

EGERIA Densa CONTROL PROGRAM

2011 ANNUAL REPORT

Submitted Pursuant to:

NPDES General Permit CAG 99005

40 CFR 122.41(k) and CFR 122.21

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information submitted. Based on my inquiry of the persons who manage the program, Terri Ely – Senior Environmental Scientist, or persons directly responsible for gathering information, including Geoff Newman – Egeria Densa Control Program Environmental Scientist, the information submitted is, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possibility of fines and imprisonment for knowing violations.

Lucia C. Becerra, Acting Director

Date

Table of Contents

Executive Summary	4
1 Introduction	
1.1 <i>Egeria densa</i> Impact on the Delta	6
1.2 Setting	6
1.3 Summary of Statutory Authority and Required Permits	
1.3.1 EDCP NPDES Permit (No. CAG990005)	7
1.3.2 EDCP USFWS B/O Section 7 Permit	8
1.3.3 EDCP NOAA Fisheries B/O Section 7 Permit	10
2 Personnel, Methods, and Materials	
2.1 EDCP Personnel, Accreditation, and Training	12
2.2 Materials	13
2.3 Environmental Monitoring	14
2.4 Laboratory Analytical Methods Data Validation	15
3 Compliance	
3.1 Herbicide Application Data and Permit Compliance	18
4 Discussion and Conclusions	
4.1 Discussion	18
4.2 Herbicide Application Compliance	18
4.3 Conclusions	18

APPENDIX A

1 – Site Maps for Discovery Bay, Franks Tract, Taylor Slough, and Piper Slough

2 – Water Quality and Chemical Residue Data for all sites Sampled in 2011

APPENDIX B

1- Pesticide Use Recommendation

2 – Application Crew Logs

3 – CDFA Laboratory Residue Results

4 – FasTest Result

5 - Effect Test Report

EXECUTIVE SUMMARY

In the beginning of April 2011, prior to the start of the treatment season, the Department of Boating and Waterways (DBW) held two outreach programs for the residents and interested parties from the Bethel Island Area and Discovery Bay. These meetings were to get input as to how bad the aquatic weed problem was in the areas of concern. DBW took this input along with our analysis of past experiences in the Delta and developed a plan of action for Discovery Bay, Franks Tract, Piper Slough, Taylor Slough, and Sandmound Slough.

Treatment of Discovery Bay was started on April, 12, 2011. Due to agricultural concerns surrounding the Discovery Bay area it was decided to start the treatment in the bays located in the southwest corner of Discovery Bay. The reasoning behind this was to ensure that the herbicide would not bleed out of the area and into the vicinity of agricultural water intakes. All intakes within the area were monitored using immuno-assay sampling (Fastests). After several weeks of monitoring of the residue levels the Northwest portion of Discovery Bay was started along with the taking of Fastest monitoring. All residue levels were well within the acceptable herbicide label limits during the time when the treatment area was expanded.

DBW used hydro-acoustic monitoring to determine the percentage of reduction in Bio-Coverage and Bio-Volume of *Egeria densa*. This monitoring was conducted pre treatment, and at 60, 120, and 180 day intervals post treatment. The average reduction in Bio-Coverage (the amount of bottom covered) for Discovery Bay was 6.25 % while the reduction in Bio-Volume (the mass of plants area and height) was 7.1%. However, aesthetically and functionally the treatment was a success in that the *Egeria densa* is no longer visible and boats can move freely in Discovery Bay and out to the main sloughs in the area.

Treatment of Franks Tract, Piper Slough, and Taylor Slough started on April 12, 2011. Piper Slough and Franks Tract were previously treated with moderate success. Taylor Slough was added to the treatment plan due to the large amount of *Egeria densa* in the southern half of the slough. DBW treated in these areas until June 22, 2011. NPDES sampling was started and continued until no herbicide residue levels was found. However, the visual presence of *Egeria densa* in both sloughs warranted DBW to start another treatment which commenced August 23, 2011 and continued until October 11, 2011.

Prior to the commencement of second treatment in Piper and Taylor Slough DBW found that Sandmound Slough was covered in *Egeria densa*. Sandmound Slough was treated during this time frame due to boats having difficulty transiting the slough. Sandmound Slough will be treated again in 2012.

Hydro-acoustic monitoring was completed in both Taylor Slough and Piper Slough. Taylor Slough had a reduction of 14.2% of bio-coverage and .3 % reduction in bio-volume. Piper Slough had an increase of 14.7% bio-coverage and an increase Of 3.5% bio-volume. This does not seem like a good result, however as compared to the control area located in the Big Break area of the Delta which had an increase of 43.8% bio-coverage and an increase of 34% bio-volume, control of the *Egeria densa* within the two sloughs was accomplished.

INTRODUCTION

1.1 *Egeria densa* Impact on the Delta

Egeria densa (Brazilian Elodea) is a fast growing submerged aquatic plant that is having a significant impact on the shallow water habitat in the Sacramento-San Joaquin River Delta (Delta) ecosystem. In the 50 years since *E. densa* was introduced into the Delta, it has grown to infest approximately 10,000 surface acres or 18% of the 55,000 surface acres of the Delta. *E. densa* influences the Delta's biological diversity, recreation, and agriculture. It crowds out native plants, slows water flows, entraps sediments, obstructs waterways, impedes anadromous fish migration patterns and clogs agricultural and municipal water intakes.

1.2 Setting

The *Egeria densa* Control Program (EDCP) area of operation includes portions of six counties that encompass much of the Delta and its upland tributaries. The six counties include Alameda, Contra Costa, Sacramento, San Joaquin, Solano and Yolo. The general boundaries for the treatment areas are:

- West to and including Sherman Island, at the confluence of the Sacramento and San Joaquin Rivers,
- North to the confluence of the Sacramento River and the Sacramento Deep Water Channel,
- East along the San Joaquin River to the city of Stockton, and
- South from Clifton Court along Old River to Mossdale.

1.3 Summary of Statutory Authority and Required Permits

In 1997, AB 2193 amended the California Harbors and Navigation Code, Division 1, Chapter 2, Article 2 Section 64, to designate the California Department of Boating and Waterways as lead agency for controlling *Egeria densa* in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh. The United States Department of Agriculture-Agriculture Research Service (USDA-ARS) acts as the federal nexus agency for all federal regulatory processes. The USDA-ARS also provides research, technical expertise, and decision making input for the *Egeria densa* Control Program (EDCP) planning process. The DBW and USDA-ARS implemented the EDCP in 2001.

1.3.1 EDCP NPDES Permit (NO. CAG 990005)

The EDCP National Pollution Discharge Elimination System General Permit (NPDES) for Aquatic Pesticide Use requires DBW to submit an annual report March 1 following the EDCP treatment season. Reporting guidelines must include an executive summary discussing general permit compliance or violations of permit terms and conditions to waters of the U.S., the effectiveness of the EDCP Aquatic Pest Application Plan (APAP), the discharge of pollutants associated with aquatic pesticide applications, a summary of monitoring data, including any changes in water quality, and violations of compliance with water quality objectives as outlined in the Central Valley Basin Plan. The report will also include a discussion of any violations and actions taken, maps showing application areas, acreage and sampling station location, types and amounts of aquatic pesticides used during the each application event, information on surface area, volume and rate of application, and sampling results for all monitoring as outlined in the General Permit Monitoring and Reporting Program.

Terms and Conditions

Herbicide Residue Limits

The maximum residue limits in receiving waters for fluridone, the main ingredient of Sonar[®], is 560 parts per billion (ppb) and for diquat, the main ingredient in Reward[®], the maximum is 20 ppb. DBW did not use any diquat during the 2011 treatment season. Maximum residue limits are based on EPA and municipal drinking water standards.

