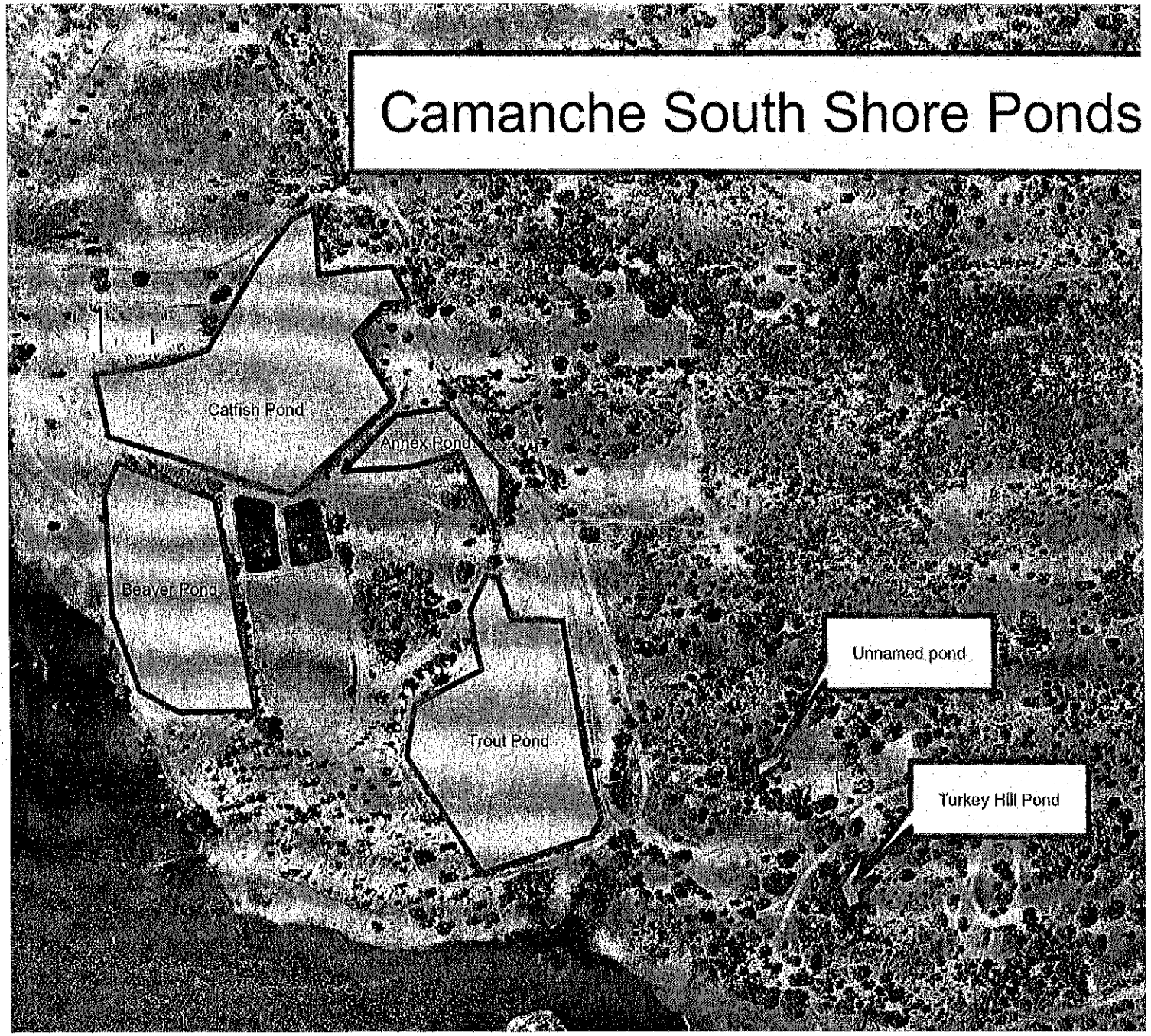

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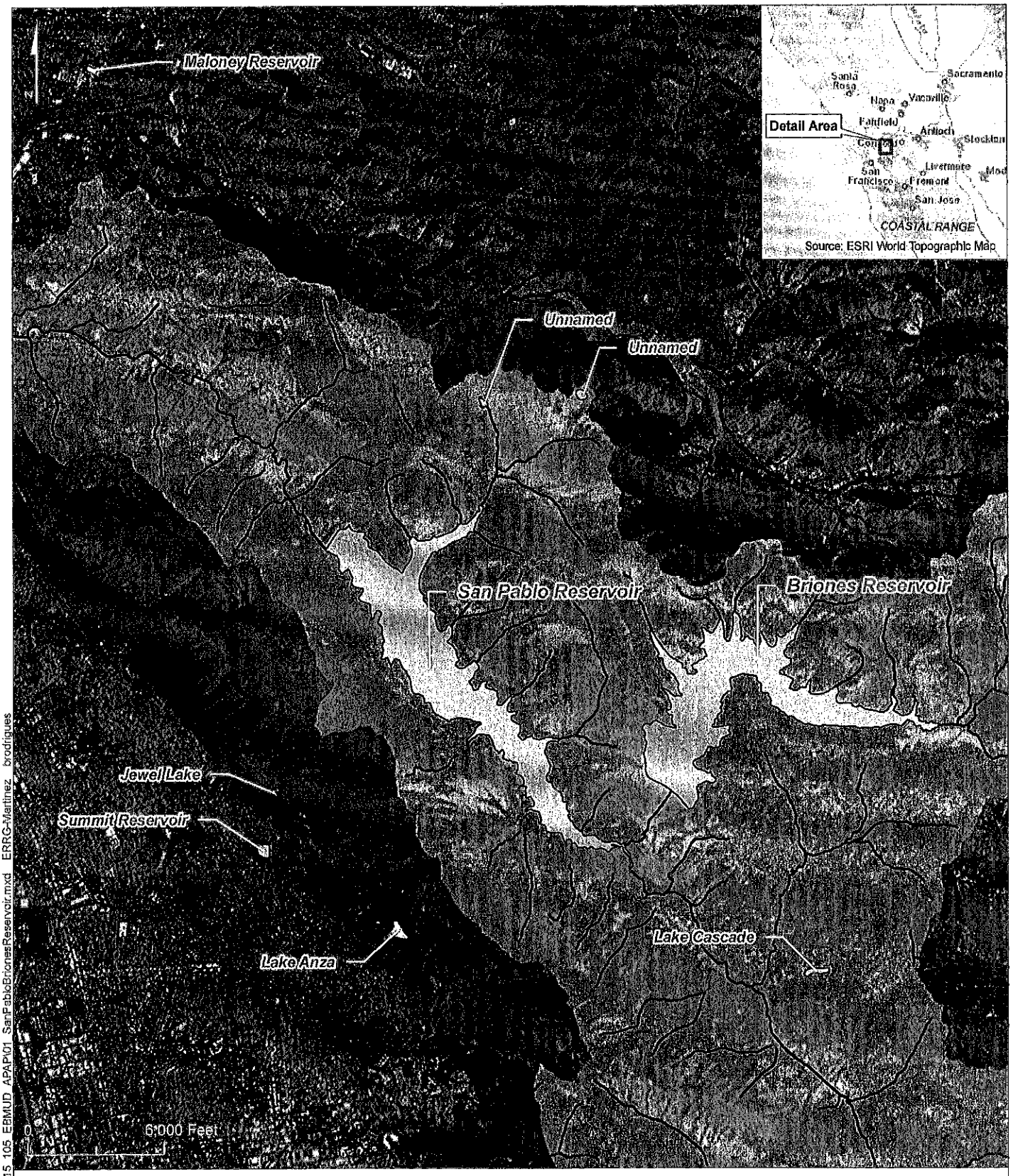

