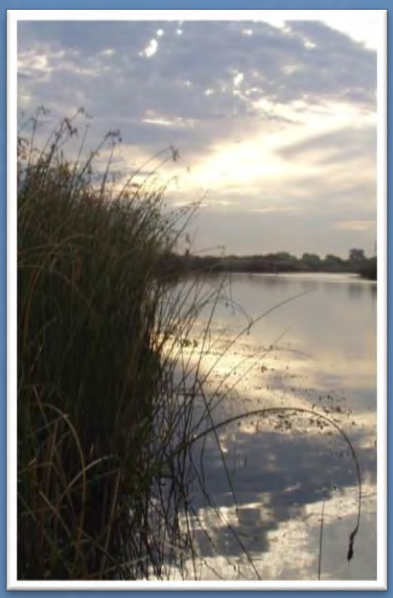

Submersed Aquatic Vegetation Control Program

[*Egeria densa*, Curlyleaf Pondweed, Eurasian Watermilfoil, Fanwort, and Coontail]

2018

California Department of Parks and Recreation
Division of Boating and Waterways
June 2018

Submersed Aquatic Vegetation Control Program

2018 Annual Monitoring Report

Submitted Pursuant to:

- State Water Resources Control Board Statewide General National Pollutant Discharge Elimination System Permit (CAG990005)
- United States Fish and Wildlife Service (USFWS) Biological Opinion (08FBDT00-2013-F-0005)
- National Marine Fisheries Service (NMFS) Letter of Concurrence (2013/9391)
- 40 CFR 122.41 (k) and 40 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, Edward Hard, *Environmental Program Manager* and Patricia Gilbert, *Senior Environmental Scientist*, 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 and imprisonment for knowing violations.

10/29/19

Ramona Fernandez, Acting Deputy Director
California Department of Parks and Recreation
Division of Boating and Waterways

Date

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Acronyms and Abbreviations

2,4-D – 2,4 dichlorophenoxyacetic acid
AIS – Aquatic Invasive Species
APAP – Aquatic Pesticide Application Plan
BMP – Best Management Practices
BO – Biological Opinion
CDEC – California Data Exchange Center
CDFW – California Department of Fish and Wildlife
CDPR – California Department of Pesticide Regulation
CEQA – California Environmental Quality Act
COLD – Cold Freshwater Habitat (Basin Plan beneficial use)
DBW – California Division of Boating and Waterways
Delta – Sacramento-San Joaquin Delta
DO – Dissolved Oxygen (measured in mg/l or ppm)
DPF – Days Post Fertilization
DPS – Distinct Population Segment
DWR – California Department of Water Resources
EDCP – Egeria densa Control Program
EPA – United States Environmental Protection Agency
ESA – Endangered Species Act (federal)
FAV – Floating Aquatic Vegetation
GGS – Giant Garter Snake
HPLC – High Performance Liquid Chromatography
IEP – Interagency Ecology Program
NASA – National Aeronautics and Space Administration
NMFS – National Marine Fisheries Service
NOAA-Fisheries – National Oceanic and Atmospheric Administration-Fisheries
NPDES – National Pollution Discharge Elimination System
NTU – Nephelometric Turbidity Units
OMP – Operations Management Plan
ppb – Parts per Billion (µg/l)
QAC – Qualified Applicator Certificate
QAPP – Quality Assurance Project Plan
SAV – Submersed Aquatic Vegetation
SCP – Spongeplant Control Program
SPWN – Spawning, Reproduction, and/or Early Development (Basin Plan beneficial use)
SWRCB – State Water Resources Control Board
UCD – University of California, Davis
USDA-ARS – United States Department of Agriculture – Agricultural Research Service
USFWS – United States Fish and Wildlife Service
VELB – Valley Elderberry Longhorn Beetle
WARM – Warm Freshwater Habitat (Basin Plan beneficial use)

EXECUTIVE SUMMARY

This annual report provides an overview on the progress and activities conducted by the Submersed Aquatic Vegetation (SAV) Control Program under the Aquatic Invasive Plant Control Program (AIPCP) in the Aquatic Invasive Species (AIS) branch of the California Department of Parks and Recreation Division of Boating and Waterways during the 2018 calendar year in the Sacramento-San Joaquin Delta (Delta) and tributaries – the San Joaquin River, Tuolumne River and Merced River.

Invasive aquatic plants can rapidly displace native species, clog water conveyance systems, form dense monospecific stands that restrict water movement, trap sediment, provide habitat for mosquitos and cause fluctuations in water quality. Dense growth may interfere with recreational uses of a waterbody and with navigation.

DBW received the Section 7, Biological Opinion (BO) from the United States Fish and Wildlife Service (USFWS) along with a Letter of Concurrence from the National Marine Fisheries Service (NMFS) on May 3, 2013 fulfilling federal requirements to move forward with the division's *Egeria densa* Control Program (EDCP). The EDCP has been renamed to Submersed Aquatic Vegetation (SAV) Control Program as of 2016. These two documents are valid until 2018. The National Pollutant Discharge Elimination System (NPDES) Permit is valid until 2018. Federal consultations were conducted with the U.S. Department of Agriculture – Agricultural Research Service (USDA-ARS) as DBW's federal Nexus.

All compliance parameters set forth in both the USFWS BO and the NMFS Concurrence Letter were met during the 2018 treatment season. All herbicide residue concentrations at receiving water locations were either not detected or were below receiving water limits as specified in the NPDES Permit.

For the 2018 season:

- 4596 acres of the 5,000 acres authorized per our permits were treated for SAV.
- Treatments occurred in 76 sites throughout the Delta.
- Collected 1,985 water samples for analysis to determine concentrations of Fluridone or Diquat in the water column.
- Conducted pre- and post-treatment hydroacoustic mapping for all 76 treatment sites.
- Conducted point sampling pre- and post-treatment to identify the species of plants in all treatment sites.
- The following quantities of herbicide were applied:
    - 21,859 lbs of Sonar Q
    - 137,743 lbs of Sonar One
    - 48,717 lbs of Sonar PR
- The SAV Control Program is currently authorized to treat *Egeria densa*, curlyleaf pondweed, Eurasian watermilfoil, fanwort, and coontail.

The division takes very seriously its responsibility to lead in the control of invasive aquatic plants in the Delta and to protect this estuary against adverse impacts on the environment, agriculture, public health and water quality. DBW adheres to strict guidelines from local, state and federal

entities to ensure that the Delta is protected from the use of herbicides. Treated areas are monitored to ensure herbicide levels do not exceed allowable limits.

The division follows mutually agreed upon protocols/conditions outlined in BOs approved by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). The BOs are designed to protect endangered species, guide acreage treated, specify the kinds of treatment used, including which herbicides and what species to control, and treatment dates. Protocols regarding the levels of herbicides to use and requirements for extensive water quality and environmental monitoring are also part of the BOs. Treated areas are monitored to ensure herbicide levels do not exceed allowable limits. No incidental take of threatened or endangered species occurred during the 2018 season.

For herbicide treatment, the division obtains a Clean Water Act permit from the State Water Resources Control Board (SWRCB) and pesticide use permits and notices from the County Agricultural Commissioner's offices.

Annual required trainings are carried out to ensure applicator staff are well versed in the herbicides being used, as well as safety protocols and methods for minimizing impacts on the environment.

A key element of DBW's monitoring program is ongoing collaboration with regulatory entities and reviewing new information that may inform and improve control programs. The division will continue to work with its partners to better understand the invasive aquatic plants, implement new integrated strategic methods and increase efficacy. Additionally, DBW will continue to adhere to the strict guidelines outlined in BOs that it receives from regulatory entities to ensure the Delta's natural resources and water quality are protected.

1 INTRODUCTION

DBW is the designated lead state department for controlling Brazilian waterweed (*Egeria densa*), curlyleaf pondweed (*Potamogeton crispus*), Eurasian watermilfoil (*Myriophyllum spicatum*), fanwort (*Cabomba caroliniana*), and coontail (*Ceratophyllum demersum*), which are invasive, submersed, aquatic plants. Coontail is a native plant but has invasive tendencies. These plants can have negative impacts on the environment, economy, and public health. More specifically, they can destabilize dissolved oxygen cycles, crowd out native plants, shade out important shallow water fish habitat, influence water flows (see Section 2 for additional information on legislation), obstruct waterways and navigational channels, and block agricultural and municipal water intakes.

DBW implemented the *Egeria densa* Control Program (EDCP) in 2001 (now called Submersed Aquatic Vegetation [SAV] Control Program as of 2016). Significant input has been provided to assist DBW with the planning process and decision-making by USDA-ARS through research and technical expertise. In 2013, Assembly Bill 763 (Buchanan, Ch. 330, Statutes of 2013) was passed designating DBW as the lead agency in cooperating with other agencies in identifying, detecting, controlling, and administering programs to manage invasive aquatic plants in the Delta, its tributaries, and the Suisun marsh. Of key importance, this bill requires DBW to consult with CDFW to perform a risk assessment for any new invasive aquatic plants that have been identified by DBW as possible threats to economy, public health and the environment. Upon receipt of CDFW's risk assessment(s), DBW will consult with the applicable federal agencies to receive necessary permissions to treat the new invasive aquatic plants.

1.1 Extent of Infestation

Invasive aquatic plants such as *Egeria densa* and curlyleaf pondweed are fast growing aquatic plants that are having a significant impact on the shallow water habitat in the Delta ecosystem. Since these invasive aquatic plants were introduced to the region, many areas have become infested. AIS influence biological diversity, water conveyance, navigation, recreation and agriculture of the Delta. These plants can crowd out native vegetation, provide habitat for mosquitoes, reduce water flows, entrap sediments, obstruct waterways, impede anadromous fish migration patterns, and clog agricultural and municipal water intakes.

1.2 Setting

The SAV Control Program area of operation includes portions of six counties that encompass much of the Delta and its upland tributaries. Those six counties are Alameda, Contra Costa, Sacramento, San Joaquin, Solano and Yolo. The general boundaries of the treatment areas are as follows:

- West up to, and including, Sherman Island, at the confluence of the Sacramento and San Joaquin Rivers.
- North to the northern confluence of the Sacramento River and Sacramento River Deep Water Ship Channel.
- South from Clifton Court along Old River to Mossdale, and continuing along the San Joaquin River to Mendota, just east of Fresno.
- East along the San Joaquin River to the city of Stockton continuing east along the San Joaquin River to Friant Dam on Millerton Lake.
- East along the Tuolumne River to LaGrange Reservoir below Don Pedro Reservoir.
- East along the Merced River to Merced Falls, below Lake McClure.

2 LEGISLATION

2.1 Section 64 of the Harbors and Navigation Code

SB 1344 (Garamendi and Nielsen, Ch. 263, Statutes of 1982) amended Section 64 of the Harbors and Navigation Code to read as follows:

"(a) The Legislature hereby finds and declares that the growth of water hyacinth (*Eichhornia crassipes*), Brazilian elodea (*Egeria densa*), and South American spongeplant (*Limnobium laevigatum*) in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh has occurred at an unprecedented level and that the resulting accumulations of water hyacinth, *Egeria densa*, and South American spongeplant obstruct navigation, impair other recreational uses of waterways, have the potential for damaging manmade facilities, and may threaten the health and stability of fisheries and other ecosystems within the Delta and marsh. Accordingly, it is necessary that the state, in cooperation with agencies of the United States, undertake an aggressive program for the effective control of water hyacinth, *Egeria densa*, and South American spongeplant in the Delta, its tributaries, and the marsh."

"(b) The Division is designated as the lead agency of the state for the purpose of cooperating with agencies of the United States and other public agencies in controlling water hyacinth, *Egeria densa*, and South American spongeplant in the Delta, its tributaries, and the marsh."

Egeria densa was first introduced in Assembly Bill 2193 (Rainey, Ch. 728, Statutes of 1996), then Assembly Bill 763 expanded species jurisdiction to DBW in 2013.

"This bill would additionally designate the Division as the lead agency of the state for the purpose of cooperating with other state, local, and federal agencies in identifying, detecting, controlling, and administering programs to manage invasive aquatic plants, as defined, in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh."

2.2 Section 64.5 of the Harbors and Navigation Code

Section 64.5 of the Harbors and Navigation Code is amended to read as follows:

"(a) The Division is designated as the lead agency of the state for the purpose of cooperating with other state, local, and federal agencies in identifying, detecting, controlling, and administering programs to manage invasive aquatic plants in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh. The Division, in consultation with appropriate state, local, and federal agencies, may take such action it determines is necessary, upon concurrence from the Department of Fish and Wildlife following the completion of the risk assessment described in subdivision (c), to implement control and, when feasible, eradication measures for invasive aquatic plants. Any actions taken to control invasive aquatic plants shall be in compliance with all applicable laws and regulations and conducted in an environmentally sound manner."

"(b) The Division shall regularly consult with the United States Department of Agriculture, the United States Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the University of California, and other members of the scientific and research communities, as well as other state agencies with authority over the control of invasive aquatic plants to determine which species of those plants should be given the highest priority for management and determine the best control and, when feasible, eradication measures."