There are clear distinctions in the NPDES Permit about the application area, treatment area, and receiving waters. An application area is defined as the area in which the aquatic herbicides are applied. The treatment area is the area that is treated by the aquatic herbicide to control aquatic weeds. The receiving waters are defined as: 1) waters directly down flow of the treatment area and 2) water within the treatment area when herbicide residue levels fall below the minimum effective concentrations. In the EDCP the herbicide can have an impact on the target species as long as residues are present in the water column. Residues found inside the treatment area are not usually considered receiving waters until seven days after an application event.

Herbicides applied to aquatic plants are not considered a pollutant until residues reach the receiving waters. This is because herbicides designed to treat aquatic plants and approved by the EPA cannot also be considered a pollutant under the Clean Water Act. This applies to chemicals approved under Federal and State pesticide use regulations.

The EPA label restrictions dictate maximum rates of application and maximum concentrations allowed in the water column. The application rate can be greater than the maximum water

column concentration due to binding properties and dispersion rates in flowing waters. Fluridone has no maximum application rate in flowing waters. The applicator is allowed to apply at a rate in which the target concentration in the water column does not exceed 40 ppb. However, most applications have target applications of 50 ppb or less with a residue of 10 ppb or less in the water column upon dispersion.

Water Quality Parameters

The EDCP is required to monitor specific water quality parameters to ensure there are no significant impacts to beneficial waters of the United States (NOAA Fisheries Biological Opinion and NPDES Permit). The physical and chemical water quality parameters monitored consist of temperature, salinity, electrical conductivity, turbidity, pH, and dissolved oxygen. DBW also conducts visual inspections before, during and after applications have been made. DBW annotates any changes in water color, odor and vegetation health.

Selection and Monitoring Frequency

The NPDES Permit requires representative monitoring for each water type found in the EDCP area of operation. The only water type for the control program is tidal. Per monitoring frequency requirements outlined in the NPDES and EDCP Aquatic Pesticide Application Plan, a minimum of two monitoring sites per water type per herbicide used if the total number of applications is below twenty. DBW records water quality parameters no earlier than twenty four hours prior to the first treatment and a minimum of two follow-up visits following the end of the treatment event or until there are no detectable residues in the water column.

1.3.2 EDCP USFWS BO SECTION Permit

Reporting Requirements

The USFWS Biological Opinion Section 7 Permit requires DBW to submit an annual report no later than January 31 following the EDCP application season. Annual reports must summarize compliance with the terms and conditions listed to include species and habitat protection, water quality monitoring, and any additional monitoring and studies that may have been conducted as part of the regulatory requirements from other participating state and federal agencies. Additional reporting requirements are on a case by case basis in the event that a “take” should occur with any of the species discussed in the permit. Take reports begin with immediate notification to the USFWS Biologist in charge of administering the permit and require documentation of information such as where the “take” occurred, number of species involved, water quality conditions, chain of custody, and prescriptive action for preventing future occurrences.

Mitigation Requirements

The EDCP USFWS BO Section 7 Take Permit imposes several measures to avoid impacts to protected species in the Delta. DBW has been directed to implement species avoidance and habitat loss minimization. There are three main components to avoidance and habitat minimization mitigation. Components are seasonal timing of applications, species specific toxicity evaluations, and education of applicators. All applicators received worker environmental awareness training before treatments started in April of 2011. Personnel were informed as to the presence of the Valley Longhorn Elderberry Beetle and the habitat associated with this species, other specific mitigation for the Giant Garter Snake and Delta Smelt. The briefing also included the contents of both the USFWS and NOAA Fisheries BO Section 7 Permits.

Delta Smelt (*Hypomesus transpacificus*)



- Using the Interagency Ecological Program (IEP) Real Time Monitoring Program 20 mm Survey determine the presence or absence of Delta Smelt within or near herbicide application areas
- There are no restrictions for the use of fluridone, however, if diquat is used it may only be applied between June 1 and Jul 31. DBW used no diquat during this reporting period.

Valley Longhorn Elderberry Beetle (*Desmocerus californicus dimorphus*)



- Avoidance is the term that USFWS has included in their Biological Opinion
- The area of operation for the EDCP has been surveyed as to the location of the Elderberry tree (*Sambucus ssp*) and there were none within the area of operation for 2011.

Giant Garter Snake (*Thamnophis gigas*)

- Avoidance of Giant Garter Snake Habitat

The only restrictions to the Giant Garter Snake apply to mechanical harvesting and land-based operations occurring on unimproved Delta banks. The EDCP currently is not implementing mechanical harvesting nor is it operating on or near any unimproved areas. However, mitigation beyond the requirements of the USFWS permit has been implemented to avoid impact. All of the EDCP project area has had a Giant Garter Snake habitat evaluation. Each application crew has been provided with a set of maps outlining potential Giant Garter Snake habitat. This is to ensure that our crews avoid areas where Giant Garter Snakes are likely to be found.

1.3.3 EDCP NOAA Fisheries BO Section 7 Permit**Reporting Requirements**

The NOAA Fisheries Biological Opinion Section 7 Permit requires DBW to submit an annual report January 31 following the EDCP application season. Annual reports must summarize compliance with the terms and conditions listed to include species and habitat protection, water quality monitoring, and any additional monitoring and studies that may have been conducted as part of the regulatory requirements from other participating state and federal agencies. Additional reporting requirements are on a case by case basis in the event a “take” should occur with any of the discussed species in the permit. Take reports begin with immediate notification of the NOAA Fisheries biologist in charge of administering the permit and require documentation of information such as, where the “take” occurred, number of species involved, water quality conditions, chain of custody, and prescriptive action for preventing future occurrences.

Mitigation Requirements

Chinook Salmon, *Onorhynchus tshawytscha* (Sacramento River winter run and Central Valley Spring run) and Central Valley Steelhead Trout, *Oncorhynchus mykiss*



- NOAA Fisheries has specified start and stop dates on which DBW can begin and end treatment. DBW cannot start treatments before April 1st and must end all treatments no later than October 15th.
- NOAA Fisheries also has specific sites with start dates that differ from April 1st. This is to preclude both out and in migrating salmonids from passing through treated areas.
- In order to avoid impacts to aquatic species, particularly salmonids, reliant on dissolved oxygen (DO) levels, crews monitor DO levels and water temperature prior to and after treatments. Crews are only permitted to make applications when DO levels are above 5 mg/l or below 3 mg/l. During the 2011 season all DO levels were within the specific parameters¹.

¹ The Central Valley Regional Water Quality Control Board (CVRWQCB), USFWS, and NOAA Fisheries have slightly different dissolved oxygen limits. The CVRWQCB Basin Plan states the DO shall not be reduced below 5.0 mg/l in all Delta waters, except the Sacramento River below the I Street Bridge and waters west of the Antioch Bridge (7.0 mg/l) and in the San Joaquin River between Turner Cut and Stockton (6.0 mg/l). All EDCP sites are by definition in the Basin Plan waters of the Delta. The USFWS BO/Take Permit directs no treatment in high flow areas where DO levels are below 5.0 mg/l. It also directs treatments to be delayed in low flow areas if DO levels are between 4-6 mg/l. The Central Delta is all tidal and with no real distinction between high flow and low flow waters. During the 2011 treatment season DBW recorded all readings above 5.0 mg/l.

PERSONNEL, METHODS AND MATERIALS

2. 1 EDCP Personnel, Accreditation, and Training

Application Crews

Each application crew consists of a specialist and a technician of which at least one is a certified applicator possessing a Qualified Applicator Certificate "F" (aquatics). This certification is administered by the California Department of Pesticide Regulation (DPR). All DBW crews have been trained on EDCP herbicide use and environmental awareness.