Figure 6. San Pablo Reservoir and Briones Reservoir
EBMUD - APAP

ERRG

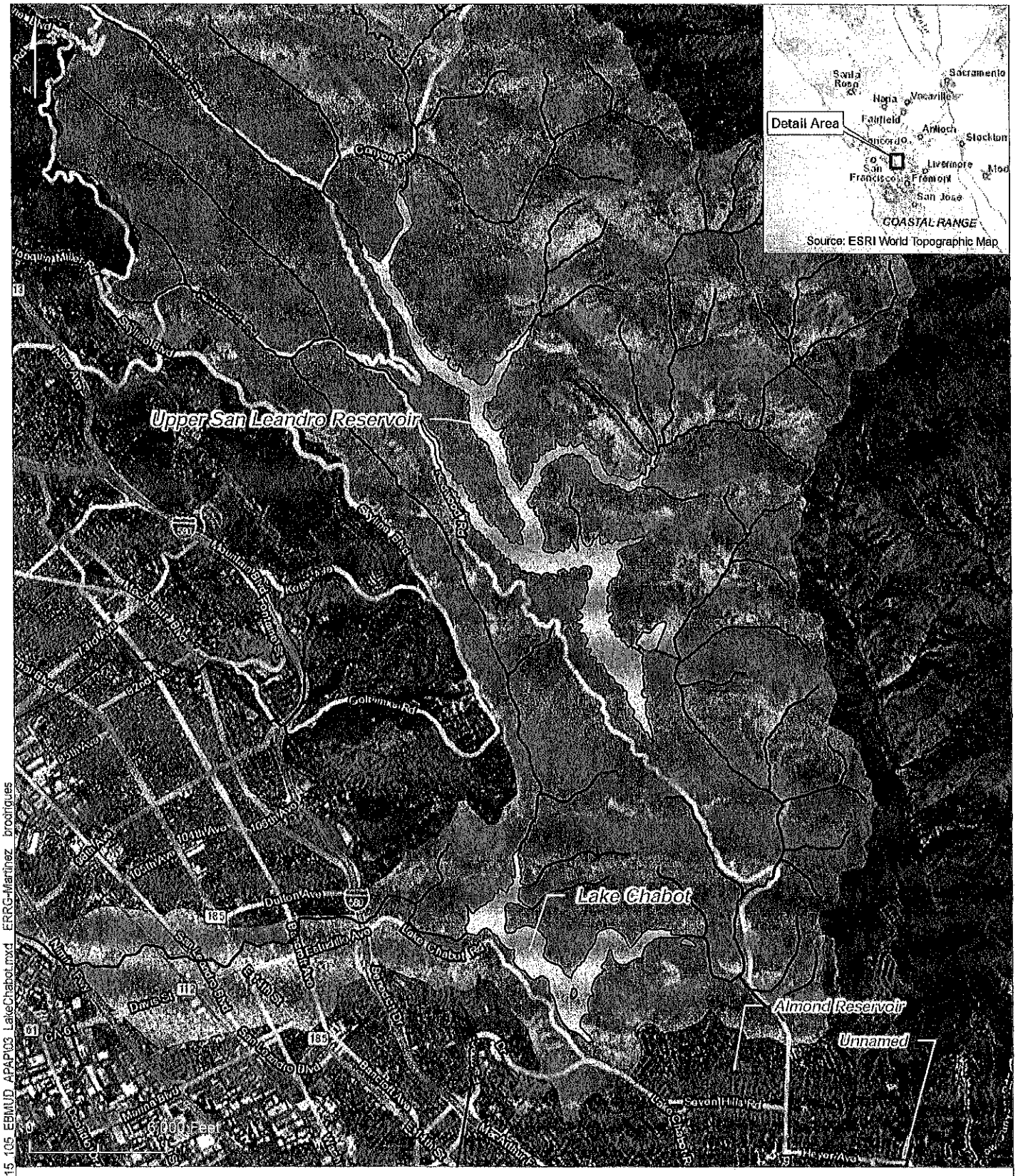

Figure 7. Lake Chabot and Upper San Leandro Reservoir
EBMUD - APAP

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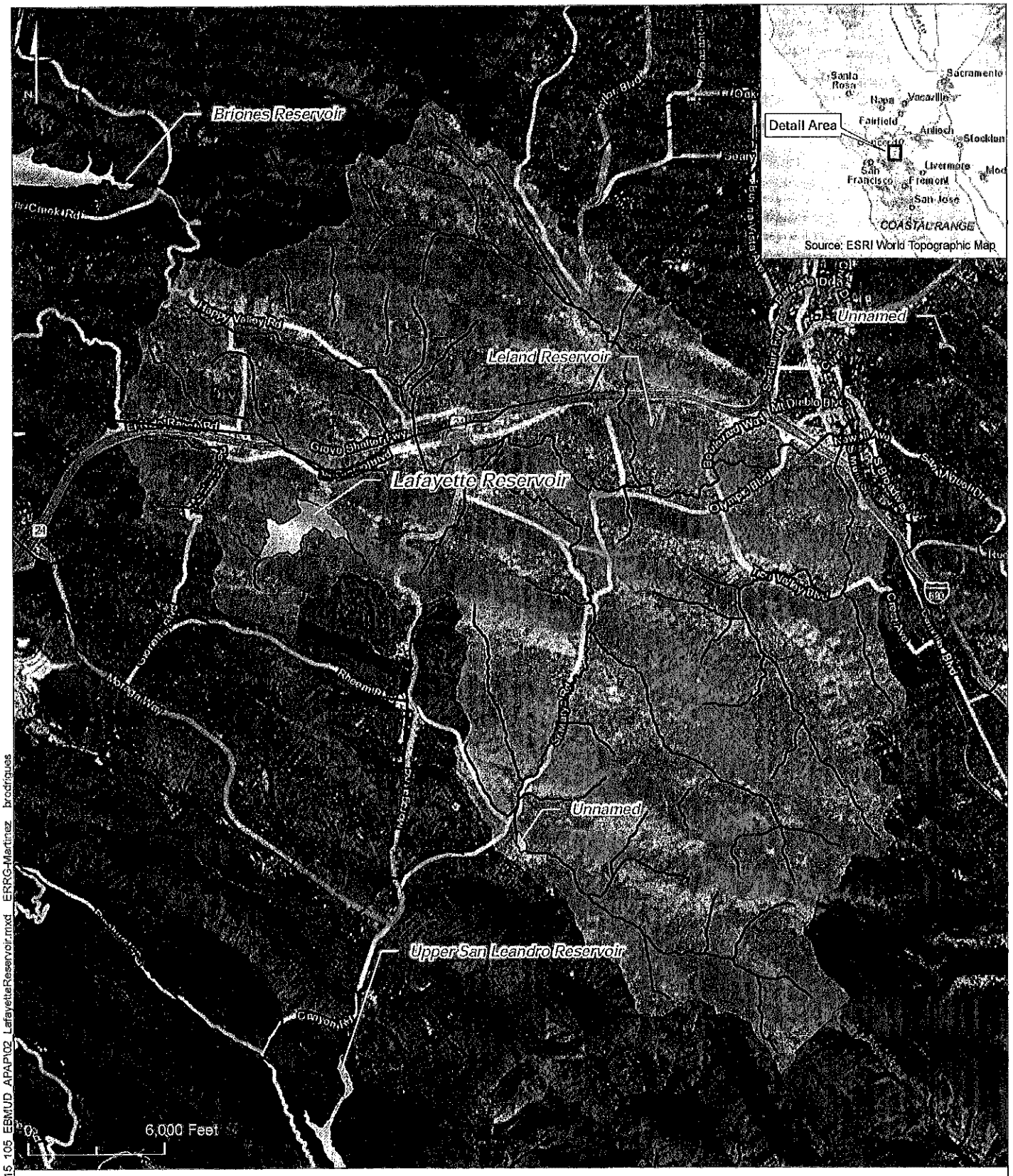
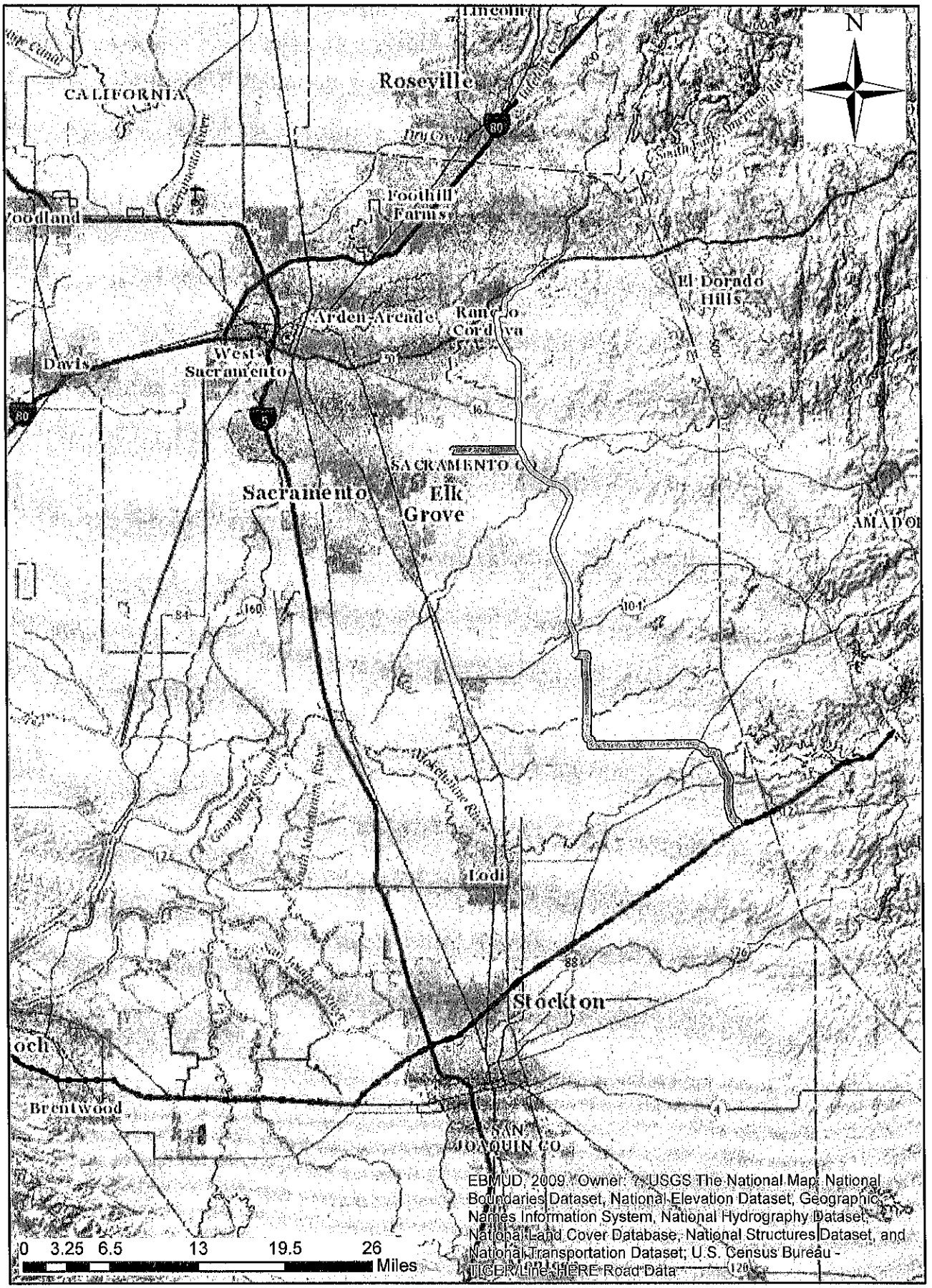