"(c) (1) After consulting with the various entities as required in subdivision (b), if the Division identifies a species of aquatic plant that may be invasive and need to be controlled or eradicated, the division shall notify the Department of Fish and Wildlife of the potential threat from that aquatic plant species. After receipt of that notice, the Department of Fish and Wildlife, in consultation with other appropriate local, state, and federal agencies, including, but not limited to, the Department of Food and Agriculture, the Department of Water Resources, the State Water Resources Control Board, the Department of Pesticide Regulation, and the Office of Environmental Health Hazard Assessment, shall conduct a risk assessment of the aquatic plant species identified by the Division to determine whether the plant species is invasive and presents a threat to the environment, economy, or human health. In making that determination, the Department of Fish and Wildlife shall take prompt action to minimize detrimental impacts and costs of management, and shall consider all of the following:

(A) Whether the aquatic plant species may obstruct navigation and recreational uses of waterways.

(B) Whether the aquatic plant species may cause environmental damage, including threats to the health and stability of fisheries, impairment to birds' access to waterways and nesting, roosting, and foraging areas, deterioration of water quality resulting from plant decay, and harm to native plants.

(C) Whether the aquatic plant species may cause harm to the state's economy, infrastructure, or manmade facilities such as state water storage facilities and pumping operations, by increasing flood risk, threatening water supplies by blocking pumps, canals, and dams necessitating early control efforts.

(2) Based on factors specified in subparagraphs (A), (B), and (C) of paragraph (1) and any other environmental, economic, or human health impacts, the risk assessment shall specify whether the plant species under consideration has been determined to be an invasive aquatic plant. Findings from the risk assessment shall be documented in a way that clearly describes the severity and types of impacts caused by a plant species determined to be an invasive aquatic plant.

(3) Within 60 days after completing the risk assessment required by paragraph (1), the Department of Fish and Wildlife shall report its findings to the division so that the division may take any necessary action to control and, when feasible, eradicate an invasive aquatic plant, as authorized under subdivision (a).

(d) For purposes of this section, "invasive aquatic plant" means an aquatic plant or algae species, including its seeds, fragments, and other biological materials capable of propagating that species, whose proliferation or dominant colonization of an area causes or is likely to cause economic or environmental harm or harm to human health.

(e) Aquatic plants shall be determined to be invasive through the risk assessment required to be completed by the Department of Fish and Wildlife in consultation with the division and other state, local, and federal agencies pursuant to subdivision (c)."

2.3 Risk Assessment Status

The CDFW administers the risk assessment process to determine whether a species can be considered an invasive species in California. An invasive species is described as a species that presents a threat to the environment, human health or the economy. CDFW uses the U.S. Aquatic Weed Risk Assessment tool to evaluate aspects of a species' ecology, reproductive potential, dispersal mechanisms, competitive ability, actual and potential impacts (including impacts to navigation and recreation, the environment, economy, and human health as specified in Harbors and Navigation Code 64.5), and resistance to management. Based on this evaluation, CDFW, in consultation with the California Department of Water Resources (DWR), State Water Resources Control Board (SWRCB), Department of Food and Agriculture (CDFA), Department of Pesticide Regulation (CDPR), and Office of Environmental Health Hazard Assessment (OEHHA), and in concurrence with DWR will make a determination whether the species is an invasive aquatic plant that causes, or is likely to cause, economic or environmental harm, or harm to human health in California. The scoring system is broken into three categories, non-invaders score < 31, scores of 31 – 39 require further evaluation, and any species with a score > 39 is considered a major invader. **Table 1** shows the risk assessment determination for each species.

Table 1 – Risk Assessment Scores for SAV

Common Name	Scientific Name	Score	Date of Determination
Brazillian waterweed	*Egeria densa*	*	2001
curlyleaf pondweed	*Potamogeton crispus*	66	June 12, 2015
Eurasian watermilfoil	*Myriophyllum spicatum*	76	June 28, 2016
coontail	*Ceratophyllum demersum*	58	October 14, 2016
fanwort	*Cabomba caroliniana*	75	January 25, 2018

**Egeria densa was determined to be an invasive in 2001, prior to the use of this scoring tool.*

Brazillian waterweed *(Egeria densa)* has been determined to be an invasive species and as such DBW has had authorization to treat this invasive species since 2001.

In August 2014, DBW requested a risk assessment for curlyleaf pondweed (*Potamogeton crispus*) and in June 2015, CDFW completed the risk assessment and concluded that curlyleaf pondweed should be considered an invasive aquatic plant. DBW added curlyleaf pondweed to the then existing *Egeria densa* Control Program (EDCP), now known as the Submersed Aquatic Vegetation Control Program.

In August 2014, DBW sent risk assessments to CDFW for Eurasian watermilfoil (*Myriophyllum spicatum*), coontail (*Ceratophyllum demersum*), and fanwort (*Cabomba caroliniana*). CDFW completed a risk assessment for each of these three species with the conclusion that each should be considered an invasive aquatic plant. Eurasian watermilfoil was completed in June 2016, coontail in October 2016, and fanwort in January 2017.

3 ENVIRONMENTAL COMPLIANCE

3.1 Summary of Regulatory Compliance Requirements

The following constitutes a summary of the environmental compliance documents required to implement the SAV Control Program. Each document has requirements designed to ensure avoidance or minimization of significant impacts to beneficial uses of waters of the U.S., threatened and endangered species protected by the Endangered Species Act (ESA). DBW partners with the US Department of Agriculture-Agricultural Research Service (USDA-ARS) as a federal nexus to obtain required approvals to operate the SAV Control Program from two federal agencies: U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS).

The division obtained a multi-year (2013-2017) authorization from USFWS and NMFS to operate the SAV Control Program pursuant to Section 7 of the ESA.

- USFWS BOs:
  - 08FBDT00-2013-F-0015, effective May 3, 2013
  - 08FBDT00-2018-F-0029, effective April 3, 2019
- NMFS Letters of Concurrence:
  - 2013-9391, effective March 26, 2014
  - 2017-8268, effective May 15, 2018

A National Pollutant Discharge Elimination System (NPDES) permit is required by the SWRCB. Coverage under this permit was obtained in December 2013 and expires in 2018, and is referenced as the Statewide General NPDES Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States (Permit No. CAG990005, Water Quality Order 2013-0002-DWQ).

3.1.1 Reporting Requirements

The NPDES Statewide General Permit for Aquatic Pesticide Use requires DBW to submit an annual report on March 1, following the SAV Control Program application season. Reporting per NPDES guidelines must include the following:

1) Executive summary discussing permit compliance or violation of permit terms and conditions to beneficial waters of the U.S.

2) Effectiveness of the Aquatic Pesticide Application Plan (APAP) to reduce or prevent the discharge of pollutants associated with aquatic herbicide applications.

3) Summary of monitoring data, including the identification of water quality improvements or degradation as a result of the algaecide or aquatic pesticide application, if appropriate, and recommendations for improvements to the APAP [including proposed best management practices (BMPs)] and monitoring program based on the monitoring results. All receiving water monitoring data shall be compared to receiving water limitations and receiving water monitoring triggers.

4) Identification of BMPs currently in use and a discussion of their effectiveness in meeting the permit requirements.

5) A discussion of BMP modifications addressing violations of this General permit.

6) A map showing the location of each treatment area.

7) Types and amounts of algaecides and aquatic herbicides used at each application event.

8) Information on surface area and/or volume of treatment areas and any other information used to calculate dosage, concentration, and quantity of each algaecide and aquatic herbicide used.

9) 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 roads, 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/quality control plan. Sampling results shall be tabulated so that they are readily discernible.

10) Summary of algaecide and aquatic herbicide application log.

Both the USFWS BO and NMFS Letter of Concurrence requires an annual report to be submitted January 31, following the application season. This report summarizes compliance with the terms and conditions which include species and habitat protection, water quality monitoring, and any additional monitoring and studies that may have been conducted as part of regulatory requirements from other participating state or federal agencies. Additional reporting requirements are on a case-by-case basis in the event an incidental take should occur with any of the species discussed in the USFWS BO. Take is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct”. Reporting of take begins with immediate notification to the USFWS biologist (based on jurisdiction) in charge of administering the BO and requires documentation of information, such as location of take, number of species, water quality conditions, chain of custody, and prescriptive action for preventing future occurrences.

3.1.2 Statewide General NPDES Permit

RECEIVING WATERS

There are clear definitions in the NPDES Permit (No. CAG990005) regarding the application area, treatment area, and receiving waters. In the NPDES Permit, an *application area* is defined as the area in which aquatic pesticides are directly applied. The *treatment area* is the area treated with an aquatic herbicide to control invasive aquatic plants. It is the responsibility of the discharger to define the treatment area for each location that it discharges to. The SAV Control Program treats waterways with invasive submerged aquatic plants. Therefore, considering the NPDES definitions, the application and treatment areas are essentially the same geographic place in relation to the SAV. Receiving waters are defined in two manners: 1) waters directly down flow of the treatment area, and 2) waters within the treatment area after completion of the treatment event when herbicide residue levels fall below minimum effective concentrations.

Herbicides applied to aquatic plants are not considered a pollutant until residues reach receiving waters. This is because an herbicide designed to treat aquatic plants and approved by the U.S. Environmental Protection Agency (U.S. EPA) cannot also be a pollutant under the Clean Water

Act when the herbicide is doing what it was designed and approved to do under federal pesticide use regulations.

WATER QUALITY PARAMETERS

The SAV Control Program is required to monitor specific water quality parameters to ensure there are no significant impacts to beneficial waters of the United States. The physical and chemical water quality parameters monitored are temperature, salinity, electrical conductivity, turbidity, pH and dissolved oxygen. The SAV also conducts visual inspections before, during and after applications have been made. All changes in water color, odor and vegetative health are annotated.

Dissolved Oxygen

Dissolved oxygen (DO) limits are outlined in the Central Valley Basin Plan issued by the CVRWQCB and subsequently required under the NPDES permit. Within the legal boundaries of the Delta, the DO concentration shall not be reduced below:

- 7.0 mg/l in the Sacramento River (below the I Street Bridge) and in all Delta waters west of the Antioch Bridge
- 6.0 mg/l in the San Joaquin River (between Turner Cut and Stockton, 1 September through 30 November)
- 5.0 mg/l in all other Delta waters

For surface water bodies outside the legal boundaries of the Delta, the monthly median of the mean daily DO concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation. To protect beneficial uses of water, the dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:

- 5.0 mg/l for waters designated as warm freshwater habitat (WARM)
- 7.0 mg/l for waters designated as cold freshwater habitat (COLD)
- 7.0 mg/l for waters designated for spawning, reproduction, and development (SPWN)

In the locations listed for dissolved oxygen, concentrations shall not be reduced below the amount indicated during the stated time period.

pH and Turbidity

In addition to DO limits, basin limits for pH and turbidity are also described in the Central Valley Basin Plan and required under the NPDES permit. The discharge shall not cause the ambient pH to fall below 6.5 or exceed 8.5, and/or cause turbidity to increase as follows:

- More than 1 Nephelometric Turbidity Units (NTU) where natural turbidity is between 0 and 5 NTUs
- More than 20 percent where natural turbidity is between 5 and 50 NTUs
- More than 10 NTUs where natural turbidity is between 50 and 100 NTUs
- More than 10 percent where natural turbidity is over 100 NTUs

The Basin Plan also outlines general turbidity objectives for Delta waters: except for periods of storm runoff, the turbidity of Delta waters shall not exceed 50 NTUs in the waters of the Central Delta and 150 NTUs in other Delta waters.

3.1.3 USFWS BO for SAV

The USFWS BO, pursuant to Section 7 of the Endangered Species Act, imposes several measures to avoid impacts to protected species in the Delta. Primarily, 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 applicator education. DBW does treat during seasonal migrations for listed protected species. Species specific toxicity concentrations used by the SAV Control Program are well under all compliance requirements listed under USFWS BO. All applicators received worker environmental awareness training before treatment began on March 7, 2016. Personnel were informed as to the presence of endangered/ threatened species such as the Valley longhorn elderberry beetle, delta smelt, and the giant garter snake and their habitats. The briefing also included the USFWS BO as required by Section 7 of the ESA and concurrences from NMFS.

DELTA SMELT

The USFWS BO outlines specific mitigation measures to minimize impact to delta smelt (*Hypomesus transpacificus)* and associated habitats. Interagency Ecological Program (IEP) fish monitoring data is used to determine the presence or absence of delta smelt within or near herbicide application areas. Timing and location requirements specified in the USFWS BO aim to reduce the potential for negative impacts on delta smelt. The SAV Control Program area is divided into four USFWS Areas: Area 1 (primary delta smelt habitat), Area 2 (secondary delta smelt habitat), Area 3 (tertiary delta smelt habitat) and Area 4 (non-delta smelt habitat). Herbicide applications using fluridone in Areas 1, 2, 3 and 4 may begin on March 1 and continue through November 30. If Diquat is used it may only be applied between June 1 and November 30. For all treatments conducted between March 1 and June 30, the ability to treat invasive aquatic plants depends on the presence of listed fish species, which is determined by a review of available fish monitoring data and by species surveys on the day of the planned treatment. Herbicide applications will be suspended in the immediate treatment area in the event that delta smelt are identified, harmed or killed in the action area.