Endangered Species Training

DBW perceives training as a major component necessary to ensure avoidance and minimization measures are met for both the NOAA Fisheries and USFWS BO Sec 7 Permits. Application crews not only received refresher training on herbicide use and restrictions before the application season began, they also received an annual environmental awareness refresher course on EDCP threatened and endangered species and species of concern. State and federally listed threatened and endangered species and species of concern training for the EDCP project area included; a discussion of legal implications of the Endangered Species Act (ESA) and the California Endangered Species Act (CEQA), identification of all endangered and threatened species and species of concern in the project area, special permit requirements for Delta Smelt, Giant Garter Snake, Valley Longhorn Elderberry Beetle, Central Valley Steelhead Trout, and Chinook Salmon including buffer zones, required surveys, fish passage protocol, and DO limits.

Monitoring Crews

Monitoring crews consist of a lead Environmental Scientist and one additional person to assist the scientist. The lead scientist is responsible for training, planning, and scheduling field sampling events. Additional responsibilities include quality control (QA/QC) of field water quality monitoring and lab analysis and the reporting of findings in an annual report as outlined in the EDCP NPDES, USFWS and NOAA Fisheries Biological Opinions.

2.2 Materials

2.2.1 Herbicide Application

Herbicides

Herbicides used during the 2011 EDCP treatment season include:

- Fluridone: 1-methyl-3-phenyl-5[3-(trifluoromethyl_phenyl)-4(1H)-pyridinone; under the commercial trade names of:

Sonar A.S.® – EPA Registration No. 67690-4 (liquid)

Sonar PR Precision Release® – EPA Registration No 67690-12 (Pellet)

Sonar Q Quick Release® – EPA Registration No. 67690-3 (Pellets)

Fluridone

Fluridone (Sonar®) is a selective systemic herbicide that inhibits the formation of carotene, an action that results in the degradation of sunlight exposed chlorophyll. Formation of carotene occurs primarily in new growth, thus fluridone is most effective in maximum growth periods of *E. densa*. Fluridone not absorbed by plants is broken down into naturally occurring elements mostly through exposure to sunlight.

Summary of Pesticide Use in 2011

Herbicide Formulations	PR Granular (lbs)	PR Granular (acres)	Q Pellets (lbs)	Q Pellets (acres)	AS Liquid (gals)	AS Liquid (acres)
April						
Contra Costa	10,200	3,814.4	20,770	3,589.2	67	3,527
May						
Contra Costa	24,110	12,806.8	20,540	10,267.6	52	4,268.4
June						
Contra Costa	42,300	16,553.1	23,220	9,596.8	27	2,412.8
July						
Contra Costa	1,320	1,241.2	0	0	0	0
August						
Contra Costa	900	1,611.4	920	331.9	3	120.9
September						
Contra Costa	900	1,611.4	920	331.9	3	120.9
October						
Contra Costa	3,120	2,940.9	880	814.6	0	0
TOTALS	82,850	40,579.2	67,250	24,932	152	10,450

NOTE: Acreages in table are gross acreages. Net acreage treated was 3194.6 acres.

Application Equipment

Crews use either a 19-21 foot aluminum boat either air or outboard powered. At the start of each treatment the application crew takes a dissolved oxygen and water temperature reading using a HACH Dissolved Oxygen Meter within the treatment site. These readings must be within the parameters outlined in the Biological Opinions and NPDES Permit before application of any herbicide is started. At the start of the application the crew will use an Explore™ iX-104C² Tablet PC with GPS unit installed to record beginning and ending spray lines, coordinates of spray area and the time of the treatment.

All boats are maintained regularly, including oil changes every 50 engine hours, washed to rid them of chemical residues, and all application pumps, hoses and nozzles are inspected and if defective are replaced on an as needed basis. Boat maintenance records are available upon request.

2. 3 Environmental Monitoring

Monitoring Equipment

A 21 foot aluminum Gregor™ or 22 foot fiberglass C-Dory vessel both powered by outboard motors are used for monitoring activities. DBW uses a Hydrolab MS-5® water quality multi-probe Datasonde. The MS-5 collects readings of water temperature, electrical conductivity, salinity, dissolved oxygen, pH, and turbidity. The data is stored together with GPS coordinates with an I-xplore 104C² PC Tablet. A digital camera is used to obtain visual records of sampling locations to denote noticeable changes in vegetation or the condition of the surrounding area.

Monitoring Activities

Environmental Monitoring Protocols

The DBW EDCP follows a water quality monitoring protocol as outlined in the 2004 EDCP Aquatic Pest Application Plan (APAP). The monitoring team plans each sampling event in coordination with the field supervisor and the application teams. Each site is representative of the water types found in the Delta. During the 2011 season DBW sampled four sites, Discovery Bay Site 93, Franks Tract Site 173, Piper Slough Site 107, and Taylor Slough Site 110.

Residue Sampling

For each application event DBW takes a pre-sample and as many post samples as necessary until a non-detection of the herbicide is obtained. These samples are identified as sample

location A, B, and C. Sample location A is inside of the application area approximately 1/4 to 1/3 the distance in from the downstream edge of the application polygon, sample location B is located on the downstream outside edge of the application polygon, and sample location C is located in an adjacent non-impacted location with similar hydrological conditions as the application site or receiving waters.

DBW also takes Fastest™ (immune assays) samples throughout the duration of treatment. These samples are sent to the herbicide manufacturer for analysis. The sample results are used to monitor herbicide residues in the treatment area as well as areas outside of the treatment area. DBW can monitor and adjust the rate of application to keep residue levels within the treatment site at optimum levels.

Water Quality Parameters

Water quality sampling is done concurrent with the residue sampling. Water quality parameters monitored are water temperature, dissolved oxygen levels, pH, turbidity, electrical conductivity, and salinity. All samples are taken at a depth of three feet. DBW also conducts visual inspections of the treated and surrounding areas to identify changes in water color or odor and also changes in vegetation health.

2.4 Laboratory Analytical Methods and Data Validation

Analytical Methods

The analytical methods used by the contract laboratories, California Department of Food and Agriculture (CDFA) are published in the U.S. EPA Test Methods for Evaluating Solid Waste Physical/Chemical SW 846 or U.S. EPA Method for Chemical Analysis of Water and Waste. The primary method used for the EDCP is Method 4000, immune assay testing (ELISA method).

Analytical Testing Validation

DBW uses several methods to validate results found by contracting laboratories. These methods are split samples, outside laboratory split samples, field spikes, field blanks, and equipment blanks. DBW took 14- Equipment Blanks, 4-Split Samples, 4-Field Blanks, and 1-Spike Sample. All validation samples were within acceptable ranges.

Efficacy Monitoring**Hydroacoustic Analysis**

Hydroacoustic studies performed involve monitoring of application sites and untreated control sites similar to the application sites. Using sonar type technology, vegetative cover (Bio-Cover) on the water body floor and the amount of vegetative plant matter present (Bio-Volume) are measured. Linear transects are used to sample vegetation for ground truthing and inventories of submerged species present and their physiological condition at the time of sampling.

3 – COMPLIANCE

3.1 Herbicide Application Data and Permit Compliance

The 2011 EDCP application season was from April 12, 2011 to October 11, 2011. DBW treated in Discovery Bay, Franks Tract, Piper Slough, Taylor Slough, and Sandmound Slough.

Compliance

DBW EDCP treatment operations were in compliance with all portions of the NPDES, Aquatic Pesticide Application Plan, USFWS BO, and the NOAA BO. There was no known take or harassment of federally endangered or threatened species.

Basin Plan Compliance (NPDES)

DBW is required to adhere to all limitations set forth in the Regional Water Quality Control Boards Basin Plan. It specifies limitations for dissolved oxygen, turbidity, pH, salinity, and temperatures.