Figure 8. Lafayette Reservoir
EBMUD - APAP

ERRG

FIGURE 9. EBMUD FSCC & SEGMENT 3 ALIGNMENT



ELEMENT 2: DESCRIPTION OF TREATMENT AREA

EBMUD will apply algaecides and aquatic pesticides to manage invasive aquatic species such as algal blooms, within the Folsom South Canal, the Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, as well as ponds and associated water bodies in the reservoir watersheds. These water bodies are described in Element 1 and presented in Figures 2 through 9.

ELEMENT 3: DESCRIPTION OF WEEDS AND ALGAE

Submerged, emergent and floating aquatic vegetation and algae are encountered at the water bodies such as Eurasian milfoil (*Myriophyllum spicatum*). EBMUD's primary concern is algae blooms, for example, diatoms (*Cyclotella* ssp. *Stephanodiscus* ssp.); planktonic, branched, filamentous, macroscopic, and blue-green algae (*Anabaena* spp., *Cladophora* ssp., *Nostoc* ssp., *Nitella* ssp., *Chara* spp.)

ELEMENT 4: ALGAECIDES AND AQUATIC HERBICIDES EXPECTED TO BE USED

Table 1. Algaecides and Aquatic Herbicides Summary

Herbicide Active Ingredient, *(Name)*	Application Method(s)	Adjuvant
Diquat Dibromide *(Harvester, Littora)*	Submersed boom, handgun, or boom sprayer.	Various "Aquatic"-labeled adjuvants
Endothall *(Aquathol K®, Teton®)*	Submersed boom/injection, handgun or boom sprayer, or spreader (granules)	Not applicable
Fluridone *(Sonar®)*	Submersed boom, or spreader (granules)	Not applicable
Sodium Carbonate Peroxyhydrate *(GreenClean®)*	Handgun, boom sprayer (liquid), or spreader (granules)	Not applicable
Copper Sulfate Pentahydrate *(Earthtec®)*	Handgun, boom sprayer (liquid), or aerial sprayer.	Not applicable
Copper Etylenediamine Complex *(Komeen®)*	Submersed boom/injection, handgun or boom sprayer.	Not applicable
Copper Ethanolamine Complex *(Captain XTR®)*	Submersed boom/injection, handgun or boom sprayer.	D-limonene or similar surfactant.
Copper Triethanolamine Complex, Copper Ethylenediamine Complex, *(Nautique®)*	Submersed boom/injection, submersed hose, handgun, drip system, aerial sprayer, or boom sprayer.	Various "Aquatic"-labeled adjuvants
Imazamox *(Raptor®)*	Handgun, boom sprayer (liquid), or aerial sprayer.	Nonionic surfactants (0.25% v/v), methylated seed oils, or vegetable oil concentrates
Triclopyr *(Garlon®, Confront®, Turflon®, Remedy®)*	Handgun, boom sprayer (liquid), or aerial sprayer.	Nonionic surfactant
Lanthanum modified clay, *(Phoslock®)*	Venturi mixing system with a boom sprayer (liquid)	Not applicable
Glyphosate *(Rodeo®, Eraser AQ®, ®Aquamaster, Touchdown Pro®, Aquaneat®)*	Handgun, or boom sprayer (liquid), or aerial sprayer	Nonionic surfactant

Aquatic-labeled adjuvants or surfactants may be used to enhance the efficiency of an herbicide as listed in Table 1. Generally, the EBMUD uses adjuvants that are not nonylphenol-based. All herbicide applications are made in accordance with product label.

ELEMENT 5: DISCUSSION OF THE FACTORS INFLUENCING SELECTION AND USE OF ALGAECIDE

The EBMUD has established an IPM Committee to develop a consistent approach toward pesticide usage and management throughout the EBMUD, and to monitor the use of herbicides and pesticides. The IPM Committee has developed a plan for use throughout the district that provides written guidance for determining the most appropriate pest control methods for a particular application, including the use of chemicals. Pests include a wide range of both plant

and animal species capable of creating a nuisance. The treatment of algae and other aquatic vegetation is determined by the application of the IPM Plan.

All personnel having algae and aquatic vegetation responsibilities shall be trained to accurately identify algae and the damage that such algae and aquatic vegetation may cause. Field manuals and other resources shall be made available to staff to assist in algae and aquatic vegetation identification, as necessary.

An injury level is the pest population size or density associated with intolerable damage (e.g., algae or aquatic vegetation growth that affects beneficial uses of the reservoir). An action threshold is the set of conditions required to trigger a control action (e.g., emergence of algae or aquatic vegetation in a reservoir). EBMUD staff shall determine through monitoring the infestation levels that will be intolerable or that will cause unacceptable damage at different times of the year, during various growth stages, and for other situations. At the same time, a monitoring plan will be devised for detecting these algae levels and determining when to implement control actions. Action thresholds are usually reached when: monitoring results indicate that the population will reach the injury level, if left untreated; biological or environmental factors cannot be expected to reduce the algae or aquatic vegetation problem within a reasonable amount of time; and management costs (including any environmental or health impacts) are considered to be lower than costs associated with potential algae or aquatic vegetation damage.

EBMUD will develop management strategies for individual sites, types of sites and/or algae. The criteria below will be considered when developing the management strategies:

- least damaging to the general environment
- least hazardous to human health
- least toxic to non-target organisms
- absence of listed species or known listed species habitat
- most likely to produce permanent reduction of the algae or aquatic vegetation
- easiest to carry out effectively
- most cost-effective in the short and long term

As strategies are developed, they may include a combination of various management alternatives. The preferred methods in an IPM program are those that permanently prevent algae or aquatic vegetation problems, thereby eliminating the potential for damage. Algae and aquatic vegetation management strategy may include one or more of the following elements:

- no controls
- physical/mechanical controls (e.g., harvesting algae)
- biological controls (e.g., use of predators or parasites)
- chemical controls (preferably low toxicity materials such as soaps and oils)
- other controls (e.g., aeration, water circulation)

The EBMUD's IPM Committee will determine the best management strategies to implement for individual sites based on monitoring results from trained management personnel. The IPM Committee will select the best management strategy, in order to prevent exceedance of an injury level or reduce current injury level to a tolerable level, below the action threshold, for a specific nuisance species. If the IPM Committee chooses to implement chemical controls, the selection of type, quantity, and timing of application of algaecide or aquatic herbicide will be based on the recommendation from a CDPR licensed Pest Control Advisor (PCA).

ELEMENT 6: GATES AND CONTROL STRUCTURES

EBMUD operates and maintains water control structures (dams/impoundments) at the downstream end of each of the seven reservoirs. EBMUD staff will close gates, valves or other structures during an algaecide or aquatic herbicide application to control the extent that receiving waters will be affected by algaecide or aquatic herbicides.

Prior to and during the application, control structures within the treatment area will be inspected to evaluate the presence of leaks. If leaks are observed on closed valves or gates, application will be stopped and the structures repaired as soon as practicable.

ELEMENT 7: DISCHARGE EXCEPTIONS UNDER STATE WATER BOARD POLICY

EBMUD qualifies for an exception for a short-term or seasonal exception to the copper water quality order. The district currently does not have a SIP exception, and would apply for an exemption under a separate application.

ELEMENT 8: DESCRIPTION OF MONITORING PROGRAM

The following element presents the Monitoring and Reporting Program (MRP). The MRP addresses two key questions:

- Does the residual algaecides and aquatic herbicides discharge cause an exceedance of the receiving water limitations?
- Does the discharge of residual algaecides and aquatic herbicides, including active ingredients, inter-ingredients, and degradation byproducts, and any combination cause or contribute to an exceedance of the "no toxics in toxic amount" narrative toxicity objective?

8.1 DATA COLLECTION

In accordance with monitoring requirements outlined in Table C-1 of the Permit, qualified personnel will perform visual monitoring and recording of algaecide and aquatic herbicide applications at an appropriate number of selected environmental settings.