The USFWS BO requires that personnel involved with the SAV Control Program receive USFWS-approved worker environmental awareness training. Under this training program, personnel are informed about the presence of delta smelt and its associated habitat. Training includes 1) species identification, 2) the life history of delta smelt, 3) the importance of Delta migratory routes, and 4) all terms and conditions of the USFWS BO for protection, avoidance and minimization of impacts to this protected species under ESA.

VALLEY ELDERBERRY LONGHORN BEETLE

The USFWS BO outlines specific mitigation measures to minimize impact to the valley elderberry longhorn beetle (VELB; *Desmocerus californicus dimorphus)* and associated elderberry shrub (*Sambucus* sp.) habitat. DBW was directed by USFWS to avoid impact to VELB by surveying for elderberry shrubs, and maintaining a 100-foot buffer between treatment sites and shoreline elderberry shrubs. Herbicide applications occur away from and downwind of elderberry shrubs.

The USFWS BO requires that personnel involved with the SAV Control Program receive worker environmental awareness training taught by a USFWS-approved biologist. Under this training program, personnel are informed about the presence of VELB and its elderberry shrub habitat. Training includes 1) species identification, 2) the life history of VELB, 3) the importance of

elderberry shrubs as habitat, and 4) all terms and conditions of the USFWS BO for protection, avoidance and minimization of impacts to this protected species under ESA.

GIANT GARTER SNAKE

The USFWS BO outlines specific mitigation measures to minimize impact to giant garter snake (GGS; *Thamnophis gigas)*. Restrictions regarding GGS in the USFWS BO apply to any land-based operations, which occur on Delta banks other than existing roads or boat ramps, and to mechanical removal operations in sensitive GGS habitat.

The SAV Control Program is not currently authorized to utilize mechanical harvesting nor is it operating near any unimproved areas. However, mitigation beyond the requirements of the USFWS permits has been implemented to avoid any impact. The entire SAV Control Program project area has been evaluated for GGS habitat. This evaluation has been incorporated into the GIS technology utilized by application crews. The application crews were also provided with a set of maps of previously surveyed and sensitive areas for GGS to minimize impact where GGS are most likely to be found.

The USFWS BO requires that personnel involved with the SAV Control Program receive USFWS approved worker environmental awareness training. Under this training program, personnel are informed about the presence of GGS and habitat associated with the species. Training includes: 1) species identification, 2) the life history of the GGS, 3) the importance of irrigation canals, marshes/wetlands, and seasonally flooded areas as habitat, and 4) all terms and conditions of the USFWS BO for protection, avoidance and minimization of impacts to this protected species under ESA.

3.1.4 NMFS Letter of Concurrence for SAV

NMFS issued a Letter of Concurrence in response to USDA-ARS and DBW's request for ESA Section 7 consultation. Based on the SAV Control Program project descriptions and supplemental material provided, and the best available scientific and commercial data, NMFS concurs with USDA-ARS and DBW's determination that the proposed use of herbicide products is not likely to adversely affect federally listed Sacramento River winter-run Chinook salmon (*Oncorhynchus tschawytscha*), Central Valley spring-run Chinook salmon (*O. tschawytscha*), Central Valley steelhead trout (*O. mykiss*), or the Southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) or any of their designated critical habitats.

The SAV project description outlines specific mitigation measures and avoidance guidelines to minimize impact to Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead trout, and green sturgeon. Dependent upon the type of water-year and in-stream flows, juvenile Chinook salmon and steelhead may be present in the Delta through June. DBW proposed to begin herbicide applications as early as March 1 in sites where listed fish species are not likely to be present. The remainder of the action area may be treated provided that the available fish monitoring data indicates that salmonids are not likely present or that the pulse of juvenile Chinook salmon has migrated through the Delta.

DBW continues to require herbicide applicators to be informed about the presence of Chinook salmon, steelhead, and green sturgeon and their associated habitat. Training includes: 1) species identification, 2) salmonid and sturgeon life history, 3) importance of migratory routes and identification of associated habitat, 4) impact avoidance guidelines and 5) the terms and conditions of the NMFS Concurrence Letter.

4 PERSONNEL, MATERIALS AND METHODS

4.1 Personnel and Certifications

4.1.1 Application Crews

During 2018, DBW had five to ten full-time crews focused on the SAV Control Program, with each crew consisting of either an aquatic pest control specialist and an aquatic pest control technician, or two aquatic pest control specialists for herbicide application activities. Each crew contains a minimum of one member possessing a Qualified Applicators Certificate (QAC), category “F” (aquatics), administered by the CDPR.

APPLICATION EQUIPMENT

Crews use either a 19 or 21-foot aluminum boat powered by either an outboard engine or are air driven. At the start of each treatment the application crew takes dissolved oxygen and a temperature reading using a HACH® Dissolved Oxygen Meter within the treatment site. These readings must be within the parameters outlined in the NPDES Permit and the USFWS BO before an application can be made. At the start of the application, the crew uses a Motion F5t Tablet PC with a GPS unit installed to record the beginning and ending spray lines, coordinates of the spray area and the time of treatment. Each crew uses either an Earthway Commercial spreader (30’ spread), Hopper (50’ to 60’ spread), or Vortex (15’ spread) unit with handheld blower tube to disperse herbicide to the target site. For diquat treatment, two drop hoses are used to administer the herbicide in the water column as the boats are equipped for direct metering of herbicide, adjuvant, and water into the pump system of the spraying unit.

All boats are washed regularly to remove herbicide residues and all application pumps, hoses, and nozzles are inspected and, if found defective, are replaced on an as-needed basis. Boat records are available upon request.

APPLICATION PERSONNEL EDUCATION AND TRAINING

Qualified Applicator Certificate

Application crews receive continuing education credits in pesticide training to keep their QACs current. Continuing education covers pesticide laws and regulations which may include topics such as federal and state pesticide regulations, pesticide and worker safety, surface and ground water protection, pesticide labeling and label interpretation, and pesticide effects on the environment. Category F QACs are renewed every two years upon completion of the continued education credit requirements.

Environmental Awareness Training

Environmental awareness training for the 2018 season was conducted on Feb. 28, 2018. This training included the following items:

- Species identification and impact avoidance guidelines on all threatened and endangered species associated with the SAV Control Program.
- Identification and protection of elderberry shrubs and protocol for monitoring species during an application season.
- Identification and protection of the giant garter snake, including life history; importance of irrigation canals, marshes, wetlands, and seasonally flooded areas as habitat.

- Identification and protection of delta smelt, longfin smelt, Chinook salmon, steelhead, green sturgeon, and associated protected habitats, fishery closure dates, and other regulatory agency requirements.
- Terms and conditions of the USFWS BO and NMFS Letter of Concurrence for the SAV Control Program for protection, avoidance and minimization of adverse effects to protected species under the ESA.
- Protocol for "take," including reviewing the "Incidental Take Statement," collection and handling of dead species, completion of chains of custody, and notification to USFWS.

Equipment Training

Refresher training on the use and calibration of the dissolved oxygen meters and use of Motion F5t Tablet PC and ArcPad application took place in February and March 2018.

4.1.2 Monitoring Personnel

Monitoring activities are overseen by an environmental scientist and conducted by qualified personnel, which may include a senior environmental scientist, environmental scientist and/or student assistants. All water sampling events are carried out in accordance with the Quality Assurance Project Plan (QAPP) and the Environmental Monitoring Protocol as approved by SWRCB, NMFS, and USFWS.

Environmental scientists are responsible for understanding and adhering to the regulatory permits and BO terms and conditions. They are also responsible for training other monitoring crew members on monitoring protocols, water sampling techniques, and the calibration and use of field equipment necessary to collect accurate data. Environmental scientists conducted monitoring training for all monitoring personnel during 2018 on environmental monitoring and field equipment protocols.

The scientist schedules and plans all field sampling events. Pictures are used to document any unusual conditions of the sampling locations, vegetation, or surrounding areas. Additional responsibilities include quality control field monitoring, laboratory analysis and reporting of findings in an annual report as outlined.

MONITORING EQUIPMENT

A 21-foot outboard motorboat (North River) was used for monitoring activities. Water samples were collected using the MasterFlex® E/S® Portable Sampler fitted with 7-10 feet of tubing. Water quality parameters were measured with a Hydrolab® Model MS5 mini datasonde. Water quality parameters included water temperature, electrical conductivity, salinity, dissolved oxygen, pH and turbidity. Parameters measured by the Hydrolab® were geographically referenced with GPS coordinates with a Motion F5t Tablet PC and ArcPad application. Data were captured electronically using Hydroplus® software specifically modified for the SAV. In the event of datasonde malfunction, a Hach® HQ-30 Dissolved Oxygen Meter was used as a backup to measure temperature and dissolved oxygen within monitoring sites. In addition, all data was hand written on datasheets as a backup copy. These datasheets were subsequently used for data quality control purposes. A digital camera was used to provide visual records of sampling locations and other notable factors that may affect water quality, species of concern, or the condition of the surrounding environment.

To avoid water sample contamination, boats used for environmental monitoring were never used for herbicide applications. Monitoring boats were also periodically washed. To ensure that

water quality data is reliable, Hydrolabs® and Hach® DO meters were calibrated on a regular basis based on the manufacturer's requirements.

4.2.1 Herbicide Application

EGERIA OPERATIONS MANAGEMENT PLAN

The Egeria Operations Management Plan (OMP) details general requirements, the scope of program activities, a pre-application planning protocol, application/monitoring coordination protocol, herbicide application protocol; Best Management Practices (BMP) for herbicide handling, spray equipment maintenance and calibration, spill avoidance and contingency plan, listed species avoidance and habitat evaluation; and dissolved oxygen/temperature measurement, fish passage protocol, and agricultural and water intake coordination.

HERBICIDES

The herbicide products used in 2018 for SAV treatment include the following:

Fluridone: 1-methyl-3phenyl-5 (trifluromethyl-phenyl)-4 (1H)-pyridone; under the commercial trade names of:

- Sonar Q® - EPA Registration No. 67690-3 (Pellets)
- Sonar One® - EPA Registration No. 67690-45 (Pellets)
- Sonar PR® - EPA Registration No. 67690-12 (Pellets)

Fluridone was approved by the U.S. EPA in 1986. There are a variety of different formulations of the herbicide, including liquid and pellets. The SAV Control Program will utilize fluridone formulations such as: Sonar® PR (granular) and two pellet formulations, SonarOne® and Sonar Q®. The pellet and granular formulations provide different release profiles due to the characteristics of the inert clay ingredients. Sonar Q is referenced as "quick release" for increasing fluridone concentrations in the target area quickly. Sonar PR is for "precision release" and is used at the end of the treatment plan due to slowly releasing the herbicide over the course of a longer period of time. Sonar One has a release rate between these two other products for use during the bulk of the treatment plan for a target area. All formulations have the same mode of action and concentration limitations. SePRO (the manufacturer of Sonar products) developed the release profile for SonarOne based on the characteristics of the Delta.

Fluridone (Sonar®) is a selective systemic herbicide that inhibits the formation of carotene, an action that results in the photo-degradation of chlorophyll exposed to sunlight. Plants are unable to produce carbohydrates and starve to death over time, usually 45-90 days. Formation of carotene occurs primarily in new growth, thus fluridone is most effective in maximum growth periods of *Egeria densa*. Fluridone not absorbed by the plants is broken down into naturally occurring elements mostly through exposure to sunlight or binding to substrate. Diquat (Reward®) is a non-selective, contact herbicide that rapidly eliminates weeds that are contacted.

The effectiveness of Fluridone depends on the degree to which the herbicide maintains contact with the target plant. Fluridone treatment programs will typically last from 8 to 16 weeks based upon site condition (plant growth, flow patterns and agriculture irrigation intake considerations). Fluridone formulations will be applied at rates of 5 to 20 ppb per application, lower than the 10 to 40 ppb listed on Sonar® labels. The intent will be to maintain a fluridone concentration in the water column at the treatment site between the 1.5 to 3.5 ppb range. This is more than two orders of magnitude below the NPDES receiving water limit of 560 ppb.

Herbicide 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 dispersal rates in flowing waters. Fluridone has no maximum application rate in flowing water. The applicator is allowed to apply at an appropriate rate such that a target concentration in the water column does not exceed 40 ppb. However, most of the applications performed by SAV crew are at or below 15 ppb with a residue level of less than 5 ppb in the water column.