Dissolved Oxygen

The Basin Plan specifies that no dissolved oxygen levels should be below 6.0 mg/l in the San Joaquin River between Turner Cut and Stockton from September 1 to November 30, and 5.0 mg/l in all other waters of Delta. All dissolved oxygen readings were between 6.4mg/l and 12.39 mg/l.

pH

The limits for pH in the Basin Plan are readings below 6.5 or elevated above 8.5. Seven readings above the upper limit were recorded during the 2011 treatment season. These readings were 8.68 and 8.71 recorded on July 13, and August 11, in Franks Tract. Five readings above the limits were recorded in Discovery Bay 8.51, 8.53, and 8.55 on October 20 and 9.54 on October 27.

Turbidity

For Delta waters the turbidity levels for the central Delta shall not exceed 50 Nephelometric Turbidity Units (NTUs) and 150 NTUs for other areas of the Delta. DBW recorded readings between 0.2 and 33.9 NTUs.

4 - DISCUSSION AND CONCLUSIONS

4.1 Discussion

DBW continued treating areas of the Central Delta during the 2011 treatment season. The areas selected were Piper Slough, Taylor Slough, Sandmound Slough, Discovery Bay and a portion of Franks Tract.

Due to the large number of agricultural water intakes DBW had to be very careful not to damage any crops using the Delta waters for irrigation. This was accomplished using extensive monitoring to ensure that herbicide residue levels did not exceed the manufacturer's acceptable levels for the crops being grown. These tests were conducted at least weekly and in some selected sites daily. The results provided were used by DBW to regulate the application rates of the herbicide. DBW took approximately 1,400 Fastest samples during the 2011 season.

4.2 Herbicide Application Compliance

All applications performed by DBW during the 2011 treatment season were in compliance with the Pesticide Control Recommendation (PCR), the USFWS Biological Opinion, the NOAA Biological Opinion, and the NPDES Permit

4.3 Conclusions

The following conclusions are the results of analysis between the Pre-Treatment, 60 day, 120 day, and 180 day hydroacoustic sampling.

Franks Tract: DBW treated 2,413 acres in 2011 in Franks Tract. The location of the treatment areas was in the southwest corner of the tract, the northeast corner and the entire west side of the tract. The sampling events showed the following:

4.3 Conclusions

The following conclusions are the results of analysis between the Pre-Treatment, 60 day, 120 day, and 180 day hydroacoustic sampling.

Franks Tract: DBW treated 2413 acres in 2011 in Franks Tract. The location of the treatment areas was in the southwest corner of the tract, the northeast corner and the entire west side of the tract. The sampling events showed the following:

Site # 173	% Bio-Coverage	% Bio-Volume
Pre	12.2	7.2
Post 60 Day	18.0	11.4
Post 120 Day	23.8	15.2
Post 180 Day	33.7	19.6

Site # 174	% Bio-Coverage	% Bio-Volume
Pre	21.8	10.8
Post 60 Day	24.5	14.3
Post 120 Day	39.3	28.5
Post 180 Day	42.0	30.2

Site # 175	% Bio-Coverage	% Bio-Volume
Pre	12.5	7.4
Post 60 Day	20.2	12.7
Post 120 Day	19.6	13.4
Post 180 Day	25.2	17.2

Taylor Slough: DBW treated 120.9 acres

Site # 110	% Bio-Coverage	% Bio-Volume
Pre	52.3	18.4
Post 60 Day	61.5	32.0
Post 120 Day	52.7	18.5
Post 180 Day	38.1	18.1

Piper Slough: DBW treated 44.1 acres.

Site # 107	% Bio-Coverage	% Bio-Volume
Pre	15.2	9.4
Post 60 Day	37.3	13.7
Post 120 Day	38.6	16.1
Post 180 Day	32.4	12.9

Discovery Bay Area 1: DBW 250 treated acres.

Site # 93	% Bio-coverage	% Bio-Volume
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Pre	28.1	9.3
Post 60 Day	30.0	14.9
Post 120 Day	22.8	5.2
Post 180 Day	21.2	3.3

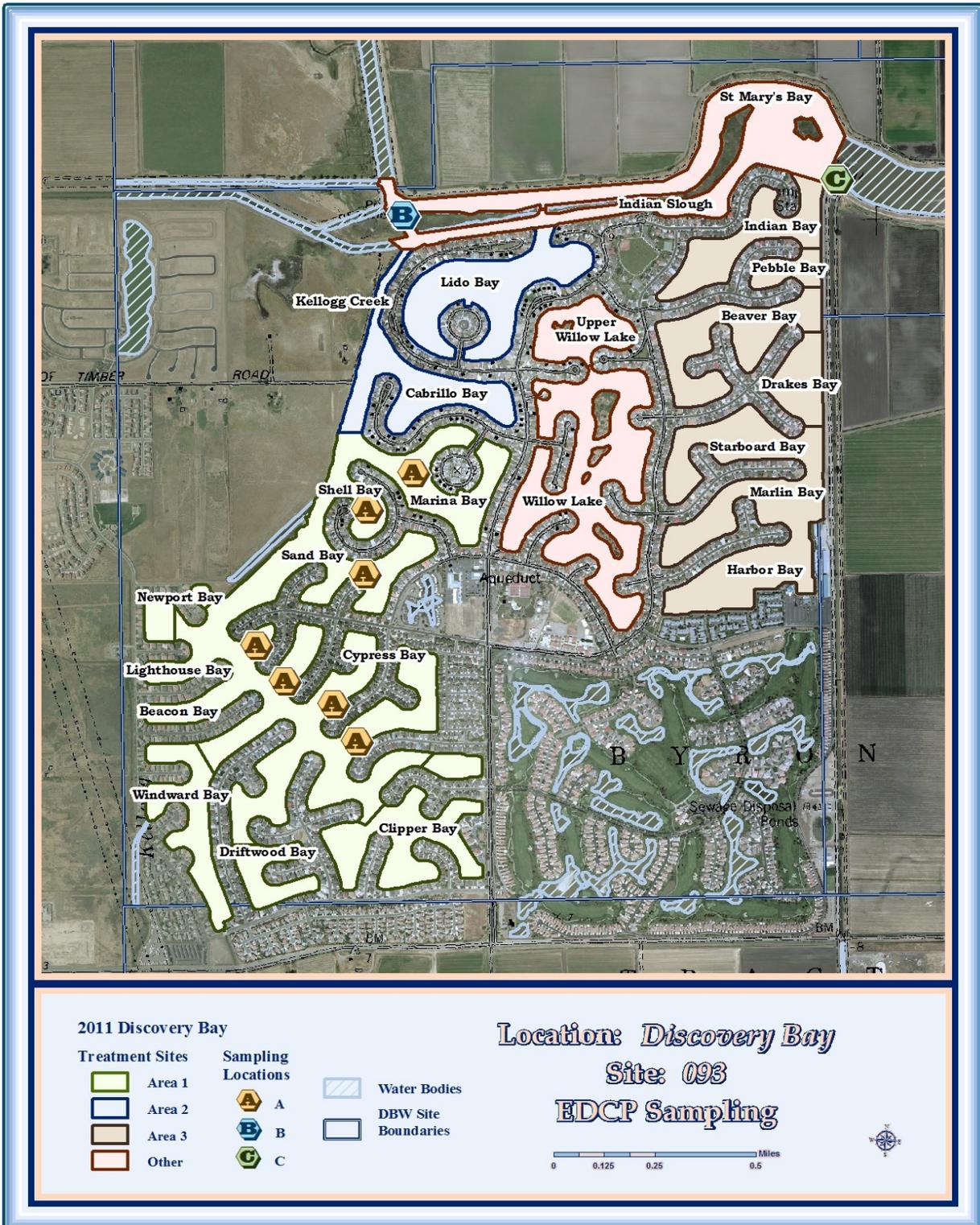
Discovery Bay Area 2: DBW 62 treated acres.