Pesticide application activities, monitoring observations, and sampling information will be recorded on the following field forms located in Appendix A: Aquatic Pesticide Application Log, and Aquatic Herbicide Field Monitoring and Sampling Form.

8.2 SAMPLE COLLECTION

Grab water samples will be collected for the purpose of monitoring any of the following active ingredients used in an aquatic pesticide application: Diquat, endothall, fluridone, sodium carbonate peroxyhydrate. Sample collection at environmental settings that have undergone pesticide application will be chosen to represent variations of treatment that occur, hydrology, conveyance or impoundment type, seasonal, and regional variations. The exact locations of environmental settings will be determined after scouting and a decision to make a pesticide application is made per the EBMUD IPM approach, and will be technically justified and identified for why those sampling areas are to be considered as representative of the environmental setting.

Water samples will 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.

8.2.1 Sample Frequency

Water samples will be collected from a minimum of six application events per calendar year for each active aquatic pesticide ingredient in each flowing water and non-flowing water environmental setting. If there are fewer than six application events in a year for each environmental setting, then water samples will be collected during each application event. If the results from six consecutive sampling events show concentrations that are less than the receiving water limitation/trigger for an active ingredient in an environmental setting, sampling shall be reduced to one application event per year for that active ingredient in that environmental setting. If the yearly sampling event shows exceedance of the receiving water limitation, trigger for an active ingredient in an environmental setting, then sampling shall return to six application events for that active ingredient in each environmental setting

8.2.2 Sample Types

In accordance with the Permit, the following sample types are required for each sampling event conducted:

1. **Background Monitoring (BG).** 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.
2. **Event Monitoring (Event).** 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.
3. **Post-Event Monitoring (PE).** Post-event monitoring samples shall be collected within the treatment area within one week after application.

The location and timing for the collection of the Event sample may be based on a number of factors including, but not limited to algae and aquatic weed density and type, flow rates, size of the treatment area and duration of treatment.

One full set of three samples (i.e. BG, Event and PE) will be collected for each sampling event from the representative environmental setting treated within the EBMUD's jurisdiction according to the monitoring frequency and locations described earlier.

Additionally, field duplicate (FD) and field blank (FB) samples will be submitted for laboratory analysis of active ingredients at a frequency that provides results once per year for each active ingredient used in each environmental setting. The FD and FB samples will most likely be collected during Event Monitoring.

8.2.3 Sample Collection Methods

Water samples will 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. If locations are difficult to access an intermediary sampling device (such as a Van-Dorn style sampler or long-handled sampling pole) will be used as necessary. Long-handled sampling poles with attached sampling container will be inverted before being lowered into the water to the desired sample depth, where it will be turned upright to collect the sample. Appropriate cleaning technique is discussed in Section 8.7.4.

8.3 FIELD MEASUREMENTS

In conjunction with sample collection, temperature, and dissolved oxygen will be measured in the field with a water quality meter. Turbidity, electrical conductivity, and pH may also be measured in the field using a water quality meter or analyzed in the laboratory. Water quality meters will be calibrated according to manufacturer's specifications at the recommended frequency, and checked with a standard throughout the year per manufacturer's specifications (typically once per month) to evaluate instrument performance. The conductivity probe will be recalibrated until it meets manufacturer's specifications if it does not meet its initial calibration standards. Calibration logs will be maintained for all instruments to document calibration.

8.4 SAMPLE PRESERVATION AND TRANSPORTATION

Samples may be collected directly into preserved containers, or collected in unpreserved containers, and preserved at the laboratory upon receipt if the analytical method requires preservation. Once a sample is collected and labeled, it will immediately be placed in a dark, cold (~4°C) environment, typically a cooler with ice. Delivery to the laboratory should be as soon as practicable after sample collection with consideration to the hold times required for the analytes being tested, shown in Table 2.

8.5 SAMPLE ANALYSIS

Table 2 shows the active ingredients that may be analyzed for in each water sample. As required by Attachment B of the Permit, adequate laboratory controls and appropriate quality assurance procedures will be followed. Analysis will be completed by the EBMUD Facility Laboratories.

8.6 REPORTING PROCEDURES

An annual report for each reporting period, from January 1 to December 31, will be prepared by March 1 of the following year and will be submitted to the appropriate Regional Water Quality

Control Board (RWQCB). In years when no algaecides or aquatic herbicides are used, a letter stating there were no applications will be sent to the appropriate RWQCB in lieu of an annual report. The EBMUD will collect and retain all information on the previous reporting year. When requested by the Deputy Director or Executive Officer of the applicable RWQCB, the EBMUD will submit the annual information collected.

The annual report will contain the following information as described in Attachment C of the Permit:

- An Executive Summary discussing compliance or violation of the Permit and the effectiveness of the APAP; and
- A summary of monitoring data, including the identification of water quality improvements or degradation as a result of algaecide or aquatic herbicide application. All receiving water monitoring data shall be compared to receiving water limitations and receiving water monitoring triggers. If appropriate, the summary will include recommendations for improvements to the APAP, including proposed best managements practices (BMPs), and monitoring program based on the monitoring results;
- A discussion of the effectiveness of identified BMPs in use for meeting the Permit requirements;
- A discussion of BMP modifications addressing violations of the Permit;
- A map showing the location of each treatment area;
- Types and amounts of algaecide or aquatic herbicides used at each application event;
- Information on surface area and/or volume of treatment area and any other information used to calculate dosage, concentration, and quantity of each aquatic herbicide used;
- Sampling results shall indicate the name of the sampling agency or organization, detailed sampling location information (including latitude and longitude or township/range/section if available), detailed map or description of each sampling area (address, cross road, etc.), collection date, name of constituent/parameter and its concentration detected, minimum levels, method detection limits for each constituent analysis, name or description of water body sampled, and a comparison with applicable water quality standards, description of analytical QA/QC control plan. Sampling results shall be tabulated so that they are readily discernible; and;
- Summary of Aquatic Herbicide Application Logs (AHALs, appendix A)

The EBMUD will report to the SWRCB and appropriate RWQCBs any noncompliance including any unexpected or unintended effect of an algaecide or aquatic herbicide that may endanger health or the environment. The Twenty-Four Hour Report will be provided orally over the phone to the SWRCB and appropriate RWQCBs within 24 hours from the time the EBMUD becomes aware of any noncompliance. The Twenty-Four Hour Report will include the following information:

- The caller's name and telephone number;
- Applicator name and mailing address;

- Waste Discharge Identification number;
- How and when the EBMUD became aware of the noncompliance;
- Description of the location of the noncompliance;
- Description of the noncompliance identified and the EPA pesticide registration number for each product the EBMUD applied in the area of the noncompliance; and
- Description of the steps that the EBMUD has taken or will take to correct, repair, remedy, cleanup, or otherwise address any adverse effects.

If the EBMUD is unable to notify the SWQCB and appropriate RWQCB within 24 hours, the EBMUD will do so as soon as possible and provide a rationale for why the EBMUD was unable to provide notification of noncompliance within 24 hours. In this case, it is required to submit a written report within five days of the time the discharger becomes aware of the noncompliance, containing the following:

- Date and time discharger contacted the SWRCB and appropriate RWQCB notifying of the noncompliance and any instructions received from the State and/or Regional Water Board; any information provided in the Twenty-Four Hour Report.
- A description of the noncompliance and its cause, including exact date and time and species affected, estimated number of individual and approximate size of dead or distressed organisms (other than the pests to be eliminated);
- Location of incident, including the names of any waters affected and appearance of those waters (sheen, color, clarity, etc.);
- Magnitude and scope of the affected area (e.g. aquatic square area or total stream distance affected);
- Algaecide and aquatic herbicide application rate, intended use site (e.g., banks, above, or direct to water), method of application, and name of algaecide and herbicide product, description of algaecide and herbicide ingredients, and EPA registration number;
- Description of the habitat and the circumstances under which the noncompliance activity occurred (including any available ambient water data for aquatic algaecides and aquatic herbicides applied);
- Laboratory tests performed, if any, and timing of tests. Provide a summary of the test results within five days after they become available;
- If applicable, explain why the Discharger believes the noncompliance could not have been caused by exposure to the algaecides or aquatic herbicides from the Discharger's application; and
- Actions to be taken to prevent recurrence of adverse incidents.

8.7 SAMPLING METHODS AND GUIDELINES

This section serves to present methods and guideline for sample collection and analysis necessary to meet the APAP objective of assessing adverse impacts, if any, to beneficial uses of

water bodies treated with algaecides and aquatic herbicides. Guidance for the preparation of this section include: NPDES Storm Water Sampling Guidance Document (USEPA 1992); Guidance and Specifications for Preparing Quality Assurance Project Plans (USEPA 1980); and U.S. Geological Survey, National Field Manual for the Collection of Water Quality Data (USGS 1995). This section describes techniques, equipment, analytical methods, and quality assurance and quality control procedures for sample collection and analysis.