Prior to the start of each treatment season, USDA-ARS and DBW (with consultative support from SePRO Corporation Aquatic Specialists) will develop a treatment protocol for each selected treatment site. The protocol will specify weekly fluridone applications at a specific ppb level, by quantity and formulation, based on the size and depth of the treatment area, infestation level, presence of nearby irrigation or potable water intakes, and the extent of tidal influence at the site. This protocol will provide a baseline treatment plan that will be adjusted on a weekly basis, if necessary, based on results from water samples taken at treatment sites throughout the treatment season. The SAV Control Program will conduct regular water sampling at each treatment site and send the collected samples to Dr. Pandey's Laboratory at the Department of Population and Health, School of Veterinary Medicine, UC Davis for analysis. Sample results are received within 24 hours of sampling. Results are used to adjust the treatment protocol, if necessary, to maintain the desired fluridone concentration of 2 ppb to 5 ppb. Information on the SAV Control Program treatment sites by delta smelt habitat level are found in Table 1.

Table 1. SAV Treatment Sites, Herbicides and Timing

Delta smelt (DS) Habitat Level	USFWS Area	Delta Boundary Area	Treatment Site Numbers[f]	Fish Survey Reporting Required[b,c]	Fluridone	Diquat[e]
Primary DS Habitat	1	Legal Delta North of Hwy 12	200-290	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30
		Legal Delta South of Hwy 12	16-24b, 39-44, 69, 98a-176	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30
Secondary DS Habitat	2	Legal Delta South of Hwy 12	11-15, 33, 49-68, 78, 79, 83a-97	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30
Tertiary DS Habitat	3	Legal Delta South of Hwy 12	1-10, 25-38, 45-48, 70-77, 80-82, 291	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30
Non-DS Habitat	4	Legal Delta South of Hwy 12	300-309	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30
		Non-Legal Delta	370 and above	March 1 to June 30	March 1 to Nov. 30	August 1 to Nov. 30

[a] DBW may not treat in any site if DO is between 3 ppm and Basin Plan limits (5 ppm to 8 ppm, by location).

[b] DBW will implement a survey-based approach to conducting treatments that allows for treatments starting as early as March 1, in areas with re-growing *Egeria densa* when listed fish species are not present and water temperatures are rising, as reported to NMFS and USFWS

[c] DBW environmental scientists will continue to monitor fish surveys and avoid treating in sites where listed fish species are present; however, formal weekly reporting to NMFS and USFWS is not required after July 1.

[d] DBW will monitor the efficacy of the new herbicides penoxsulam and imazamox (time to symptoms, plant death, and regrowth).

[e] DBW will utilize Diquat between August 1 and November 30 for emergency conditions only, such as when *Egeria densa* blocks a slough such that emergency response vehicles access is impaired. DBW will not treat a total of more than 50 acres using Diquat per year.

[f] See Appendix A for a map with treatment site numbers.

BEST MANAGEMENT PRACTICES

- DBW developed a series of BMPs that outline methods or techniques that have been found to be the most effective and a practical means of achieving a particular objective and/or to comply with SAV Control Program requirements.
- Herbicide Handling Requirements – All personnel will be trained in herbicide handling in accordance with Food and Agriculture Code and Title 3 of California Code of Regulations pertaining to Pesticides and Pest Control Operations.
- Spray Equipment Calibration – Herbicide application equipment used for the SAV Control Program is to be calibrated on at least a monthly basis during the treatment season.
- Spill Avoidance and Contingency Plan – All herbicide spills are treated as emergencies and need to be remediated immediately. DBW applies preventative measures to reduce the potential for a serious spill.
- Annual Environmental Awareness Training – All program personnel involved in herbicidal treatments receive required Annual Environmental Awareness training
- Endangered Species Avoidance Measures – Implement avoidance measures to reduce or eliminate potential impacts of the programs on endangered species.
- Agricultural and Water Intake Coordination – Specific measures are implemented to ensure herbicide treatments do not negatively impact water intakes. All herbicide label requirements are followed as they related to use of treated water for irrigation or drinking purposes. DBW also coordinates with county, water districts, State Water Project (SWP) or Central Valley Project (CVP) regarding water quality impacts.

TREATMENT SITE SELECTION AND PRIORITIZATION

Prior to the start of the 2018 treatment season, field crews visually surveyed all sites in their application region and estimated the amount of acres infested with AIS. Hydroacoustic mapping was conducted in the areas considered by the crews to have a high infestation of submersed aquatic plants and that fell into one of DBW's high priority categories. Herbicide applications were prioritized such that nursery areas with a high amount of growth and areas that are critical to public, agricultural, municipal, industrial, recreational or navigational use were treated first. DBW prioritized treatment sites based on results of these pre-season field surveys, combined with the staff's experience and knowledge of AIS growth patterns and distribution. Each site was ranked on several factors including: (1) whether or not the site was a nursery area, (2) current infestation levels, (3) potential for infestation, and (4) whether the site is important for navigation, public safety, recreation and/or commercial use.

The 2018 herbicide application season began on April 8, 2018 throughout the Delta where protected fish species were not likely to be present. All through the season, fish monitoring data were continuously reviewed to avoid treating in sites where listed fish species were likely to be present. During 2018 the site selection process also considered information and concerns received via email and phone from the public.

4.2.2 Environmental Monitoring

The SAV Control Program is responsible for collecting water quality monitoring data (NPDES), as well as collecting water samples for herbicide residue testing.

SAV NPDES ANNUAL MONITORING PROTOCOL

All water quality monitoring follows the NPDES Annual Monitoring Protocol as outlined in the SAV Control Program Aquatic Pesticide Application Plan (APAP), which was approved in

January 2014 by the SWRCB. Quality control and quality analysis measures are outlined in the Quality Assurance Project Plan (QAPP). Monitoring activities include recording SAV impacts on beneficial waters of the U.S., federally listed threatened and endangered species, and associated threatened or endangered species habitats. DBW is required to document herbicide residues in receiving waters and monitor water quality parameters such as water temperature, electrical conductivity, salinity, dissolved oxygen, pH and turbidity. DBW also conducts physical inspections of the treated and surrounding areas to identify changes in water color and odor along with changes in vegetative health of the species within and around the treatment area.

NPDES Monitoring Site Selection

Environmental monitoring sites were selected based on requirements listed under the NPDES permit and biological opinion. The SWRCB Statewide General NPDES Permit requires that dischargers monitor a certain proportion of sites based on the total number of treated sites. Since DBW does not conduct herbicide applications in non-flowing water and tidal and riverine water body types are considered flowing water, all monitoring took place only in the “flowing water” environmental setting category. In 2018, two sites within the Delta were designated as monitoring sites. Locations of the sites monitored in 2018 are listed in Table 2 below and laboratory results data are in Appendix C.

Representative monitoring occurred in sites with varying degrees of habitat for the following species: giant garter snake (*T. gigas*), delta smelt (*H. transpacificus*) and valley elderberry longhorn beetle (VELB) (*D. californicus dimorphus*). Giant garter snake habitat has been rated as low, medium or high, while VELB and delta smelt habitat are classified as being absent or present based on the known distribution of delta smelt and the known locations of valley elderberry shrubs in the project area.

NPDES Residue Sampling

For each application event, DBW takes a pre-sample and as many weekly post samples as necessary until a non-detection of the herbicide residue is obtained for fluridone. Samples of diquat are take according to NPDES with pre-treatment, post-treatment and downstream. These samples are identified as A, B and C. Sample location A is inside of the application area approximately 1/4 to 1/3 the distance from the downstream edge of the application polygon, sample location B is located on the downstream edge of the application polygon, and sample site C is located in an adjacent non-impacted area with similar hydrological conditions as the application area or receiving waters.

SAV WATER SAMPLING Annual Monitoring Protocol

DBW will also take water samples at approximately 3 feet depth and submit these samples to Dr. Pandey’s Laboratory at the Department of Population and Health, School of Veterinary Medicine, UC Davis. The lab will determine herbicide concentrations by a High Performance Liquid Chromatography (HPLC) test. Results will be provided within 24 hours of the time the sample was taken. This quick and regular herbicide monitoring will allow SAV staff to ensure that herbicide concentrations are maintained at efficacious levels, and that water quality standards are not exceeded, particularly for irrigation. Depending on the results, the treatment protocol may be adjusted to achieve an appropriate herbicide concentration.

Water Sampling Monitoring Site Selection

Each treatment polygon has at least one water sampling sample site selected that best represents the treatment site. These sample points are generally selected at the middle and end points for sloughs and equally spaced around larger polygon areas such as Franks Tract. Each

site is sampled at least every other week. Most of the sites are established at the beginning of the treatment season and remain throughout. Extra sample sites were added during the 2018 treatment season at points where information regarding the residence time of fluridone was needed. Maps of each treatment site with water sampling sample point locations are listed in Appendix B.

WATER SAMPLING RESIDUE SAMPLING

The results of the water sampling samples were used to monitor and adjust the herbicide rate of application to ensure that the residues in the water column are conducive to attain the maximum *Egeria densa* efficacy, preferably 1.5 to 3.5 ppb. DBW took 1,045 water samples during the 2018 treatment season.

Table 2. 2018 SAV Control Program Monitoring Sites

PHASE I - Fluridone			
Site ID	**Site Name**	**Acres**	**NPDES Site**
8.A	Atherton Cove	27	
8.D	Duraflame	6	
10.B	Buckley Cove	23	
10.W	Windmill Cove Marina	9	
14.D	Delta Yacht Club	3	
14.H	Headreach Island	65	
14.P	Power Squadron	18	
15	St. Francis Yacht Club	19	
18a.K	Korth's Pirates Lair	14	
18a.P	Perry's Boat Harbor	9	
18a.W	Willow Berm	19	
20	Sevenmile Slough	65	
22.M	Brannan Island State Park Marina	1	
22.S	Brannan Island Slough	12	
22.O	Outrigger Marina	16	
26	Fourteenmile Slough	45	
30	Mosher Slough	36	
31	Pixley Slough	70	
32	Disappointment Slough	183	
34	Bishop Cut	112	
36	White Slough Upland	25	
37	White Slough	197	
38	Honker Cut / King Island Resort	48	
40.G	Grindstone Joe's	10	
40.T	Tower Park / Little Potato Slough	58	X
62	Whiskey Slough	71	
79	Rivers End Marina	12	
87a/b.I	Italian Slough	11	
87b.K	Kings Island	2	
88	Italian Slough / Lazy M Marina	5	
91a	Cruiser Haven	21	X
92b	Old River - Diablo Ski Run	15	

Site ID	Site Name	Acres	NPDES Site
93	Discovery Bay	250	
97	Rock Slough / Holland Riverside	119	
107	Piper Slough	121	
108	Sandmound Slough	32	
109	Sandmound Slough	100	
110	Taylor Slough	111	
111	Taylor Slough	13	
112	Emerson Slough	15	
115	Big Break	199	
116	Big Break	211	
117	Big Break	137	
117.M	Big Break Marina	8	
117.F	Foundation Construction Inc.	6	
119b.D	Driftwood Marina	8	
120b.K	Key Con	1	
120b.L	Lloyd's Holiday Harbor	4	
120b.N	New Bridge Marina	7	
120b.S	San Joaquin Harbor / PGE	1	
120b.V	Sportsmen Yacht Harbor / Vortex Foundations	6	
140	Delta Marina Rio Vista	8	
141	Das Cliff House	8	
173	Franks Tract	220	
174	Franks Tract	906	
176	Decker Island	18	
203	Sycamore Slough	219	
205	Hog Slough	115	
207	Beaver Slough	76	
209a	B&W Resort Marina	3	
214	The Meadows	22	
216	The Meadows	28	
241	Long Island Slough	10	
251a	Hidden Harbor Resort	8	
252a	Snug Harbor	10	
252b.H	Hogback	3	
252b.M	Morgan Slough	2	
272	French Island	9	
272.L	Little Hastings Tract	141	
284.L	Lindsey Slough	10	
286	Oxbow Marina	16	
	Phase I Acreage for Fluridone	**4408**	
PHASE II - Fluridone			
Site ID	**Site Name**	**Acres**	**NPDES Site**
272.L	Little Hastings Tract	141	
	Phase II Acreage for Fluridone	**141**	
	Total Acres for Fluridone Treatments in 2018	**4549**	

Diquat			
Site ID	**Site Name**	**Acres**	**NPDES Site**
93.C	Discovery Bay - Cabrillo Bay	12	X
93.S	Discovery Bay - Sand & Princess Coves	9	X
93.I	Indian Slough	8	X
97	Rock Slough	9	X
109	Sandmound Slough	9	X
	Total Acres for Diquat Treatments in 2018	**47**	
	Total Acres for SAV Treatments in 2018	**4596**	

4.2.3 Contract Laboratory Standard Operating Procedures

The analytical methods used by contract laboratories are published in the EPA Test Methods for Evaluating Solid Waste Physical/Chemical SW 846 or EPA Method for Chemical Analysis of Water and Waste. Analysis of water samples was conducted by Dr. Pandey's Laboratory at the Department of Population and Health, School of Veterinary Medicine, UC Davis. The method used to analyze fluridone in surface water is an Enzyme-Linked Immunoassay (HPLC) test.