Site # 93	% Bio-coverage	% Bio-Volume
Pre	31.5	11.5
Post 60 Day	39.4	18.6
Post 120 Day	27.3	5.8
Post 180 Day	25.3	3.4

APPENDIX A

1 – Site Maps for Discovery Bay, Franks Tract, Taylor Slough, and Piper Slough

2 – Water Quality and Chemical Residue Data for all sites Sampled in 2011

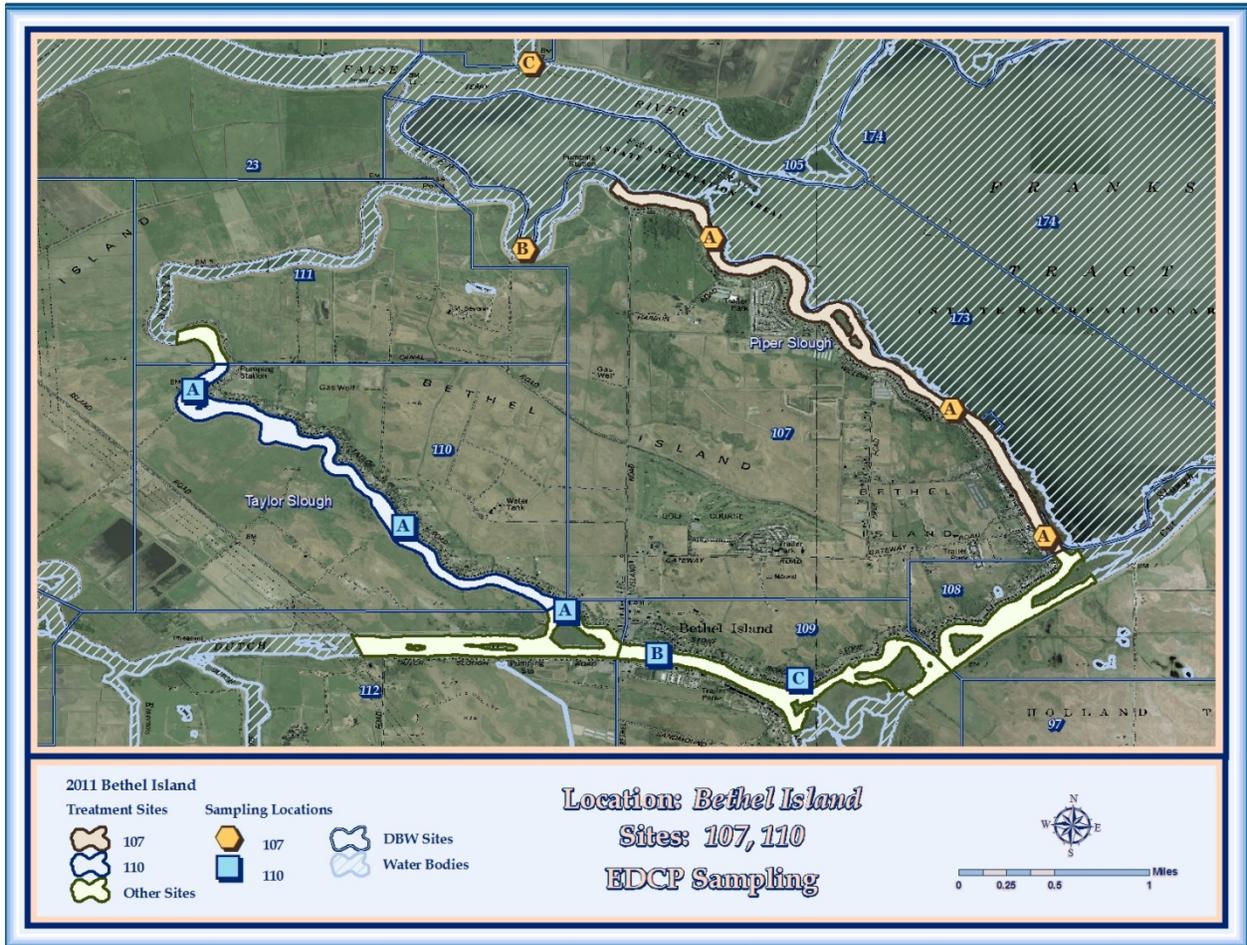


Note: Only Area 1 and Area 2 were treated during the 2011 treatment season.

Discovery Bay Water Quality and Residue Measurements

Sample Location	Sample Number	UTM	Date	Time	Temp	Conductivity (ms/cm)	Salinity (ppt)	DO (mg/l)	Depth	pH	Turbidity	Residue Level
A	E093-041111-01	E622361 N4195375	041111	1054	15.78	.435	.22	10.36	3	8.13	5.7	ND
A	E093-041111-02	E622272 N4195525	041111	1100	15.86	.426	.21	10.72	3	8.15	6.6	ND
A	E093-041111-03	E622080 N4195618	041111	1105	15.81	.403	.20	10.52	3	8.13	5.4	ND
A	E093-041111-04	E621967 N4195766	041111	1112	16.02	.402	.20	11.31	3	8.24	5.7	ND
A	E093-041111-05	E622396 N4196058	041111	1123	15.80	.375	.19	10.68	3	8.15	3.8	ND
A	E093-041111-06	E622407 N4196323	041111	1132	16.13	.379	.19	11.76	3	8.41	2.3	ND
A	E093-041111-07	E622588 N4196472	041111	1140	15.67	.337	.17	10.72	3	8.10	4.7	ND
B	E093-041111-08	E622548 N4197527	041111	0947	14.74	.257	.12	9.99	3	7.89	4.9	ND
C	E093-041111-09	E624271 N4197674	041111	0922	14.42	.293	.13	9.57	3	7.87	7.7	ND
C	E093-041111-35	E621847 N4197601	041111	1016	15.59	.417	.21	10.20	3	8.16	30.6	ND
A	E093-102011-128	E622366 N4195375	102011	1005	20.80	.263	.13	12.39	3	8.47	10.9	ND
A	E093-102011-129	E622272 N4195525	102011	1015	20.49	.256	.12	11.39	3	8.53	13.1	ND
A	E093-102011-130	E622080 N4195618	102011	1025	20.63	.262	.12	10.68	3	8.32	11.1	ND
A	E093-102011-131	E621967 N4195766	102011	1035	20.88	.265	.13	11.69	3	8.51	9.3	ND
A	E093-102011-132	E622396 N4196058	102011	1040	21.02	.244	.12	11.68	3	8.55	7.6	1.6
A	E093-102011-133	E622407 N4196323	102011	1050	20.69	.231	.11	10.01	3	8.26	8.4	ND
A	E093-102011-134	E622588 N4196472	102011	1100	20.75	.240	.11	11.22	3	8.34	9.5	1.3
B	E093-102011-135	E622548 N4197527	102011	0945	20.25	.252	.12	10.43	3	8.19	12.9	ND
C	E093-102011-136	E624271 N4197674	102011	0930	20.02	.205	.09	9.29	3	8.26	4.0	ND
A	E093-102711-138	E622366 N4195375	102711	1015	18.31	.253	.12	9.63	3	8.03	10.0	1.1
A	E093-102711-139	E622272 N4195525	102711	1025	18.64	.256	.12	10.02	3	8.26	14.5	1.1
A	E093-102711-140	E622080 N4195618	102711	1030	18.29	.245	.12	9.49	3	9.54	8.15	ND
A	E093-102711-141	E621967 N4195766	102711	1040	18.20	.256	.12	9.58	3	8.08	9.1	1.0
A	E093-102711-142	E622396 N4196058	102711	1100	18.51	.233	.11	10.01	3	8.23	10.8	1.3
A	E093-102711-143	E622407 N4196323	102711	1105	18.27	.225	.10	9.48	3	8.11	6.8	1.1
A	E093-102711-144	E622588 N4196472	102711	1120	18.62	.236	.11	10.16	3	8.16	13.0	1.8
B	E093-102711-145	E622548 N4197527	102711	0955	17.23	.199	.09	9.26	3	7.93	7.3	ND
C	E093-102711-146	E624271 N4197674	102711	0945	17.71	.169	.08	9.41	3	7.97	6.9	ND