8.7.1 Surface Water Sampling Techniques

In addition to compliance to sampling techniques discussed in Section 8.2.3, the samples will be collected in a manner that minimizes the amount of suspended sediment and debris in the sample. Surface water grab samples will be collected directly by the sample container or by an intermediary container in the event that the sample container cannot be adequately or safely used. Intermediary samplers will be either poly (plastic/HDPE), stainless steel or glass. Alternatively, disposable poly or glass intermediary sample containers can be used. Any non-disposable container that will be reused between sites will be washed thoroughly and triple rinsed before collection of the next sample, see Section 8.7.4.

8.7.2 Sample Containers

Clean, empty sample containers with caps will be supplied in protective cardboard cartons or ice chests by the primary laboratory. The containers will be certified clean by either the laboratory or the container supplier. To ensure data quality control, the sampler will utilize the appropriate sample container as specified by the laboratory for each sample type. Sample container type, holding time, and appropriate preservatives are listed in Table 2. Each container will be affixed with a label indicating a discrete sample number for each sample location. The label will also indicate the date and time of sampling.

8.7.3 Sample Preservation and Filtering

As described in Section 8.4, samples may either be collected with bottles containing the correct preservative(s), or collected in unpreserved bottles and preserved upon receipt at the analytical lab if necessary. If filtration is required, it must be done prior to sample preservation. After collection, samples will be refrigerated at approximately four degrees Celsius (°C), stored in a dark place, and transported to the analytical laboratory. Refer to Table 2.

Table 2: Sample Analysis and Reporting

Analyte	CAS#	Analytical Method	Sample Containers (number, size, type)	Min. sample volume required for analysis	Preservation Require-ments (Chemical, temperature, light protected)	In-field filtration required (Y/N)	Max Hold Time (Prep/ analy-sis)	Limit of detec-tion (µg/L)	Limit of quan-titation (µg/L)
Diquat dibromide[1]	85-00-7	EPA 549.2	2 each 250 plastic brown bottle	250 mL	temp < 4 degC; dark	N	7 days / 14 days	0.29 ug/L	4
Endothall[1]	145-73-3	EPA 548.1	2 each 125 mL amber bottle	125 mL	temp < 4 degC; dark	N	7 days / 14 days	1 ug/L	45
Fluridone[1]	59756-60-4	NCL Me 326	40 mL amber glass	40 mL	temp < 4 degC; dark	N	14 days	0.024	0.1
Sodium carbonate peroxyhydrate[2]	15630-89-4	NA	NA	NA	NA	NA	NA	NA	NA
Copper [1]	7440-50-8	EPA 200.8	1 L Plastic	500 mL	temp < 4 degC, 10% HNO3 to pH < 2	0.45 µm capsule filter	6 months if field preserv ed	0.03	0.5
Imazamox[1]	24705 7-22-3	HPLC	2 each 40 mL VOA	40 mL	temp < 4 degC	N	7 days / 14 days	50	50
Triclopyr[1]	57213-69-1, 06470 0-56-7	EPA 615, 8150A, 8151,	2 each 1 L amber glass	1 L	temp < 4 degC; dark	N	7 days / 40 days	0.5	1
Lanthanum modified clay[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Glyphosate[1]	38641-94-0; 75-31-0	EPA 547	2 each 40 mL VOA	60 mL	temp < 4 degC; dark	N	14 days / 14 days	9	9
Nonylphenol[3]	25154-52-3	EPA 550.1m	2 each 1 L amber glass	1 L	temp < 4 degC; dark	N	7 days / 14 days	0.5	0.5

Notes:
1 Aquatic herbicide or algaecide active ingredient.
2 General Permit CAG990005 does have a monitoring trigger or a monitoring requirement for sodium carbonate peroxyhydrate or lanthanum modified clay. (SWRCB 2013).
3 Analysis required when a surfactant containing nonlyphenol is used.
Methods referenced from EPA 2016

8.7.4 Sampling Equipment Cleaning

In the event that sampling equipment will be used in more than one location, the equipment will be thoroughly cleaned with a non-phosphate cleaner, triple-rinsed with distilled water, and then rinsed once with the water being sampled prior to its first use at a new sample collection location.

8.7.5 Sample Packing and Shipping

All samples are to be packed and transported the day the samples are collected to provide ample time for samples to be analyzed within the required holding time. Ice will be included in coolers containing samples that require temperature control. In general, all samples will be analyzed in the EBMUD laboratory. In the event that the samples are analyzed elsewhere and need to be transported to an alternate location, samples will be packaged in the following manner:

- Sample container stickers will be checked for secure attachment to each sample container.
- The sample containers will be placed in the cooler lined with padding, along with appropriate padding between sample containers to protect the sample containers from breakage during shipment and handling. Bubble-wrap, suitable foam padding, or newspaper can be used for such purposes.
- The Chain of Custody (COC) will be placed inside a plastic bag and placed inside the cooler. The COC will indicate each unique sample identification name, time and place of sample collection, the sample collector, the required analysis, turn-around-time, and location to which data will be reported.
- The cooler will then be readied for pick-up by a courier or delivered directly to the laboratory.

8.8 FIELD SAMPLING OPERATIONS

8.8.1 Field Logbook

Sample records are to be kept with the intent to provide sufficient data and observations to enable project team members to reconstruct events that occurred during the sampling. A hard-copy record must be maintained by members of the sampling team to provide a record of sample location, significant events, observations, and measurements taken during sampling. They must be legible, factual, detailed, and objective. As appropriate and at the discretion of the EBMUD staff, observations and measurements can be supplemented with pictures of site conditions at the time of sampling. When recording observations in the field book, the sampling team will note the presence or absence of:

- Floating or suspended matter;
- Discoloration;
- Bottom deposits;
- Aquatic life;

- Visible films, sheens, or coatings;
- Fungi, slimes, or objectionable growths; and
- Potential nuisance conditions.

See Appendix A for the forms to be used to record relevant field data when sampling.

8.8.2 Alteration of Sampling Techniques

It is possible that actual field conditions may require a modification of the procedures outlined herein. Specifically, water levels, weather, other environmental parameters and hazards including stream flow, rainfall, and irrigation water use may pose access and/or sampling problems. In such instances, variations from standard operating procedures and planned sampling locations and frequencies will be documented by means of appropriate entry into the field logbook.

8.8.3 Flow Estimation

Flow estimation measurements must be made for all moving water sampling locations. If feasible, a flow meter calibrated according to the manufacturer's directions may be placed as close to the center of the stream, creek or canal as possible and a reading taken in feet per second (ft./sec). Alternatively, a common floating object (ball, branch, leaf, etc.) may be placed as close to the center of the conveyance as possible and estimated on its time to travel a known distance of approximately 25 feet (minimum), represented in ft./sec.

8.8.4 Chain of Custody (COC)

The COC record will be employed as physical evidence of sample custody. The sampler will complete a COC record to accompany each sample shipment from the field to the laboratory, per Section 8.7.5 instructions. The COC will specify: time, date, location of sample collection, specific and unique sample number, requested analysis, sampler name, required turn-around-time, time and date of sample transaction between field and laboratory staff, preservative, if any, and name of receiving party at the laboratory.

Corrections to the COC will be made by drawing a line through, initialing, and dating the error, and entering the correct information. Erasures are not permitted. Upon receipt of the samples, laboratory personnel will review sample documentation, verify correct containers were used, check that samples were received within holding time, verify proper field preservation, and measure the temperature of a representative sample. The laboratory sample receiver documents this information and notifies the Senior Chemist of anomalies.. Upon verification of the number and type of samples and the requested analysis, a laboratory representative will sign the COC, indicating receipt of the samples. The Senior Chemist will review the COC and sample documentation and notify the client of anomalies.

The COC record form will be completed in duplicate. Upon sample delivery, the original copy will be left with the laboratory and a copy will be kept by the sampler, three-hole punched (if for a binder), and placed in the field logbook.

8.8.5 Sample Label

Prior to sampling, a water resistant label will be completed with waterproof ink and will be affixed to the appropriate container. The label will contain information on the specific project (i.e. EBMUD), the unique individual sample ID (i.e. Camanche Reservoir – BG), and the date and time the sample was collected.

8.8.6 Corrections and Documentation

Documents will not be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement or correction. If an error is made on a document used by an individual, that individual will make corrections by making a line through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated.

8.8.7 Document Control

A central file location will be established and used to store documentation such as the field logbook and laboratory data.

8.8.8 Sample Kit

Prior to departing to the field to collect samples, the following equipment will be prepared for use:

- Laboratory-supplied sampling bottles (one set for each sample to be collected plus spares, and QA/QC samples)
- Sample labels (one for each sample to be collected plus spares)
- Sharpie® Pen or other permanent, water-proof ink marker
- COC forms
- Field data logbook
- Flow meter (if for moving water applications)
- Zip lock style bags for paperwork
- Nitrile gloves
- Non-phosphate cleaner (i.e. Liquinox)
- Deionized or distilled water
- Ice or blue ice packs
- Clear packing tape (if samples are to be shipped)
- Cooler for samples
- Intermediary sampling device
- Gloves
- Rubber boots or waders
- Wrist watch (and stop watch)

- Camera
- YSI Multi-parameter meter (able to read temperature, turbidity, electrical conductivity, pH, and dissolved oxygen), or similar.