ANALYTICAL TESTING VALIDATION

DBW used several methods to validate results found by contracting laboratories. These methods include collecting split (duplicate) water samples, field blanks and equipment blanks. An equipment blank sample (de-ionized water) was collected at every sampling event to detect potential contamination from sampling equipment.

4.2.4 Hydroacoustic Monitoring

Measuring efficacy is an important part of any treatment program. Monitoring methods need to be non-intrusive, repeatable, and show consistent and reliable results over time.

This is the second season where hydroacoustic biomonitoring has been employed in a robust and systematic fashion. All but two of the treatment sites for the 2018 season were mapped prior to the onset of treatment, then again after the end of the season, post-treatment. These surveys provided detailed, quantitative metrics of the change in bio-volume and percent cover in treated sites.

HYDROACOUSTICS AND BIOBASE

The sonar system used by DBW is a combination of Lowrance™ HighDefinition System (HDS®) consumer echosounders (www.lowrance.com) and a cloud-based algorithm called Biobase (www.cibiobase.com). Biobase is a geo-spatial web platform designed to process Lowrance sonar logs for mapping submerged aquatic vegetation (SAV). The software is retailed by Navico on an annual subscription basis. Biobase generates data on water depth, SAV presence/ absence, SAV height, bottom hardness (composition), and biovolume. The Lowrance / Biobase combination has a distinct advantage over other sonar systems for mapping aquatic vegetation by having lower hardware and analysis costs as well as faster processing times (Radomski and Holbrook 2015). In addition, Biobase outputs are automatically adjusted to Mean Lower Low Tide for consistency across all measurements; an important feature when mapping tidal-influenced systems such as the Delta. The service provided by Biobase offers vegetation point data, interpolated vegetation grids, default maps and tabular data that can be viewed online or downloaded to the subscription holder.

Acoustic and global positioning system (GPS) data are obtained using echosounders connected to 200-Khz 20 degree, single-beam transducers mounted on the research vessels' sterns. When conducting hydroacoustic surveys, the transducer transmits sound pulses through the water column, termed pings and the return acoustic signals are recorded by the unit. Settings for the echosounders follow those recommended by Biobase. The units are set to collect 15 acoustic pings s^{-1} and GPS coordinates every one ms^{-1}. The internal GPS units are differentially corrected using a wide-area augmented system (WAAS). The acoustic and GPS signals are logged to secure digital (SD) cards in sl2 and slg format.

Upon completion of a survey, the sonar data is uploaded to Biobase. The algorithm evaluates each ping to determine SAV presence/absence and calculates water depth and a plant height for valid features. These values are concatenated into biovolume, the proportion of plant height occupying the water column. The vegetation data points from the survey are interpolated into a raster grid format and map products are produced from this data. The original vegetation point data and the raster grids are available for download as text files in csv format.

PYTHON CODES, TOOLS, AND MAP PRODUCTS

Data Processing

The BioBase Aquatic Map System provides the data to be analyzed by DBW and converted into aquatic maps using Python scrips via the *Biovolume data correction* script. The logical process is shown in Figure 1 on value assignment.

The next step involves the *Aquatic Habitat Map* script which generates geographic points to create a raster aquatic map. The logical process is shown in Figure 2. Biovolume value is the relation between the actual height of the aquatic plant divided by the height of the water column, and is ranged from zero to one. Vegetation cover is any sort of aquatic plants present in a water body which has a biovolume greater than 0.05 percent. A percent cover of this vegetation is calculated as vegetation cover divided by the total area surveyed. This parameter is used to compare both the pre and post treatment.

Map Product

The final biovolume maps show SAV with color gradients: blue indicates areas with no aquatic plants, to red where aquatic plants fill the entire water column, with intermediate gradients of green to yellow to orange. A histogram accompanies each map to show the frequency of biovolume data.

The two values used are Biovolume data and vegetation cover. Biovolume value is the relation between aquatic plant height divided by the height of the water column, ranging from zero to one.

Vegetation cover is any sort of aquatic plants present in a water body which has a biovolume value greater than 0.05. A percent cover of this vegetation is calculated as vegetation cover divided by the total area surveyed. This parameter is used to compare both the pre and post treatment.

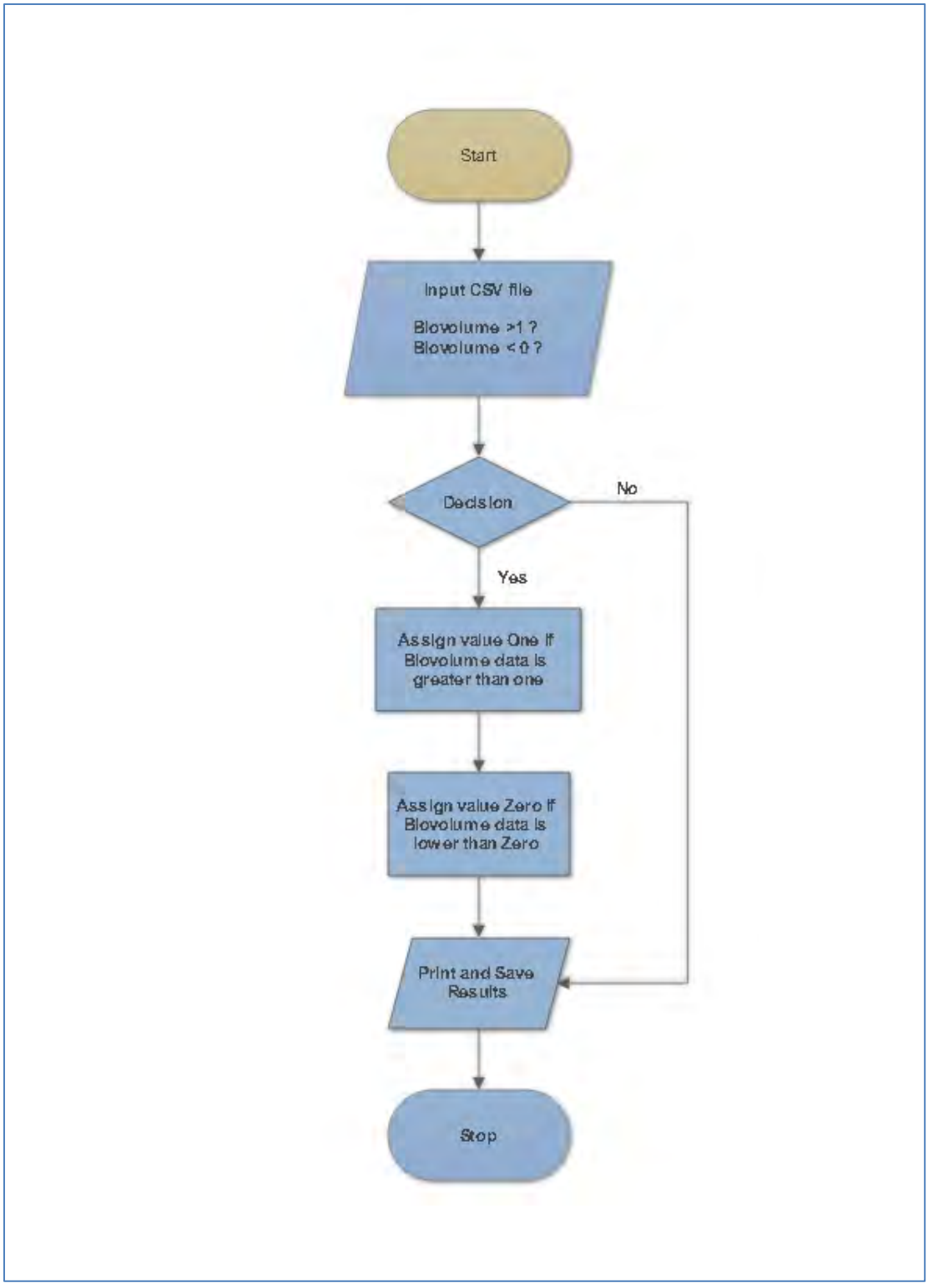

Figure 1. Biovolume Data Correction Flow Script

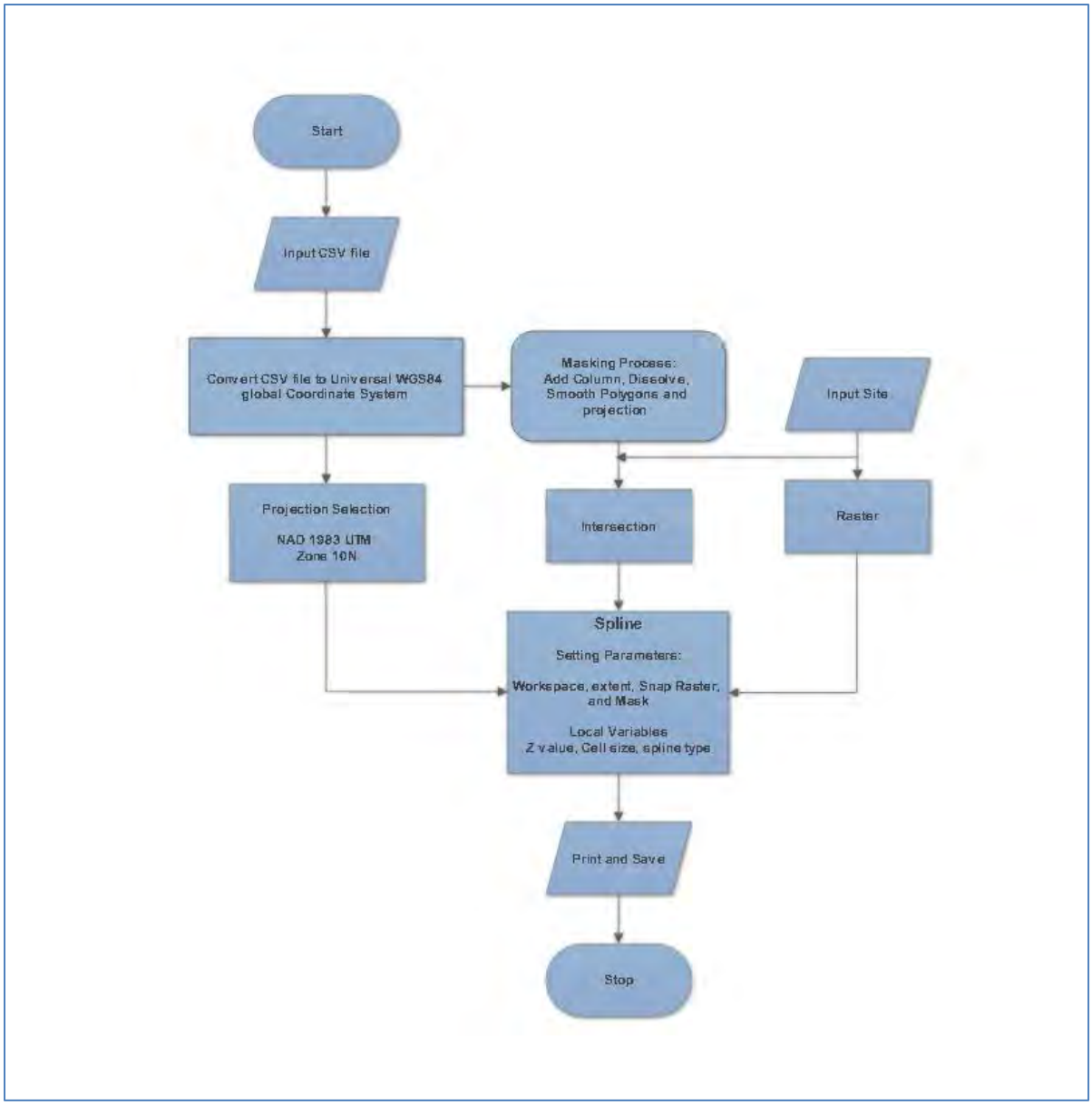

Figure 2. Aquatic Habitat Map Flow Script

SURVEY METHODS

Hydroacoustic surveys were conducted in the legal Delta area (California Central Valley; UTM 627133.242E, 4216458.982N). Seventy-six sites (4407 surface acres) were selected for treatment and mapped based on confirmation of visual and hydroacoustic surveys for high densities of *Egeria densa* and other invasive SAV. Pre- and post-treatment hydroacoustic surveys were instituted to accomplish two efficacy-orientated goals. First, the pre- treatment surveys establish a measure of SAV abundance/density at these sites and the level of treatment needed. Second, the post-treatment surveys provide a current assessment of treatment efficacy and will be used to assess the program's overall efficacy on an annual basis. Surveys were completed by various DBW staff using unit research vessels. Since the Delta is comprised of sloughs, riverine areas, and large shallow waterbodies, mapping was divided into two strategic methods. Large bodies of water, such as Frank's Tract, were gridded to approximately 30 meter intervals for survey transects. In smaller slough and marina areas, transects followed the contours of the shoreline and internal structures (e.g. boat docks, tule islands) and ranged between 10 and 30 meters in width. Transects were performed in water depths ranging from 1 to 8 meters as SAV are shallow-water plants not typically found deeper than 8 meters.