Sample Location	Sample Number	UTM	Date	Time	Temp	Conductivity (ms/cm)	Salinity (ppt)	DO (mg/l)	Depth	Ph	Turbidity	Residue Level
A	E093-110811-148	E622366 N4195375	110811	1020	14.08	.246	.12	10.14	3	8.04	3.6	ND
A	E093-110811-149	E622272 N4195525	110811	1030	14.06	.242	.11	10.25	3	8.03	8.2	ND
A	E093-110811-150	E622080 N4195618	110811	1040	13.95	.230	.11	10.07	3	7.96	7.2	ND
A	E093-110811-151	E621967 N4195766	110811	1050	14.31	.228	.11	10.65	3	8.06	5.6	ND
A	E093-110811-152	E622396 N4196058	110811	1100	14.07	.220	.10	9.86	3	7.94	5.0	ND
A	E093-110811-153	E622407 N4196323	110811	1110	14.13	.225	.10	9.62	3	7.89	6.1	1.1
A	E093-110811-154	E622588 N4196472	110811	1120	14.09	.218	.10	10.21	3	7.94	4.0	ND
B	E093-110811-155	E622548 N4197527	110811	0955	13.75	.230	.11	10.56	3	8.06	8.2	ND
C	E093-110811-156	E624271 N4197674	110811	0930	13.87	.190	.09	10.23	3	8.09	2.7	ND
A	E093-111511-158	E622366 N4195375	111511	1100	13.71	.212	.11	10.27	3	8.07	6.5	ND
A	E093-111511-159	E622272 N4195525	111511	1045	13.56	.219	.10	10.41	3	8.01	6.3	ND
A	E093-111511-160	E622080 N4195618	111511	1040	13.60	.229	.11	10.61	3	7.98	1.8	ND
A	E093-111511-161	E621967 N4195766	111511	1030	13.58	.215	.12	10.43	3	7.71	6.6	ND
A	E093-111511-162	E622396 N4196058	111511	1015	13.48	.216	.11	10.41	3	7.86	6.4	ND
A	E093-111511-163	E622407 N4196323	111511	1005	13.59	.226	.11	10.43	3	7.95	7.1	ND
A	E093-111511-164	E622588 N4196472	111511	0955	13.41	.223	.10	10.23	3	7.94	2.6	ND
B	E093-111511-165	E622548 N4197527	111511	0950	13.27	.215	.10	10.71	3	7.94	1.7	ND
C	E093-111511-166	E624271 N4197674	111511	0945	13.23	.164	.10	10.54	3	8.23	7.6	ND



Piper Slough Water Quality and Measurements

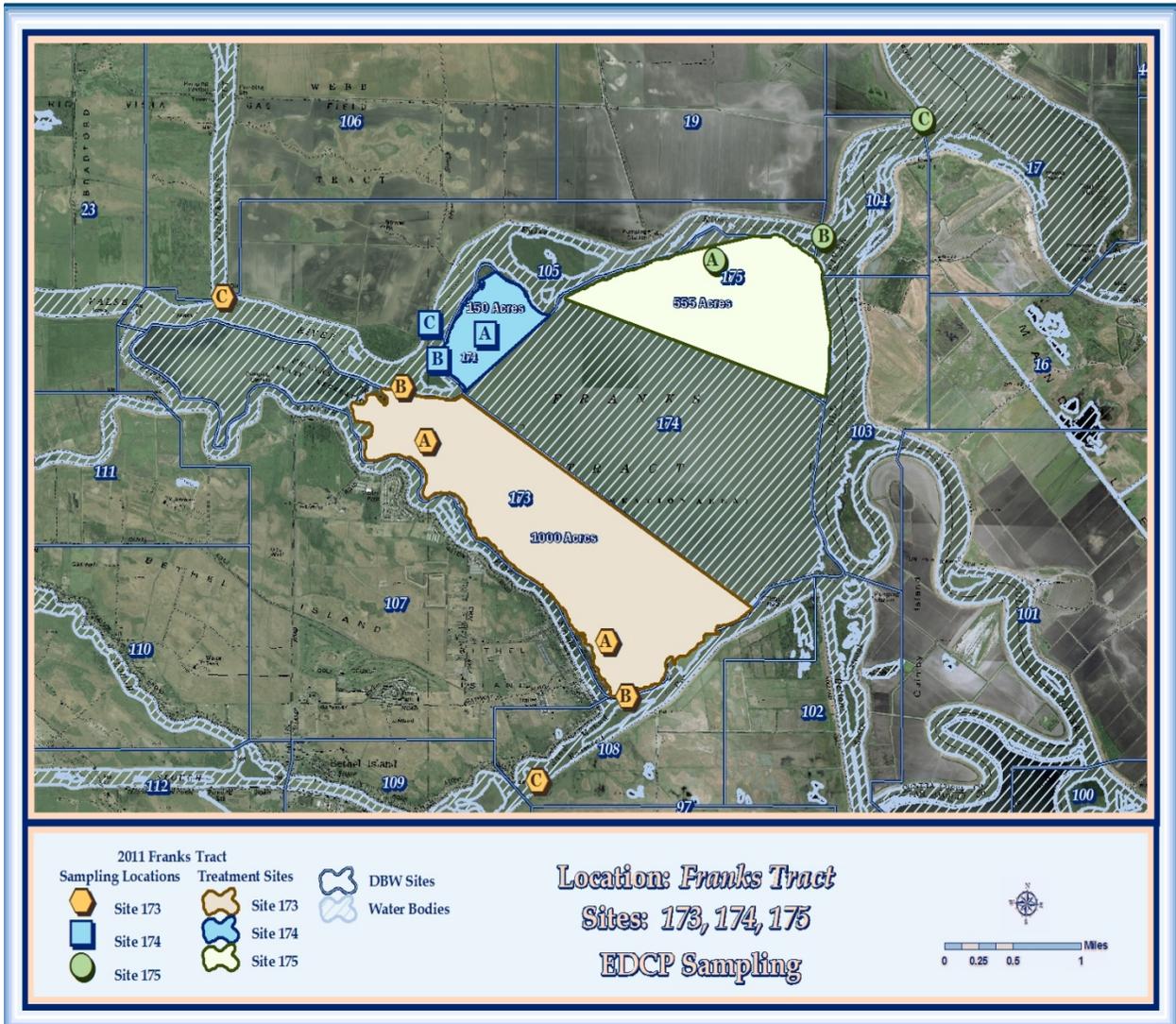
Sample Location	Sample Number	UTM	Date	Time	Temp	Conductivity (ms/cm)	Salinity (ppt)	DO (mg/l)	Depth	pH	Turbidity	Residue Level
A	E107-041211-015	E622135 N4209061	041211	0805	15.06	.202	.09	9.04	3	7.61	5.8	ND
A	E107-041211-016	E621615 N4210046	041211	0817	15.49	.211	.10	9.78	3	7.72	3.6	ND
A	E107-041211-017	E619960 N4211335	041211	0840	15.62	.212	.10	9.75	3	7.72	5.4	ND
B	E107-041211-022	E619023 N4212099	041211	0856	15.37	.202	.09	9.70	3	7.81	5.2	ND
C	E107-041211-023	E618592 N4212968	041211	0850	15.21	.184	.08	9.80	3	7.71	8.8	ND
A	E107-070711-048	E622109 N4209062	070711	0930	20.90	0	.01	8.80	3	7.33	2.1	>2
A	E107-070711-049	E6214470 N4210123	070711	0940	21.2	.119	.05	7.77	3	7.65	5.9	>2
A	E107-070711-050	E619848 N4211548	070711	0950	22.7	.114	.05	8.06	3	7.61	8.6	1.3
B	E107-070711-051	E618599 N4211434	070711	1000	22.7	.115	.05	8.10	3	7.66	7.4	ND
C	E107-070711-052	E618614 N4213005	070711	1005	22.8	.113	.05	8.32	3	7.68	9.0	ND
A	E107-071311-078	E622109 N4209062	071311	0905	23.6	.127	.05	6.40	3	7.84	6.5	2.7
A	E107-071311-079	E6214470 N410123	071311	0915	23.3	.123	.05	7.51	3	7.66	1.8	2.3
A	E107-071311-080	E619848 N4211548	071311	0920	22.9	.120	.05	7.75	3	7.61	3.8	2.2
B	E107-071311-081	E618599 N4211434	071311	0930	22.5	.117	.05	7.70	3	7.67	7.6	1.1
C	E107-071311-082	E618614 N4213005	071311	0945	22.4	.110	.04	7.54	3	7.60	8.3	ND
A	E107-072011-095	E622109 N4209062	072011	0900	0	0	0	0	3	0	0	1.4
A	E107-072011-096	E6214470 N4210123	072011	0915	0	0	0	0	3	0	0	1.4
A	E107-072011-097	E619848 N4211548	072011	0920	0	0	0	0	3	0	0	ND
B	E107-072011-098	E618599 N4211434	072011	0925	0	0	0	0	3	0	0	ND
C	E107-072011-099	E618614 N4213005	072011	0930	0	0	0	0	3	0	0	ND
A	E107-081111-114	E622109 N4209062	081111	1125	22.93	.156	.07	9.19	3	8.14	1.9	ND
A	E107-081111-115	E621447 N4210123	081111	1120	23.29	.154	.07	8.75	3	8.23	1.6	ND
A	E107-081111-116	E619848 N4211548	081111	1115	23.42	.155	.07	8.49	3	8.11	2.7	ND
B	E107-081111-117	E618599 N4211434	081111	1135	22.44	.161	.07	8.27	3	7.93	3.7	ND
C	E107-081111-118	E618614 N4213005	081111	0950	22.34	.162	.07	7.49	3	7.59	33.9	ND