Three 5 gallon buckets (for decontamination of non-disposable sampling equipment)

8.9 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

The purpose of quality assurance and quality control (QA/QC) is to assure and control the quality of data generated during sample collection and analysis as described earlier in this document. Quality assurance and quality control are measured in a variety of ways, as described below.

8.9.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to the average value of the group and is expressed as the relative percent difference (RPD). Sources of error in precision (imprecision) can be related to both laboratory and field techniques. Specifically, lack of precision is caused by inconsistencies in instrument settings, measurement and sampling techniques, and record keeping.

Laboratory precision is estimated by generating analytical laboratory matrix spike (MS) and matrix spike duplicate (MSD) sample results and calculating RPD. In general, laboratory RPD values of less than 20 percent will be considered acceptable.

Field precision is estimated by collecting field duplicates (FDs) in the field and calculating RPD. In general, field RPD values of less than 35 percent will be considered acceptable. Refer to the discussion of FDs in Section 8.9.5.

8.9.2 Accuracy

Accuracy is a measure of how close data are to their true values and is expressed as percent recovery (%R), by taking the difference between the mean and the true value. Sources of error (inaccuracy) are the sampling process, field contamination, preservation, handling, sample matrix effects, sample preparation, analytical techniques, and instrument error.

Laboratory accuracy is estimated using reference standards, matrix spike (MS) and matrix spike duplicates (MSD) samples. Acceptable accuracy is generally between 75 and 125 percent.

8.9.3 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness objective is that the sufficiently valid data is generated to allow for submittal to the SWRCB and RWQCB. Completeness will be assessed by comparing the number of valid sample results to the number of samples collected. The objective for completeness is > 80 percent.

8.9.4 Representativeness

Representativeness refers to a sample or group of samples that reflects the predominant characteristics of the media at the sampling point. The objective in addressing representativeness is to assess whether the information obtained during the sampling and analysis represents the actual site conditions. Permit requirements of sampling each application at 10 percent of all sites treated is assumed to meet the representativeness criteria.

8.9.5 Field Duplicate

The purpose of a field duplicate (FD) is to quantify the precision, or reproducibility, of the field sampling technique. It involves the duplication of the technique used for a particular field sample collection method and the subsequent comparison of the initial and duplicate values. This comparison is measured as the relative percent difference (RPD). RPD is calculated as follows:

$$RPD = [(Sample1 - Sample2) / (Average\ of\ Samples\ 1\ and\ 2)] \times 100$$

An acceptable field RPD value is < 35 percent. The FD is collected at the same time as the actual field sample.

8.9.6 Field Blank

The purpose of the field blank (FB) is to assure that the field sampling technique, equipment, or equipment cleaning technique or materials do not impart a false positive or negative result during the collection of the sample. A FB will be prepared with distilled water and allowed to come into contact with the sampling device in a manner identical to the actual sample. The only acceptable values for analytes in the FB is less than the detection limit for the compounds of interest, or an expected, previously determined, background value.

The FB will be collected at the same time as the actual field sample.

8.9.7 Laboratory Quality Assurance and Quality Control

Laboratory precision and accuracy will be monitored by a series of laboratory-generated quality control samples. As long as sufficient sample volume is collected and submitted to the laboratory, no additional effort is required by field activities to generate laboratory quality control samples. Associated with each set of field samples will be one of each from the following set of laboratory quality control samples.

8.9.7.1 Method Blank

The purpose of the method blank (MB) is to assure that the analytical technique does not impart a false positive result during the preparation or analysis of the sample. A method blank will be prepared by the laboratory from high purity distilled or deionized water. The only acceptable values for analytes in the MB are zero or an expected, previously determined, background values.

8.9.7.2 Matrix Spike

The purpose of a matrix spike (MS) is to quantify accuracy and to assure that the analytical technique does not impart a false negative or positive result during the preparation or analysis of the sample. It involves the introduction of the analyte (or an analyte surrogate) of interest into the actual sample matrix and then quantitating it.

The amount detected divided by the amount added to the matrix is expressed as a percent recovery (%R). Acceptable values of %R range from 70 percent to 130 percent. Percent recovery is calculated as follows:

$$\%R = [(\text{Spike Amount Detected} - \text{Sample Value}) / \text{Amount Spiked}] \times 100$$

8.9.7.3 Matrix Spike Duplicate

The purpose of a matrix spike duplicate (MSD) is to quantify laboratory precision. An acceptable RPD is less than or equal to 25 percent. The MSD involves duplication of the MS resulting in two data points from which relative percent difference (RPD) is calculated as follows:

$$RPD = [(MS - MSD) / (\text{Average of MS and MSD})] \times 100$$

8.9.8 Data Validation

Data validation will use data generated from the analytical laboratory and the field. References that can be used to assist in data validation include USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 1994) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999).

The purpose of data validation is to ensure that data collected are of sufficient quality for inclusion in reports to the RWQCB. In order to serve this purpose, the following information must be available in order to evaluate data validity:

1. Date of sample collection – required to uniquely identify sample and holding time.
2. Location of samples – required to identify sample.
3. Laboratory QA/QC procedures – required to assess analytical accuracy, precision, and sample integrity. A laboratory QA/QC sample set consists of a MS, a MSD, and a MB. A laboratory QA/QC sample set will be analyzed by the laboratory for each field sample batch. Sufficient sample volume and number will be supplied to the laboratory in order to prepare and evaluate the laboratory QA/QC sample set.
4. Analytical methods – required to assess appropriateness and acceptability of analytical method used.
5. Detection limits – required to assess lower limit of parameter identification.

6. Holding times, preservation, and dates of extraction and analysis – required to assess if a sample was extracted and analyzed within the specified time limits and if a sample was stored at the appropriate temperature.
7. Field QA/QC procedures – required to assess field precision and sample integrity. A field QA/QC sample set consists of FB and FD samples. A field QA/QC sample set will be analyzed by the laboratory for one sampling event per year. Sufficient sample volume and number will be collected in the field and supplied to each laboratory in order to prepare and evaluate the field QA/QC sample set.

8.9.9 Data Qualification

Data collected for compliance with the Permit will be qualified through the Analytical Lab Validation process described in 8.9.7. This process will ensure all data has been thoroughly reviewed and qualified as valid. During the data validation process, data qualifiers will be used to classify sample data. The following qualifiers will be used:

A - Acceptable. The data have satisfied each of the requirements and are quantitatively acceptable (i.e., valid) and will be used in reports.

R - Reject. Data not valid. This qualifier will be used for samples that cannot be uniquely identified by date of collection or sample location or that fail holding time or, detection limit requirements. Invalid data will not be presented in reports submitted to the RWQCB.

8.9.10 Corrective Action

If previously described criteria for valid data are not met, then corrective action as follows will be taken:

1. The laboratory will be asked to check their quality assurance/quality control data and calculations associated with the sample in question. If the error is not found and resolved, then:
    a. The extracts or the actual samples, which will be saved until the data are validated, will be reanalyzed by the laboratory if they are within holding time limitations. These new results will be compared with the previous results. If the error is not found and resolved, then:
    b. If field analytical equipment is used, then calibration records will be reviewed. If the error is not found, then:
    c. The sampling procedure and sample preparation will be re-checked and verified. If the procedures appear to be in order and the error is not resolved, then:
    d. The data will be deemed invalid and not used.
2. Upon discovery of the source of an error, every attempt will be made to address the cause of the error and remedy the problem.

8.9.11 Data Reporting

The results of sampling and analysis will be summarized in the Annual Report. The data will be tabulated so that they are readily discernible.

ELEMENT 9: PREVENTATIVE SAMPLE CONTAMINATION PROCEDURES

Sample collection will be planned and performed to not contact pesticide application PPE, equipment, and/or containers Samplers will take precautions to avoid and minimize contact with water treated with algaecides. Collection of samples will not be performed near pesticide application equipment. If possible, sampling will be performed upwind of pesticide application equipment and operations. Disposable gloves will be used to collect samples, and will be changed between sample locations.

Reusable sampling equipment will be cleaned between sample locations. Cleaning will consist of:

1. Washing equipment with a laboratory-grade, non-phosphate detergent.
2. Rinse three times with potable water.
3. Prior to sampling at the new location, a single rinse with water to be sampled.

ELEMENT 10: DESCRIPTION OF BEST MANAGEMENT PRACTICES

10.1 MEASURES TO PREVENT SPILLS AND CONTAINMENT IN THE EVENT OF SPILLS

Applicators will take care when mixing and loading aquatic herbicides and algaecides and adjuvants. Secondary containment shall be used when mixing and loading aquatic herbicides and algaecides and adjuvants in order to prevent spills. All label language shall be followed to ensure safe handling and loading of algaecides and aquatic herbicides. Application equipment will be regularly checked and maintained to identify and minimize the likelihood of leaks developing or failure that would lead to a spill.

If aquatic herbicides or algaecides are spilled, they will be prevented from entering any waterbodies to the extent practicable. Applicator staff is trained in the use of absorbent materials such as kitty litter, "pigs" and "pillows". Spills will be cleaned up according to label instructions, and all equipment used to remove spills will be properly contained and disposed of or decontaminated as appropriate. Applicators will report spills as required and in a manner consistent with local, state and federal requirements.