4.2.5 Point Sample Monitoring

Hydroacoustic mapping is a good tool to measure the abundance of submersed aquatic vegetation in an area, but does not identify the plants scanned. Therefore, a new metric was added in the 2017 treatment season – point sampling. Point sample data is gathered by using double-sided rakes on long length of rope that are tossed from the boat, and hauled thru the submersed aquatic plants back to the boat. Density and health data were evaluated and rated onto field data sheets.

Submersed Vegetation Density Scale

Rating	Range	Description
1	1-25%	A fragment to a few strands of species on rake – nothing visible other than a few plants
2	26-50%	Rake has good abundance of a species up to 50% of rake and/or visible plant coverage Of approximately 25% of the area
3	52-75%	Rake has good abundance of a species up to 75% of rake and/or visible plant coverage of approximately 50% of the area
4	76-100%	Topped out dense plants – abundant rake mass and/or visible plant coverage of 75% of the area or greater

Submersed Vegetation Health Scale

Rating	Description
5	Completely healthy, green tissues
4	Leaves chlorotic or abnormal (e.g. darkened, senescent)
3	Defoliation – many leaves gone, partially defoliated along stems
2	Stem defoliated and partially necrotic (discolored)
1	Stem, any leaves necrotic, mushy, little structural integrity – easily squished; usually any roots are also necrotic, mushy or absent

The above health scale was developed for *Egeria densa* and is slightly modified for other submersed aquatic plants evaluated, such as curly leaf pondweed and fanwort.

Sites with 1 to 10 acres had 5 rake pulls; 11 – 100 acres had 10 rake pulls; and sites over 100 acres had 15 rake pulls.

5 MONITORING RESULTS AND DISCUSSION

5.1 Threatened and Endangered Species

The USFWS has established incidental take for ESA listed species and outlined terms and conditions necessary to minimize the impact of incidental take on threatened and endangered species. No incidental take of threatened or endangered species occurred in the 2018 season. Since NMFS concurs with USDA and DBW's determination that the proposed SAV Control Program is not likely to adversely affect federally listed salmonids or green sturgeon, or their habitat, there is no incidental take provided by NMFS in implementing the SAV Control Program.

5.2 Infestation and Herbicide Application

In 2018, the DBW treated a total of 4,596 acres at 76 sites of the project area for *Egeria densa,* curlyleaf pondweed, Eurasian watermilfoil, fanwort, and coontail. The treated sites encompassed most of the Delta. Seventy-one (71) sites were treated with fluridone for a total of 4,549 acres while the remaining 47 acres were split between 5 sites treated with Diquat.

5.2.1 Summary of Herbicide Use

Each crew completed a daily treatment log to record herbicide treatment activities. The 2018 SAV daily log information can be found in Appendix D, Tables D-1 to D-9. Number of crews available, travel time to sites, herbicide label restrictions and environmental mitigation measures were important factors used when scheduling which sites to treat each day. No applications were made if DO concentrations were between 3.0 mg/L and the Basin Plan limits (5 mg/L to 7 mg/L, by location) as adopted by the CVRWQCB.

The herbicide treatment season was conducted in two Phases in 2018. Phase I was from March 12, 2018 to July 2, 2018 with 4,408 acres at 71 sites. Phase II began on Sept. 17, 2018 and ran until Nov. 26, 2018 with 141 acres at one site. In 2018, the SAV Control Program used 208,319 lbs. of fluridone to effectively treat a total of 4,408 acres of submersed aquatic vegetation in the Delta (Table 3). Herbicide applications utilized three formulas of fluridone, Sonar Q® (21,859 lbs.), Sonar One® (137,743 lbs.) and Sonar PR® (48,717 lbs.). Totals of herbicide usage by Sonar product for the SAV program since 2014 are found in Figure 3. DBW discontinued the liquid formulation of fluridone, Sonar AS®, after the 2012 treatment season. A breakdown of the SAV acreage treated since 2010 is found in Figure 4.

Visible effects of the herbicide treatment were bleaching of the tips after 2-3 weeks, followed closely by breaking off of the growing tips, then leaves falling off and gradual degradation of the plants which eventually advanced to small segments of dark husks floating in the water. Even at this late stage, new growth can form at nodes which are still viable. Observations of herbicide symptoms such as bleaching, deleaving and biomass reduction were observed as a result from all treatments.

The USFWS BO for the SAV Control Program states, "California State Parks may treat up to 5,000 acres of *Egeria densa* within the 350 treatment sites". Factors such as staffing, funding, resources, and environmental restrictions have prevented DBW from treating up to the alloted 5,000 acres at this time.

Table 3. 2018 SAV Herbicide Use and Acreage Treated by Month

Month and County	*Sonar Q (lbs.)*	*Sonar One (lbs.)*	*Sonar PR (lbs.)*
PHASE I			
March			
Alameda	**0**	**44**	**0**
Contra Costa	**6,692**	**7,602**	**972**
Sacramento	**1,424**	**1,108**	**0**
San Joaquin	**8,063**	**8,029**	**0**
Solano	**752**	**352**	**0**
April			
Alameda	**0**	**92**	**0**
Contra Costa	**2568**	**28,246**	**1,463**
Sacramento	**0**	**3,199**	**0**
San Joaquin	**0**	**9,715**	**0**
Solano	**0**	**3,800**	**0**
May			
Alameda	**0**	**24**	**0**
Contra Costa	**1,552**	**23,043**	**3,134**
Sacramento	**0**	**3,364**	**0**
San Joaquin	**0**	**15,168**	**0**
Solano	**0**	**2,108**	**0**
June			
Alameda	**0**	**72**	**45**
Contra Costa	**428**	**11,763**	**17,814**
Merced	**0**	**44**	**0**
Sacramento	**0**	**2,352**	**1,872**
San Joaquin	**0**	**1,018**	**0**
July			
Alameda	**0**	**124**	**16,459**
Contra Costa	**0**	**4,298**	**1,554**
Sacramento	**0**	**588**	**99**
San Joaquin	**0**	**1,839**	**3,460**
Solano	**0**	**212**	**570**
August			
Contra Costa	**0**	**4,144**	**0**
September			
Contra Costa	**0**	**2,284**	**0**
Solano	**380**	**0**	**0**
October			
Contra Costa	**0**	**639**	**513**
Solano	**0**	**2,472**	**0**
November			
Solano	**0**	**0**	**762**
Totals	***21,859***	***137,743***	***48,717***

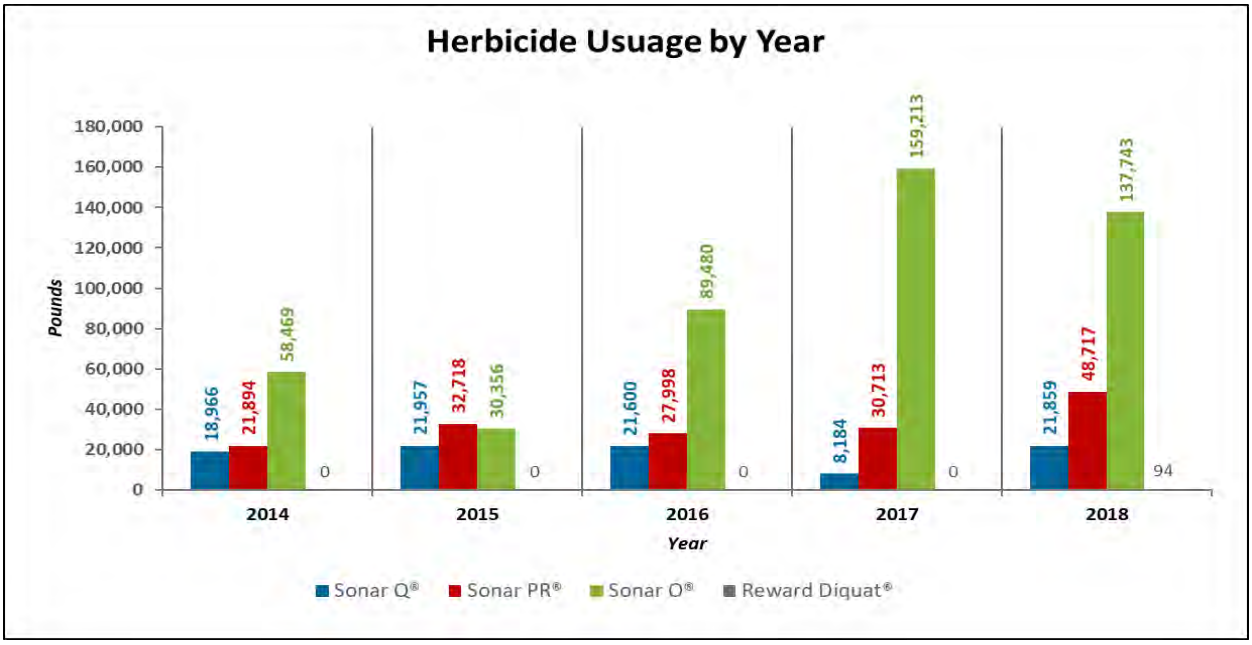

Figure 3. Herbicide Usage by Year for 2014 to 2018

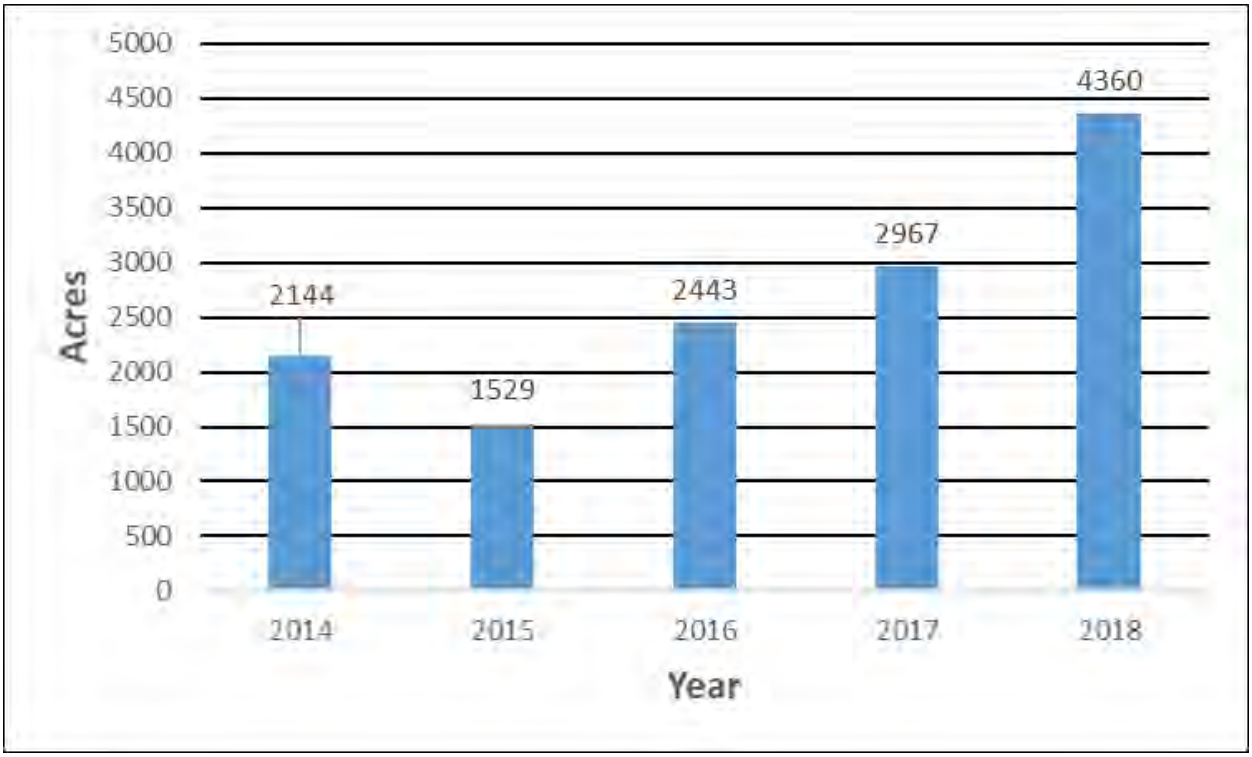

Figure 4. Number of Acres Treated from 2014 to 2018

5.3 Monitoring Data and Laboratory Results

5.3.1 NPDES Results

In 2018, two treatment sites within the Delta were designated as monitoring sites (explanation on selecting NPDES Monitoring Sites under Section 4.2.2). Field monitoring data and lab results collected in compliance with the NPDES permit and BOs are summarized in Appendix C. The maps with corresponding tables document the sample locations, herbicide residues and water quality data for these two monitoring sampling points.

The NPDES permit (General Permit No. CAG990005, Water Quality Order No. 2013-0002-DWQ), that became effective on Dec. 1, 2013, contains sampling requirements that are materially less than what has been historically measured, in terms of frequency of measurement. To ensure that the SAV Control Program maintains environmental quality measures and meets federal ESA requirements, and that monitoring provides independent statistical validity, DBW aims to maintain a more thorough monitoring plan as resources will allow. A total of 61 water quality samples were collected during the 2018 treatment season.