NOTE: Sampling on 07-20-11 was completed however a malfunction with the Data Sonde did not permit water quality readings



Taylor Slough Water Quality and Residue Measurements

Sample Location	Sample Number	UTM	Date	Time	Temp	Conductivity (ms/cm)	Salinity (ppt)	DO (mg/l)	Depth	pH	Turbidity	Residue Level
A	E110-041211-018	E616484 N4210704	041211	0910	14.87	.529	.27	9.8	3	7.68	8.6	ND
A	E110-041211-019	E617337 N4209760	041211	0926	15.10	.611	.31	11.1	3	8.13	1.4	ND
A	E110-041211-020	E618444 N4208652	041211	0944	15.58	.316	.16	9.81	3	7.84	5.4	ND
B	E110-041211-025	E617708 N4208098	041211	1000	15.65	.239	.11	9.2	3	7.49	6.3	ND
C	E110-041211-026	E615477 N4208254	041211	1009	15.68	.334	.16	8.8	3	7.57	13.8	ND
A	E110-070711-054	E618927 N4208390	070711	1050	24.5	.150	.06	7.5	3	7.82	8.8	>2
A	E110-070711-055	E617839 N4209088	070711	1025	24.9	.159	.07	6.7	3	7.57	2.8	>2
A	E110-070711-056	E616418 N4210218	070711	1020	24.2	.314	.15	6.9	3	7.56	3.4	>2
B	E110-070711-057	E619546 N4208030	070711	1100	24.6	.151	.07	7.5	3	7.56	2.8	>2
C	E110-070711-058	E620491 N4207835	070711	1110	24.8	.152	.07	7.3	3	7.41	3.5	>2
A	E110-071311-060	E618927 N4208390	071311	0950	23.5	.200	.09	6.8	3	7.41	0.3	1.7
A	E110-071311-061	E617839 N4209088	071311	1005	24.0	.164	.07	7.1	3	7.46	0.5	2.3
A	E110-071311-062	E616418 N4210218	071311	1025	23.8	.142	.06	7.4	3	7.81	6.0	1.6
B	E110-071311-063	E619546 N4208030	071311	1040	23.8	.146	.06	6.9	3	7.50	2.6	1.7
C	E110-071311-064	E620491 N4207835	071311	1050	23.9	.136	.06	7.7	3	7.71	2.9	2.0
A	E110-072011-103	E618927 N4208390	072011	0955	23.01	.168	.07	7.9	3	7.71	2.8	1.1
A	E110-07-2011104	E617839 N4209088	072011	1005	23.56	.170	.07	7.8	3	7.62	6.1	ND
A	E110-072011-105	E616418 N4210218	072011	1020	24.00	.171	.08	7.6	3	7.81	3.4	ND
B	E110-072011-106	E619546 N4208030	072011	1025	23.81	.169	.09	8.3	3	7.93	4.1	1.2
C	E110-072011-107	E620491 N4207835	072011	1040	23.11	.172	.08	7.9	3	8.01	4.8	ND
A	E110-081111-108	E618927 N4208390	081111	1000	22.98	.165	.07	7.9	3	7.73	1.2	ND
A	E110-081111-109	E617839 N4209088	081111	1005	23.38	.173	.08	8.5	3	7.97	2.0	ND
A	E110-081111-110	E616418 N4210218	081111	1025	23.30	.176	.08	7.6	3	7.86	4.1	ND
B	E110-081111-111	E619546 N4208030	081111	1035	23.34	.174	.08	7.4	3	7.62	2.8	ND
C	E110-081111-112	E620491 N4207835	081111	1050	23.31	.163	.07	8.0	3	7.89	5.3	ND