10.2 MEASURES TO ENSURE APPROPRIATE APPLICATION RATE

Application of algaecides and aquatic pesticides will be conducted by Qualified Applicator Certificate (QAC) holders. Holders of QAC, Qualified Applicator License (QAL), or those under their direct supervision make applications recommended by the IPM Committee. These applicators have knowledge of proper equipment loading, nozzle selection, calibration, and operation so that spills are minimized, precise application rates are made according to the label,

and only target algae or vegetation are treated. Calibration ensures that the correct quantity and rate of herbicide is applied.

10.2.1 Site Scouting

Prior to the treatment, a PCA licensed by CDPR and/or qualified EBMUD staff scout the area(s) to be treated, make a positive identification of pest(s) to be treated, check applicable product label(s) for control efficacy, and the PCA prepares a written recommendation, including rates of application, and any warnings or conditions that limit the application so that non-target flora and fauna are not adversely impacted. Licensed PCAs must complete 40 hours of continuing education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

If a location is deemed to have exceeded a threshold, or given algae or aquatic weed population is anticipated to exceed a threshold based on site and weather conditions, lake depth, historic aquatic weed growth, or other information, an aquatic herbicide or algaecide application is considered. If the application can be made without negatively impacting the water quality, then an application is made.

10.2.2 Applications Made According to Label

All algaecide and aquatic herbicide applications are made according to the product label in accordance with regulations of the EPA, Cal OSHA, CDPR, and local agricultural commissioner. The EBMUD's PCA and CDPR-licensed QAC or QAL holders regularly monitor updates and amendments to the label so that applications are in accordance with label directions. Licensed QACs and QALs 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.

10.2.3 The EBMUD Plan in Educating Its Staff and Herbicide Applicators on How to Avoid Any Potential Adverse Effects from the Herbicide Applications.

All EBMUD application staff hold QALs or QACs from CDPR and are trained annually in the safe handing, mixing, application, storage, and transport of all aquatic herbicides and algaecides that are used. In addition to this, staff are briefed as to site specific conditions including water volume, use restrictions, environmental constraints, flow conditions, pest identification, and nuisance thresholds. All application staff are familiar with label instructions and conditions in regard to the safe and legal handing, mixing, and application of aquatic herbicides and algaecides in their control. Training materials and procedures are updated every 6 -12 months or as required depending upon the use of different active ingredients, compounds, or the addition of new treatment sites. All QALs require 20 continuing education units every two years in order to stay current on new application methods and requirements.

10.2.4 Planning and Coordination with Water Users in Order to Minimize Impacts During Application.

As required by the aquatic herbicide and algaecide label, water users potentially affected by any water use restrictions will be notified prior to an application being made. As necessary, gates, weirs, etc. will be closed as necessary to prevent discharge of residual aquatic herbicides or algaecides to off target locations.

10.3 MEASURES TO PREVENT ADVERSE EFFECTS TO STAFF

See information above in section 10.2.3 and 10.2.4.

10.4 DISCUSSION OF HOW BENEFICIAL USES OF WATER BODY WILL NOT BE IMPACTED DURING TREATMENT PERIOD

As required by the algaecide and aquatic herbicide label, water users potentially affected by any water use restrictions will be notified prior to an application being made. As necessary, gates, weirs, etc. will be closed to prevent discharge of residual algaecide or aquatic herbicides.

10.5 DESCRIPTION OF HOW FISH KILL WILL BE AVOIDED

It is important to acknowledge that the use of aquatic herbicides and algaecides, even when used according to label instructions, may result in unavoidable fish kills. Nonetheless, measures will be taken to reduce likelihood of fish kills as described below. Generally speaking, the concentration of residual aquatic herbicides and algaecides (i.e., the concentration of aquatic herbicide or algaecide present after the treatment is complete) is not sufficiently high enough to result in fish kills.

All algaecide and aquatic herbicide applications are made according to the product label in accordance with regulations of the EPA, Cal OSHA, CDPR, and local agricultural commissioner. Precautions on product label to prevent fish kills will be followed. Limitations on the surface water area treated will be followed to prevent dead algae or aquatic weeds from accumulating and then decaying and subsequently depressing the dissolved oxygen (DO) level. Depressed DO may adversely impact fish populations.

10.6 MEASURES TO AVOID TAKE OF LISTED SPECIES

The use of aquatic herbicides and algaecides may result in impacts to species listed under the Federal Endangered Species Act and the California Endangered Species Act. Listed animal and plant species are known to occur within and around the EBMUD watershed lands. The EPA and CDPR have established Endangered Species Programs to reduce impacts to listed wildlife and plant species during pesticide and herbicide applications. EBMUD also has developed specific plans, agreements and guidance documents to avoid take of listed species. EBMUD also uses biologists who are experts in listed species biology and the sensitive habitats and species in EBMUD lands.

EBMUD has developed specific measures in Alameda and Contra Costa Counties to avoid and minimize effects to special status species through a habitat conservation plan (HCP, EBMUD 2008). EDMUD will use the avoidance and minimization measures in their (HCP) guide to algaecide and aquatic herbicide application. Additionally, all algaecide and aquatic herbicides will be applied in accordance with existing regulations and guidance from EPA, CDPR, including their species-specific programs. The EPA's Endangered Species Protection Program's Interim Use Limitations for the San Francisco Bay Area (2015) and the CDPR Endangered Species Project (2013) will be used to guide applications in Alameda and Contra Costa Counties.

The EPA Endangered Species Protection Program and the CDPR Endangered Species Project have guidance applicable to the Pardee and Camanche watershed lands. The watershed lands are managed under a Federal Safe Harbor Agreement (SHA) and a State Routine Maintenance Agreement (RMA). EDMUD will use the avoidance and minimization measures in these agreements to guide algaecide and aquatic herbicide application.

EBMUD biology experts will be consulted prior to a proposed treatment or application to avoid unintended effects to sensitive habitats and special status species. The biology experts will assess the need for additional investigation and additional natural resources agency authorization based on the details of the proposed treatment. They will assess any constraints and limitations on the proposed application based on existing guidelines in the SHA, RMA, HCP, and other applicable guidances and regulations. Special status animal and plant surveys may be conducted prior to pesticide applications in shallow water, riparian habitat, reservoir shorelines and/or when recommended by EBMUD Biologists. Listed species or habitat observed that may be affected will be identified, mapped and avoided during pesticide applications.

ELEMENT 11: EXAMINATION OF POSSIBLE ALTERNATIVES

Treatment of algae and aquatic weeds is determined by the application of principles detailed in the IPM Plan. For example, if a population of algae or aquatic weeds equals or exceeds a threshold, an algaecide or aquatic herbicide application is made. Thresholds are met when aquatic weeds or algae cause problems, typically associated with odor complaints, adverse impacts to recreational, educational, or other beneficial uses of the EBMUD's facilities.

Algaecide and aquatic herbicide applications may also be made prior to threshold exceedance. For example, based on predicted growth rate and density, weather, water availability, and historical records and experience, aquatic weeds may reasonably be predicted to cause future problems. Accordingly, they may be treated soon after emergence. Even though algae or aquatic weeds may not be an immediate problem at this phase, treating them before they mature reduces the amount of algaecide and aquatic herbicide needed because the younger aquatic weeds are more susceptible and there is less plant mass to target. Selection of appropriate algaecides and aquatic herbicides and rate of application is done based on identification of the algae or aquatic weed and the appearance of that algae or aquatic weed on the product label.

11.1 EVALUATING MANAGEMENT OPTIONS

11.1.1 No action

Whenever possible, this is the preferred BMP. If pre-determined nuisance levels have not been reached, than this may be a feasible approach

11.1.2 Prevention

Habitat Modification

Habitat modification focuses on altering the environmental conditions in such a way as to modify the habitat in order to prevent nuisance aquatic weeds and algae. Methods such as aeration, light attenuating dyes, dredging, or bio-manipulation have all had positive results in regard to

reduction of the growth rate of aquatic plants and algae. Aeration, oxygenation and mixing are methods that can mechanically add oxygen directly to the water, and can result in the reduction of nuisance algae growth. Shading the water column using non-toxic, inert dyes can reduce unwanted submerged plants and algae. Use of dyes works on algae and submerged vegetation by limiting their ability to photosynthesize when the dye is present, but is not a long-term solution.

Bio-manipulation utilizes various natural mechanisms that can reduce suspended algae, and involves increasing biological controls in the habitat. The biological controls are typically done by top-down or bottom-up changes to the food-web structure aimed at increasing populations of algae-consuming zooplankton. Bio-manipulation may be more efficient when used in conjunction of other habitat modification methods.

A potential method for control of submersed aquatic vegetation is the use of aquatic weed mats. These mats can be secured to the bottom of the standing water body with soil nails or similar devices and provide a physical and sunlight penetration inhibiting barrier to aquatic weeds growing in the substrate.

Native Species Establishment

No appropriate submersed aquatic native plants have been found to establish within lakes or reservoirs to out-compete aquatic weed species and not create similar or other operational problems. As such, aquatic vegetation in the reservoirs must be controlled to maintain the aquatic weed density tolerances established by the EBMUD.