DISSOLVED OXYGEN, TURBIDITY AND PH

The average of the measurements taken at “A” (treatment area) and “C” (control site) locations on the sampling day in question will constitute an average natural turbidity against which the receiving water “B” (downstream location) measurements will be compared (refer to maps in Appendix C). Per protocol, DBW takes a pre-treatment sample in each monitoring site and as many weekly post-treatment samples as necessary until a non-detection of the herbicide residue is obtained, therefore, the number of sampling occurrences varies at each of the sites.

Dissolved Oxygen

The areas of the Delta treated for SAV during the 2018 season fall within the region where 5 mg/L is the lower limit allowable for DO concentrations.

Turbidity

As per Basin Plan standards for turbidity, waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the limits listed in Section 3.1.2.

High turbidity may have been caused by natural waterway characteristics or propeller wash from the sampling boat. If the SAV was responsible for the turbidity violations, the effects were expected to be temporary due to the tidal nature of the Delta, varying hydrodynamics and periodic mixing of the water column. There were no injured or impacted species of concern observed during post-treatment follow-up monitoring.

pH

The Basin Plan Limit for pH shall not cause the ambient pH in the receiving water to fall below 6.5 or exceed 8.5.

5.3.2 Herbicide Residue Concentrations - Water Sampling

Maximum residue limits are based on EPA municipal drinking water standards. Herbicide residue shall not exceed the following concentrations in receiving waters (Table 4).

Table 4. Receiving Water Limits for SAV Herbicides

Herbicide Active Ingredient	Maximum Concentration
Fluridone	560 ppb
Diquat	20 ppb

During 2018, all herbicide residue concentrations at receiving water locations were either not detected or were below receiving water limits as specified in the NPDES permit.

WATER SAMPLING RESULTS

For best efficacy, the intent is to maintain a fluridone concentration in the water column at the treatment site of between 1.5 and 3.5 ppb.

DBW collected 1,985 Water Sampling samples during the 2018 treatment season. In each instance where the residue level exceeded the target of 5 ppb, adjustments were made to the amount of fluridone treated the following week by either skipping a week of treatment or reducing the rate of fluridone used which usually resulted in a reduction in the residue to within range limits.

5.3.3 Hydroacoustic Mapping

RESULTS AND CONCLUSION

All 71 treatment sites were mapped for pre- and post-treatment. The Egeria mapping tool proved to be an effective intermediary between exported data from Biobase and the final map products, automating and reducing the processing time. The limitation to the tool is raster cells from both pre- and post-treatment maps must overlap to provide a change value. Hydroacoustic survey protocols have been established to standardize the procedure and to assure consistency in the pre- and post-treatment mapping regime. Maps with the pre-treatment, post-treatment and mean percent biovolume and the mean percent cover maps will be completed and will follow soon.

5.3.4 Point Sample Monitoring

RESULTS AND CONCLUSION

A total of 1,250 rake pulls were performed throughout the 71 treatment sites. Analysis was only performed for the overall percentages of each of the species collected while rake pulling. Below are the results between the rake pulls conducted pre-treatment and post-treatment.

Submersed Aquatic Plant	Pre	Post	Difference	Reduction/Increase
Egeria	37.50%	26.38%	-11.12%	-29.66%
Curly leaf pondweed	20.63%	12.95%	-7.69%	-37.26%
Coontail	24.92%	18.00%	-6.92%	-27.76%
Eurasian water milfoil	15.74%	9.55%	-6.19%	-39.34%
Fanwort	15.70%	8.67%	-7.03%	-44.79%
Sago PW	0.00%	7.00%	7.00%	See below
Richardson PW	20.33%	5.58%	-14.75%	-72.56%
Threadleaf PW	0.00%	14.77%	14.77%	See below

American PW	0.00%	0.00%	0.00%	0.00%
Other PW	0.00%	10.84%	10.84%	See below
Elodea	14.36%	12.94%	-1.42%	-9.89%

There were reductions in all target invasive aquatic species, ranging from the actual reductions of 27.76 percent to 44.79 percent. The difference noted above is the post rake percentage minus the pre rake percentage where the reduction/increase is the percent difference (26.38 percent is a 29.66 percent decrease from 37.50 percent for *Egeria densa*). Several native pondweeds (PW) have been identified in areas that did not have them last year, such as Sago PW, Threadleaf PW and other PW. Maps with pre-treatment point sample data and post-treatment point sample data maps will be completed and follow soon.

5.3.5 Aquatic Pesticide Application Plan Effectiveness

The APAP describes aquatic pesticides and application methods used for the SAV Control Program. Herbicide application methods and BMPs were effective in maintaining herbicide residues in receiving water below the maximum concentration limits. In addition, all reporting requirements described in the APAP such as providing a Pest Control Recommendation (PCR), Notice of Intent (NOI) and public notification, were met. NOI were provided to county agricultural commissioners at least 24 hours before herbicide applications were made. The NOI included descriptions, treatment locations and application rates for restricted use materials in addition to all other herbicides used by the SAV Control Program. To improve public notifications, DBW developed a new outreach tool in the form of a weekly email notification, available to anyone who subscribes to the distribution list. Updates provided planned treatment areas, and facts and figures on the 2018 treatments.

5.4 Alternative Control Methods and Special Studies

5.4.1 Non-Herbicide Control

Handpicking

No handpicking of SAV by DBW staff occurred in 2018.

Mechanical Removal

While removing a few plants by hand can be effective in small and limited areas, mechanical aquatic weed control on a large scale is generally difficult and expensive. For SAV, mechanical removal can cause more harm by breaking up the vegetation and allowing fragments to disperse elsewhere, compounding the problem. DBW does not currently have a permit to remove SAV mechanically and no mechanical removal of SAV occurred in 2018.

5.4.2 Delta Smelt Resiliency Strategy

The Delta Smelt Resiliency Strategy (DSRS) is a science-based document that has been prepared by the State of California to voluntarily address both immediate and near-term needs of Delta Smelt, to promote their resiliency to drought conditions as well as future variations in habitat conditions. The primary objective of this strategy is to improve the status of Delta Smelt. One of the goals to achieve the strategy objective is to reduce the levels of invasive species, both aquatic weeds and nonnative predators. DBW is partnered/involved in the DSRS to help achieve this goal. Decker Island and Little Hastings Tract were treated this year to support the DSRS.

6 ACKNOWLEDGEMENTS

DBW would like to thank the following entities for their cooperation and collaboration on invasive aquatic plant management in the Sacramento-San Joaquin Delta.

California Department of Fish and Wildlife

California Department of Food and Agriculture

California Department of Food and Agriculture – Center for Analytical Chemistry

California Department of Water Resources

County Agricultural Commissioners

Delta Conservancy

Delta Protection Commission

Delta Stewardship Council

Lauritzen Yacht Harbor

National Aeronautics and Space Administration

National Oceanic and Atmospheric Administration – National Marine Fisheries Service

Paradise Point Marina

SePro Corporation

State Water Resources Control Board

United States Bureau of Reclamation

United States Department of Agriculture – Agricultural Research Service

United States Fish and Wildlife Service

University of California, Davis

A special thanks to:

Various Chambers of Commerce

Stakeholders and Members of the Public

Numerous Legislative Offices

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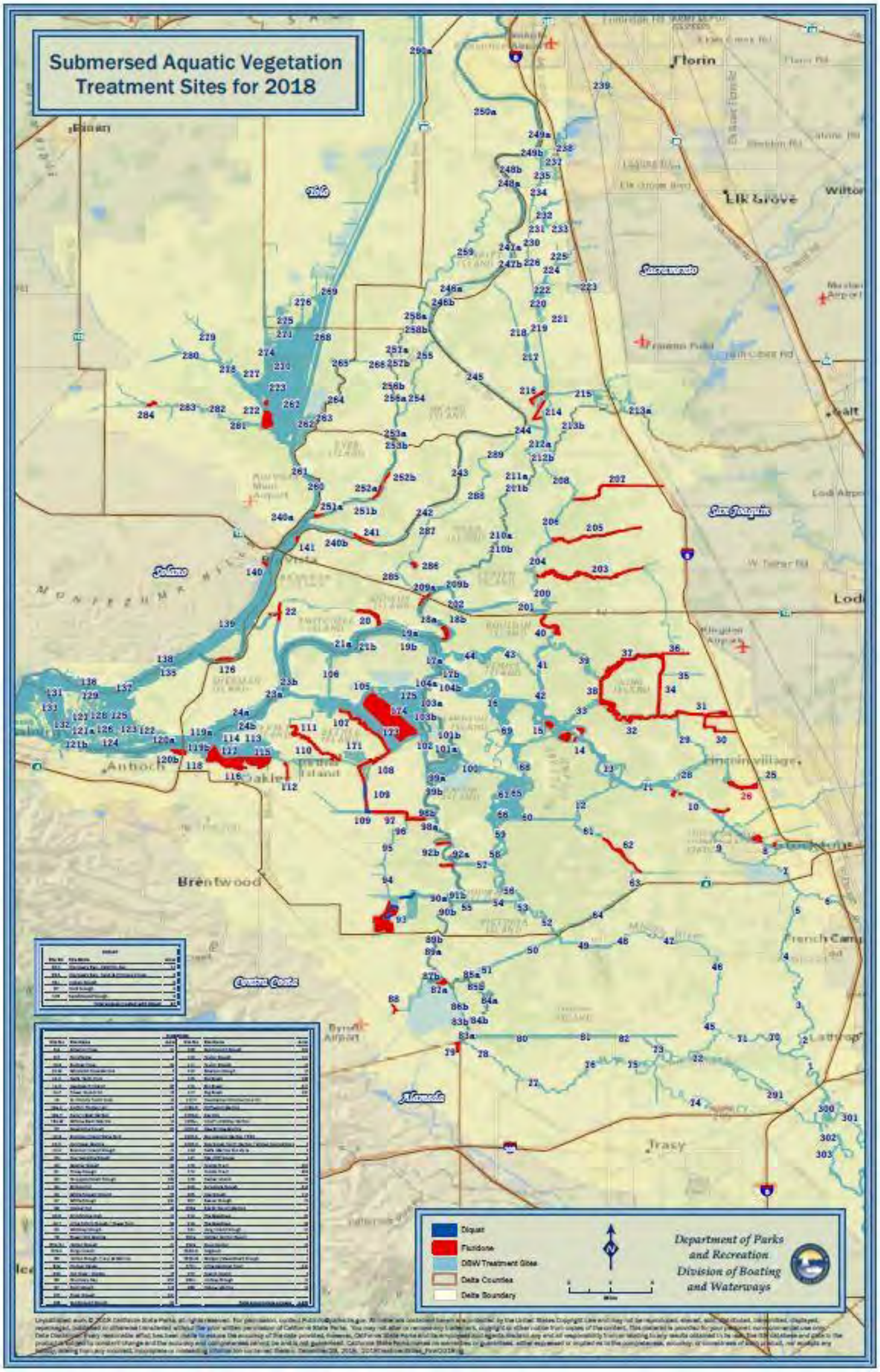
Radomski, P., and B.V. Holbrook. (2015). A comparison of two hydroacoustic methods for estimating submerged macrophyte distribution and abundance: a cautionary note. Journal of Aquatic Plant Management.