Franks Tract Water Quality and Residue Measurements

Sample Location	Sample Number	UTM	Date	Time	Temp	Conductivity (ms/cm)	Salinity (ppt)	DO (mg/l)	Depth	pH	Turbidity	Residue Level
A	E173N-041211-034	E620794 N4211413	041211	1239	15.73	.220	.10	10.39	3	7.73	1.7	ND
B	E173N-041211-033	E620330 N4212128	041211	1246	14.97	.187	.08	11.39	3	7.79	4.1	ND
C	E173N-041211-011	E618603 N4212971	041211	1250	14.42	.174	.08	10.33	3	7.70	5.8	ND
A	E173S-041211-027	E622362 N4209240	041211	1236	15.39	.224	.10	10.99	3	7.74	6.5	ND
B	E173S-041211-028	E622515 N4208926	041211	1231	15.38	.215	.10	9.68	3	7.62	4.0	ND
C	E173S-041211-029	E621607 N4208113	041211	1222	15.47	.220	.10	9.56	3	7.94	2.4	ND
A	E173N-070711-038	E620524 N4211557	070711	0900	23.9	.118	.05	8.06	3	7.68	2.3	>2
B	E173N-070711-037	E620291 N4212107	070711	0905	24.5	.126	.05	7.70	3	7.76	6.5	>2
C	E173N-070711-036	E618614 N4213005	070711	0915	24.6	.153	.07	6.55	3	7.55	2.9	>2
A	E173S-070711-039	E622235 N4209534	070711	0955	22.9	.117	.05	7.69	3	7.42	6.2	>2
B	E173S-070711-040	E622438 N4218983	070711	0850	22.6	.114	.05	7.45	3	7.47	7.1	1.1
C	E173S-070711-041	E621609 N4208105	070711	0845	22.5	.113	.05	7.97	3	7.55	6.3	ND
A	E173N-071311-071	E620524 N4211557	071311	0850	22.5	.118	.05	7.9	3	7.61	3.0	2.1
B	E173N-071311-072	E620291 N4212107	071311	0845	22.01	.114	.05	7.9	3	7.63	6.5	ND
C	E173N-071311-073	E618614 N4213005	071311	0840	22.05	.109	.04	7.6	3	7.72	6.6	ND
A	E173S-071311-074	E622235 N4209534	071311	0850	23.8	.102	.05	8.5	3	8.68	0.7	2.3
B	E173S-071311-075	E622438 N4218983	071311	0900	23.5	.128	.05	7.1	3	8.14	3.2	2.3
C	E173S-071311-076	E621609 N4208105	071311	1100	23.6	.125	.05	7.9	3	7.72	4.4	2.0
A	E173N-072011-084	E 620524 N4211557	072011	0805	22.11	.156	.07	7.93	3	8.01	4.1	ND
B	E173N-072011-085	E620291 N4212107	072011	0810	22.81	.161	.07	7.81	3	7.71	4.8	ND
C	E173N-072011-086	E618614 N4213005	072011	0822	22.83	.158	.07	7.92	3	7.93	3.4	ND
A	E173S-072011-087	E622235 N4209534	072011	0828	23.01	.170	.08	7.86	3	7.81	2.8	2.4
B	E173S-072011-088	E622438 N4218983	072011	0835	22.61	.168	.07	7.91	3	8.03	3.7	1.3
C	E173S-072011-089	E621609 N4208105	072011	0840	23.13	.166	.08	8.30	3	7.91	6.1	1.3
A	E173N-081111-121	E620524 N4211557	081111	0935	22.39	.158	.07	8.77	3	8.29	0.2	ND
B	E173N-081111-122	E620291 N4212107	081111	0945	21.99	.172	.08	8.29	3	8.02	10.1	ND
C	E173N-081111-123	E618614 N4213005	081111	0950	22.34	.163	.07	7.49	3	7.59	33.9	ND
A	E173S-081111-124	E622235 N4209534	081111	0920	23.82	.149	.06	8.77	3	8.71	0.1	1.9

B	E173S-081111-125	E622438 N4218983	081111	1105	23.32	.155	.07	8.47	3	8.22	2.7	ND
C	E173S-081111-126	E621609 N4208105	081111	1055	23.24	.159	.07	8.52	3	8.13	1.9	ND
A	E175-041211-012	E623772 N4213455	041211	1313	15.31	.202	.09	10.45	3	7.72	3.8	ND
B	E175-041211-013	E624258 N4213606	041211	1319	14.64	.169	.07	10.18	3	7.66	2.7	ND
C	E175-041211-014	E625116 N4214908	041211	1322	14.43	.157	.07	10.44	3	7.62	4.5	ND
A	E175-070711-045	E623202 N4213446	070711	0835	22.9	.118	.05	7.84	3	7.45	6.1	1.95
B	E175-070711-046	E624204 N4213701	070711	0830	23.2	.122	.05	8.03	3	7.47	5.2	1.2
C	E175-070711-047	E625109 N4214910	070711	0820	23.0	.116	.05	7.83	3	7.37	6.9	ND
A	E175-071311-066	E623202 N4213446	071311	0830	22.06	.115	.05	7.9	3	7.51	4.3	ND
B	E175-071311-067	E624204 N4213701	071311	0825	22.08	.110	.04	7.3	3	7.7	4.9	ND
C	E175-071311-068	E625109 N4214910	071311	0820	22.17	.109	.04	7.8	3	8.03	8.6	ND
A	E175-072011-091	E623202 N4213466	072011	0955	23.02	.196	.06	8.74	3	7.81	3.8	ND
B	E175-072011-092	E624204 N42137014	072011	0950	23.11	.184	.07	8.56	3	7.62	4.9	ND
C	E175-072011-093	E625109 N4214910	072011	0940	23.50	.190	.07	9.33	3	7.54	3.7	ND

APPENDIX B

1– Pesticide Use Recommendation

2 – Application Crews Daily Logs

3 – CDFA Laboratory Residue Results

4 - FastTest Result

5 – EffecTest Report – Plant Analysis to Treatment

California Agriculture Pest Control Recommendation Aquatic Herbicide Application

Pest Control Adviser: Ken Yelle

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2000 Evergreen Street #100
Sacramento, CA 95815-3888
Phone: 916-212-3845
kyelle@dbw.ca.gov

License Number: 074809

NOTE: All products recommended below are general use herbicides.

- 1) Owner of Treatment Site: Sacramento-San Joaquin Delta, California Dept of Boating & Waterways, as lead management agency.**
- 2) Product Names: Sonar AS (liquid), Sonar PR (Precision Release pellet), Sonar Q (Quick Release pellet).**
- 3) Application Rate: Sonar Q at 5-30 ppb per application. Sonar PR at 5-30 ppb per application. Sonar AS will be used as necessary during the program to supplement in-water concentrations, at an application rate of 5-20 ppb for each treatment. Treatment protocol is designed to maintain a range of 1-10 ppb of Fluridone in the water column during the treatment period.**
- 4) Water Use Restrictions: See label recommendations. Water from Sonar treated areas can be immediately used for swimming, fishing and potable uses.**

Water users are not expected to be impacted by the treatments scheduled under this Fluridone program. FastEST analysis will be used to determine the actual Fluridone concentration present in the water in the treatment zones and near irrigation intakes during the entire treatment program. The following guidelines (as specified on the product label) will be implemented should water from these treatment sites be needed for irrigation purposes.

Water from Sonar treated areas should not be used to irrigate established turf, row crops and tree crops if Fluridone concentrations are greater than 10 ppb. Water from the Sonar treated areas should not be used to irrigate newly seeded grasses, tobacco, tomatoes, peppers and other plants in the Solanaceae family until Fluridone concentrations are 5 ppb or lower. Do not use Fluridone treated water for irrigation of greenhouse or nursery plants until Fluridone concentrations are <1 ppb.

- 5) **Targeted Aquatic Weed: Brazilian elodea, *Egeria densa*.**
- 6) **Recommended Treatment Protocol:**
- a) **Time/Schedule Treatment Window: April 1st – October 15th, 2011.**
 - b) **Total Acreage: Franks Tract area range is from 1700-3274 Acres; Discovery Bay 300-600 Acres; Piper Slough approximately 44 Acres; and Taylor Slough approximately 52 Acres.**
 - c) **Concentration (ppb): The Sonar products will be used as needed to maintain approximately 1-10 ppb of Fluridone in the water column during the treatment program. Applications will occur as needed per label guidelines.**
 - d) **Criteria used determining the need for the treatment (alternative assessment): CA Dept. of Boating & Waterways has been designated the lead agency to develop and implement a control program for the aquatic weed *Egeria densa* in the Sacramento – San Joaquin Delta, Egeria Densa Control Program (EDCP). The primary objective of this program is to improve navigation in currently infested areas of the Delta by reducing the growth and spread of *Egeria densa*. An Environmental Impact Report (EIR) was completed in 2000 and updated in 2006 to address potential impacts of the EDCP. The proposed Sonar treatment program for 2011 follows the treatment protocols outlined in the EIR, as well as the specific treatment guidelines established by state and federal agencies; State Water Resources Control Board, CA Dept of Fish & Game, US Fish & Wildlife and the National Oceanic and Atmospheric Administration.**

The use of FastEST assay will be used for monitoring Fluridone concentrations in waters surrounding the treatment areas. FastEST data will also be used to make the necessary adjustments to treatment frequency and rates (within label specifications) to achieve optimum control and monitor concentrations at irrigation intakes.

- 7) **Expiration Date of Recommendation: October 15, 2011**

Ken Yelle, Pest Control Adviser

Date

Rev. 20110329