11.1.3 Mechanical or Physical Methods

Mechanical Removal

In some instances, the use of mechanical techniques may be necessary when the use of algaecides or aquatic herbicides is not practical, or when vegetation is not at an appropriate growth stage. Various methods of mechanical removal include: hand cutting from shore or while wading, use of motor-driven aquatic weed harvesters to pull up and remove vegetation, aquatic weed-whacking, or mowing.

Generally, these techniques are very labor intensive per unit acre or length of water treated. Mechanical removal places personnel at risk of general water, boating, slip, trip, and fall hazards, poisonous wildlife, drowning, risks the spilling of motor oil and fuel, and can increase air pollution. The cost per area of mechanical removal is significantly higher than the cost of labor, product and equipment of the application of aquatic herbicides. The increased cost of mechanical aquatic weed abatement does not include the cost of the aforementioned risks (pollution abatement, workman's compensation claims, etc.)

Aquatic weed harvesting systems can also be utilized to cut and remove aquatic vegetation from the lake and reduce labor costs. These systems are barges with cutting knives around a conveyor belt that harvest the plants, and move them onto the barge where a second conveyor belt collects and off loads the vegetation. These systems cut generally to a depth of five feet. Aquatic plants will then go through a short period of recovery and then begin to grow again.

Harvesting operations are efficient when the plants can be accessed without interference of obstructions such as docks and boat houses, and when the shore side operations for transfer and removal of the vegetation can be located close to where the harvester is working. The more time the harvester has to spend transporting weeds to the shore-side operation, the lower the production of the harvester.

Rotovation systems use underwater tilling systems to cut the widgeon grass roots from the lake sediment. This can provide somewhat longer term control of this species. Rotovation dislodges a considerable amount of plant material, detritus, and nutrients in the lakebed. In the long term, rotovation may actually increase the presence of nuisance species.

Environmental impacts due to the use of mechanical techniques include the creation of water-borne sediment and turbidity due to people and equipment working in the water. This suspended sediment can adversely affect aquatic species by lowering dissolved oxygen and preventing light penetration. Disturbing sediment or conveyance banks may cause additional problems including, but not limited to, new areas for aquatic weed establishment, fragmentation, re-establishment of aquatic weeds and siltation.

Physical Removal

Diver hand removal can be a very effective method of controlling aquatic plants under certain conditions. Divers swim through the littoral zone of the lake, note and often map the locations of stands of weeds, and hand remove and bag the plant material and roots. This system is effective in waters where visibility is good. The method provides rapid removal and clears the plants from the water column. One of the drawbacks of this method is the expense of deploying divers. Many states require prevailing wages for this activity that can cost upwards of $100.00 per hour for a dive team. For safety purposes, at least two divers must be working together underwater with a tender/safety diver on the support boat monitoring these operations.

Diver dredging is also used in this type of application. Using this technology dive teams use a hose system to pump the vegetation to a barge where it is captured for removal from the lake. While this system is more productive than diver hand removal, the same potential drawbacks apply.

11.1.4 Cultural Methods

Cultural methods to reduce the use of aquatic herbicides include modifying the timing of the algaecide and aquatic herbicide non-herbicide controls. The EBMUD may make algaecide and aquatic herbicide applications before the density of algae or aquatic vegetation is high enough to require higher algaecide or aquatic herbicide application rates or additional applications to maintain algae or aquatic weed populations below threshold levels.

11.1.5 Biological Control Agents

Utilization of ungulate species such as goats is often used for grazing in and along riparian areas. However grazing is not suitable for submerged aquatic weeds or algae. There is no known approved method of biological control for the removal of aquatic vegetation and algae.

11.1.6 Algaecides and Aquatic Herbicides

The selection of and decision to use an algaecide or aquatic herbicide is based on the recommendation of a PCA in collaboration with EBMUD IPM Committee. The PCA then considers a variety of control options that may include mechanical and cultural techniques that alone or in combination with chemical controls are the most efficacious and protective of the environment.

Evaluating alternative control techniques is a part of the EBMUD IPM approach; therefore an alternative treatment may be selected as part of its program. Alternative control techniques and detailed description of each of these is presented in section 11.1. In general, alternative control methods are not cost effective, labor intensive, not as effective, and cause temporary water quality degradation. The equipment and labor required to perform such techniques is not always readily available during busy maintenance periods for the EBMUD. High recreational activity during the summer months may cause delays in removal or sporadic plant material activity leading to increased plant growth and subsequently higher plant removal cost.

The quantity of algaecide and aquatic herbicide required for an application is determined by a PCA that has followed the label directions in making a recommendation. The rate at which an algaecide and aquatic herbicide is used is highly variable and depends on the type, time of year, location, and density and type of aquatic weeds, water presence, and goal of application. All these factors are considered by the PCA in collaboration with the EBMUD IPM Committee prior to making a recommendation for an application.

11.2 USING THE LEAST INTRUSIVE METHOD OF ALGAECIDE APPLICATION

EBMUD staff will use application techniques so as to apply aquatic herbicides in the least intrusive manner, and to insure rapid and accurate delivery to the treatment site. Algaecides and herbicides that are selected are chosen for the maximum efficacy at the lowest suitable amount and for minimal impact on the lake during application.

The EBMUD may use a variety of application methods including specialized mechanized vehicles (trucks, all-terrain vehicles, small boats, etc.) and personnel with backpack sprayers to make algaecide and aquatic herbicide applications. Combined with the need to hold, safely transport and properly apply algaecides and aquatic herbicides, the EBMUD techniques are the least intrusive as feasibly possible.

Please refer to Table 1 for application methods.

11.3 APPLYING A DECISION MATRIX CONCEPT TO THE CHOICE OF THE MOST APPROPRIATE FORMULATION

When selecting the appropriate formulation for aquatic weed and algae control, several factors must be taken into consideration. The components of this decision matrix are as follows:

- Accurate identification of pest
- Established nuisance threshold and tolerances

- External influences such as flow, water volume, and water use restrictions
- Method of application
- Duration of application
- Mitigation of treatment effects on lake ecology
- Ability to apply BMPs effectively

As previously stated, a PCA and/ or qualified EBMUD staff will scout the area to be treated, make positive identification of pest(s) present, checks appropriate algaecide and aquatic herbicide product label(s) for control efficacy, and then the PCS prepares a written recommendation. The written recommendation includes rates of application, and any warnings or conditions that limit application.

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Appendix A

Aquatic Herbicide Application Log

Aquatic Herbicide Field Monitoring and Sampling Form

Aquatic Herbicide Application Log

EBMUD

Date: _____ Application Start (time): _____ AM/PM

Application End (time): _____ AM/PM

Applicator Name: _____

Applicator Company: _____

Application Location: _____

Other Personnel: _____

Air Temperature (F°): _____ Wind Speed (MPH): _____ Target Species: _____

Treatment Area Size (Acres or Linear Feet): _____

Herbicide #1 Used: _____	Application Rate/ Target Concentration: _____	Units: _____	Total Amount Applied: _____	Units: _____
Herbicide #2 Used: _____	Application Rate/ Target Concentration: _____	Units: _____	Total Amount Applied: _____	Units: _____
Adjuvant #1 Used: _____	Application Rate/ Target Concentration: _____	Units: _____	Total Amount Applied: _____	Units: _____
Adjuvant #2 Used: _____	Application Rate/ Target Concentration: _____	Units: _____	Total Amount Applied: _____	Units: _____

Application Method #1: _____

Application Method #2: _____

Application Made (Circle One) With Flow / Against Flow / N/A

Waterbody Type: _____ Water Depth (Feet): _____

Water Temperature (F°): _____ Water Flow (Feet/Second, cfs): _____

Percent Weed Cover: _____

Please Enter Any Other Relevant Information Regarding Application:

I certify that the APAP has been followed:

Print Name: _____ Signature: _____

Aquatic Herbicide Field Monitoring and Sampling Form

EBMUD

IMPORTANT*: Attach Relevant Aquatic Herbicide Application Form

Event Type (Circle One): **Pre - Event (Background) / Event / Post - Event**

Application Type (Circle One): **Flowing Water / Non-Flowing Water**

Personnel: _____

Measurement Date / Time: _____

Application Location: _____

GPS Coordinates: _____

Herbicide Applied: _____

Surfactants: _____

Target Species: _____

Physical Monitoring

Dissolved Oxygen (mg/L): _____ Water Color: _____

pH: _____ Electrical Conductivity (µS/cm): _____

Temperature (C°): _____ Turbidity (NTU): _____

Grab Sample Method: _____ Analysis Equipment: _____

Grab Sample Depth (ft.): _____ _____

_____

Visual Monitoring

OBSERVED (Check One)	No	Unknown	Yes (If yes or unknown, describe)
Floating Material			
Suspended Material			
Water Discoloration			
Bottom Deposits			
Visible Films, Sheens or Coatings			
Fungi, Slimes, or Objectionable Growths			
Aquatic Life			

Chemical Analysis

Grab Sample Method: _____ Grab Sample Depth (ft.): _____

Sample ID:	Time and Date:	Container:	# of Containers:	Preservative:	Analysis:

Laboratory Chain Of Custody Attached (Circle One): Yes / No