APPENDIX A

Overall Map of 2018 SAV Treatment Sites


Submersed Aquatic Vegetation Treatment Sites for 2018
Florin
Elk Grove
Galt
Lodi
Antioch
Oakley
Brentwood
Tracy
Diquat
Fluridone
DBW Treatment Sites
Delta Counties
Delta Boundary
Department of Parks and Recreation
Division of Boating and Waterways

APPENDIX B

Maps of Treatment Sites with Water Sampling Points

PHASE I - Fluridone				
Site ID	**Site Name**	**Acres**	**Comments**	**NPDES Site**
8.A	Atherton Cove	27		
8.D	Duraflame	6		
10.B	Buckley Cove	23		
10.W	Windmill Cove Marina	9		
14.D	Delta Yacht Club	3		
14.H	Headreach Island	65		
14.P	Power Squadron	18		
15	St. Francis Yacht Club	19		
18a.K	Korth's Pirates Lair	14		
18a.P	Perry's Boat Harbor	9		
18a.W	Willow Berm	19		
20	Sevenmile Slough	65		
22.M	Brannan Island State Park Marina	1		
22.S	Brannan Island Slough	12		
22.O	Outrigger Marina	16		
26	Fourteenmile Slough	45		
30	Mosher Slough	36		
31	Pixley Slough	70		
32	Disappointment Slough	183		
34	Bishop Cut	112		
36	White Slough Upland	25		
37	White Slough	197		
38	Honker Cut / King Island Resort	48		
40.G	Grindstone Joe's	10		
40.T	Tower Park / Little Potato Slough	58		X
62	Whiskey Slough	71		
79	Rivers End Marina	12		
87a/b.I	Italian Slough	11		
87b.K	Kings Island	2		
88	Italian Slough / Lazy M Marina	5		
91a	Cruiser Haven	21		X
92b	Old River - Diablo Ski Run	15		
93	Discovery Bay	250	Reduced to 143 acres July 9	
97	Rock Slough / Holland Riverside	119	Began Treatment May 28	
107	Piper Slough	121		
108	Sandmound Slough	32	Began Treatment May 28	
109	Sandmound Slough	100	Began Treatment May 28	
110	Taylor Slough	111		
111	Taylor Slough	13		
112	Emerson Slough	15		
115	Big Break	199		
116	Big Break	211		
117	Big Break	137		
117.M	Big Break Marina	8	Discontinued April 9	

117.F	Foundation Construction Inc.	6		
119b.D	Driftwood Marina	8		
120b.K	Key Con	1		
120b.L	Lloyd's Holiday Harbor	4		
120b.N	New Bridge Marina	7		
120b.S	San Joaquin Harbor / PGE	1		
120b.V	Sportsmen Yacht Harbor / Vortex Foundations	6		
140	Delta Marina Rio Vista	8		
141	Das Cliff House	8		
173	Franks Tract	220		
174	Franks Tract	906		
176	Decker Island	18	DSRS Site	
203	Sycamore Slough	219		
205	Hog Slough	115		
207	Beaver Slough	76		
209a	B&W Resort Marina	3		
214	The Meadows	22		
216	The Meadows	28		
241	Long Island Slough	10		
251a	Hidden Harbor Resort	8		
252a	Snug Harbor	10		
252b.H	Hogback	3		
252b.M	Morgan Slough	2		
272	French Island	9		
272.L	Little Hastings Tract	141	DSRS Site	
284.L	Lindsey Slough	10		
286	Oxbow Marina	16		
	Phase I Acreage for Fluridone	**4408**		

PHASE II - Fluridone

Site ID	Site Name	Acres	Comments	NPDES Site
272.L	Little Hastings Tract	141		
	Phase II Acreage for Fluridone	**141**		
	Total Acres for Fluridone Treatments in 2018	**4549**		

Diquat

Site ID	Site Name	Acres	Comments	NPDES Site
93.C	Discovery Bay - Cabrillo Bay	12		X
93.S	Discovery Bay - Sand & Princess Coves	9		X
93.I	Indian Slough	8		X
97	Rock Slough	9		X
109	Sandmound Slough	9		X
	Total Acres for Diquat Treatments in 2018	**47**		
	Total Acres for SAV Treatments in 2018	**4596**		


SAV Treatment Sites for 2018
Site 252a Snug Harbor
Sites 272 & 272.L, French Island & Little Hastings Tract
Sites 252b.H & 252b.M Hogback & Morgan Slough
Sites 214 & 216 The Meadows
Site 284 Lindsey Slough
Site 203 Sycamore Slough
Site 251a Hidden Harbor Resort
Site 241 Long Island Marina
Site 286 Oxbow Marina
Site 205 Hog Slough
Site 207 Beaver Slough
Site 141 Das Cliff House
Site 140 Delta Marina Rio Vista
Sites 18a.K, 18a.P &18a.W Korth's Pirates Lair, Perry's Boat Harbor & Willow Berm
Site 20 Sevenmile Slough
Site 209a B & W Resort
Sites 40.G & 40.T Grindstone Joe's & Little Potato Slough/Tower Park
Sites 22.B, 22.O & 22.S Brannan Island State Park, Outrigger Marina, & Brannan Island Slough
Site 37 White Slough
Site 36 White Slough Upland
Site 176 Decker Island
Sites 173 & 174 Franks Tract
Site 34 Bishop Cut
Site 38 Honker Cut
Site 107 Piper Slough
Sites 110 & 111 Taylor Slough
Site 31 Pixley Slough
Sites 119b.D, 120b.K, 120b.L, 120b.N, 120b.S & 120b.V Driftwood Marina, Key Con, Lloyd's Holiday Harbor, New Bridge Marina, San Joaquin Harbor/PGE & Sportsmen Yacht Harbor
Site 30 Mosher Slough
Site 32 Disappointment
Sites 115, 116, 117 & 117.F Big Break Marina & Foundation Constructors Inc.
Site 97 Rock Slough
Site 26 Fourteenmile Slough
Site 112 Emerson Slough
Sites 108 & 109 Sandmound
Site 91a Cruiser Haven
Site 82 Whiskey Slough
Sites 8.A & 8.D Atherton Cove & Duraflame
East Contra Costa Irrigation District (ECCID)
Site 92b Old River-Diablo
Sites 10.B & 10.W Buckley Cove & Windmill Cove
Site 93 Discovery Bay
Site 15 St. Francis Yacht Club
Site 88 Italian Slough/Lazy M. Marina
Sites 14.D, 14.H & 14.P Delta Yacht Club, Headreach Island & Power Squadron
Sites 87a/b Kings Island & Italian Slough
Site 79 Rivers End
Department of Parks and Recreation Division of Boating and Waterways
2018 FasTest Points
2018 SAV Treatment Sites
DBW Sites
2018 SAV Treatment Sites with FasTEST Sampling Points
N
0 1 2 3 4 5
Miles


Atherton Cove
1
2
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 8.A - Atherton Cove

2018 SAV Treatment Sites with Water Sampling Points
N
0
500
1000
Feet


Duraflame
3
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 8.D - Duraflame

2018 SAV Treatment Sites with Water Sampling Points
N
0
150
Feet


4
5
Buckley Cove
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 10.B - Buckley Cove

2018 SAV Treatment Sites
with Water Sampling Points
0
400
800
Feet


Windmill Cove Marina
7
6
8
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 10.W - Windmill Cove Marina

2018 SAV Treatment Sites
with Water Sampling Points
N
0
200
400
Feet


9
Delta Yacht Club
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 14.D - Delta Yacht Club

2018 SAV Treatment Sites with Water Sampling Points
N
0
100
Feet
Date: December 26, 2018
By: Constancia Dominguez
File Name: SR_WaterSampling_DeltaYachtClub


Headreach Island
12
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 14.H - Headreach Island

2018 SAV Treatment Sites with Water Sampling Points
N
0
200
400
Feet


11
Power Squadron
10
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 14.P - Power Squadron

2018 SAV Treatment Sites with Water Sampling Points
N
0
200
Feet


14
13
St. Francis Yacht Club
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 15 - St. Francis Yacht Club

2018 SAV Treatment Sites with Water Sampling Points
0
200
Feet


16
15
Korth's Pirates Lair
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 18a.K - Korth's Pirates Lair

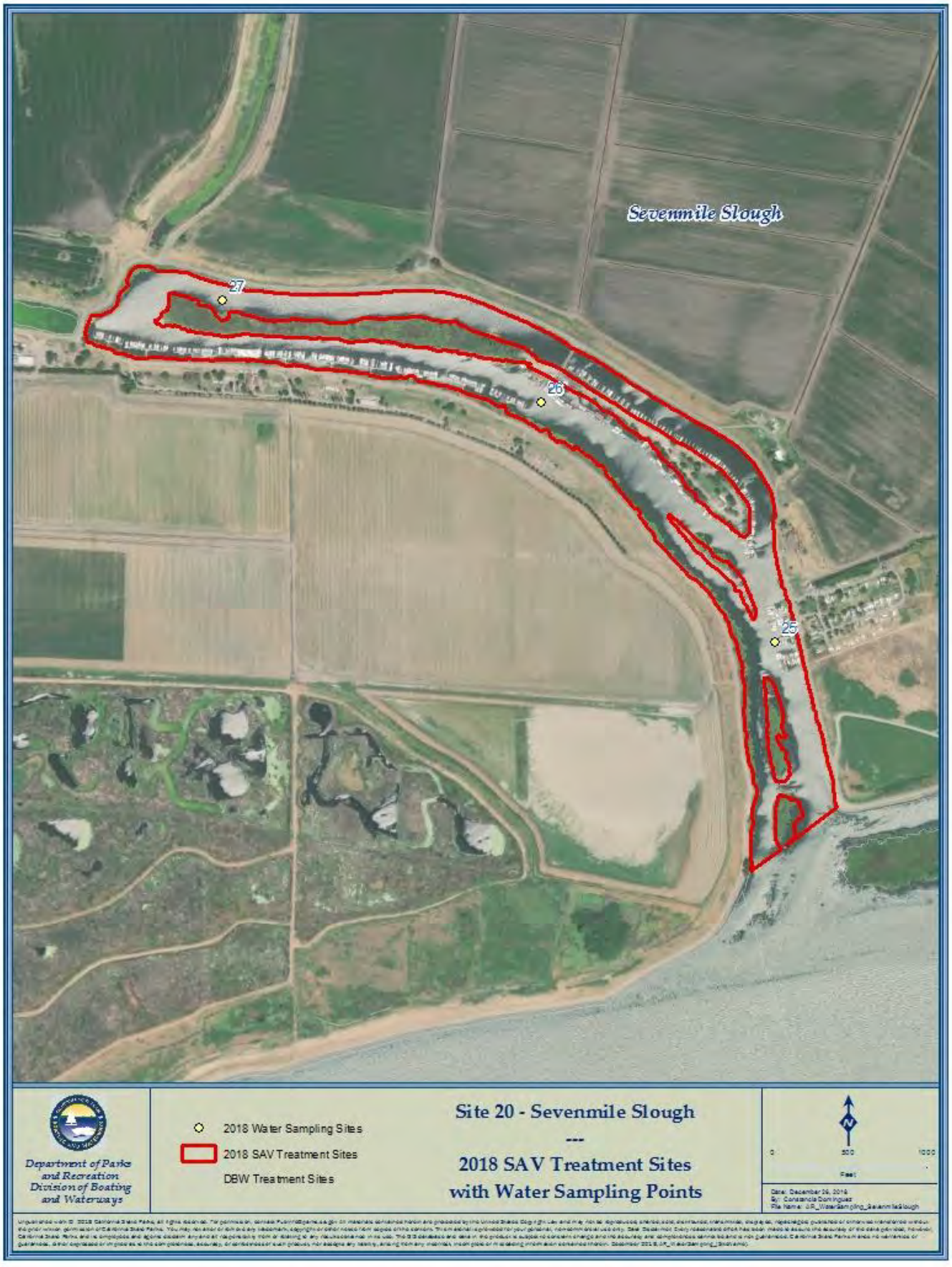
2018 SAV Treatment Sites with Water Sampling Points
0
150
300
Feet


21
20
Perry's Boat Harbor
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 18a.P - Perry's Boat Harbor

2018 SAV Treatment Sites
with Water Sampling Points
0
200
400
Feet
Date: December 26, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_PerrysBoatHarbor


Willow Berm Marina
19
18
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 18a.W - Willow Berm Marina

2018 SAV Treatment Sites with Water Sampling Points
0
300
Feet


Sevenmile Slough
27
26
25
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 20 - Sevenmile Slough

2018 SAV Treatment Sites with Water Sampling Points
0
500
1000
Feet


Brannan Island State Park
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 22.B - Brannan Island State Park

2018 SAV Treatment Sites
with Water Sampling Points
N
0
50
Feet


29
Brannan Island Slough
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 22.S - Brannan Island Slough

2018 SAV Treatment Sites
with Water Sampling Points
0
200
400
Feet


Outrigger Marina
30
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 22.O - Outrigger Marina

2018 SAV Treatment Sites with Water Sampling Points
N
0
100
200
300
Feet


31
32
33
Fourteenmile Slough
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 26 - Fourteenmile Slough

2018 SAV Treatment Sites with Water Sampling Points
0
1000
Feet


34
35
Mosher Slough
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 30 - Mosher Slough

2018 SAV Treatment Sites
with Water Sampling Points
0
1000
Feet
Date: December 26, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_MosherSlough


Pixley Slough
38
37
36
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 31 - Pixley Slough

2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
Feet


Disappointment Slough
44
43
42
41
40
39
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 32 - Disappointment Slough

2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
3000
Feet
Date: December 26, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_DisappointmentSlough


48
47
46
45
Bishop Cut
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 34 - Bishop Cut

2018 SAV Treatment Sites with Water Sampling Points
0 500 1000 1500 2000
Feet


White Slough Upland
49
Department of Parks and Recreation Division of Boating and Waterways
2018 FasTest Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 36 - White Slough Upland

2018 SAV Treatment Sites with Water Sampling Points
0
500
1000
Feet


White Slough
50
51
52
53
54
55
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 37 - White Slough

2018 SAV Treatment Sites
with Water Sampling Points
0
1000
2000
Feet


Honker Cut
56
57
58
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 38 - Honker Cut

2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


59
Grindstone Joe's
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 40.G - Grindstone Joe's

2018 SAV Treatment Sites
with Water Sampling Points
0
100
200
Feet


61
62
60
Little Potato Slough / Tower Park
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 40.T - Little Potato Slough / Tower Park

2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


63
64
65
Whiskey Slough
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 62 - Whiskey Slough

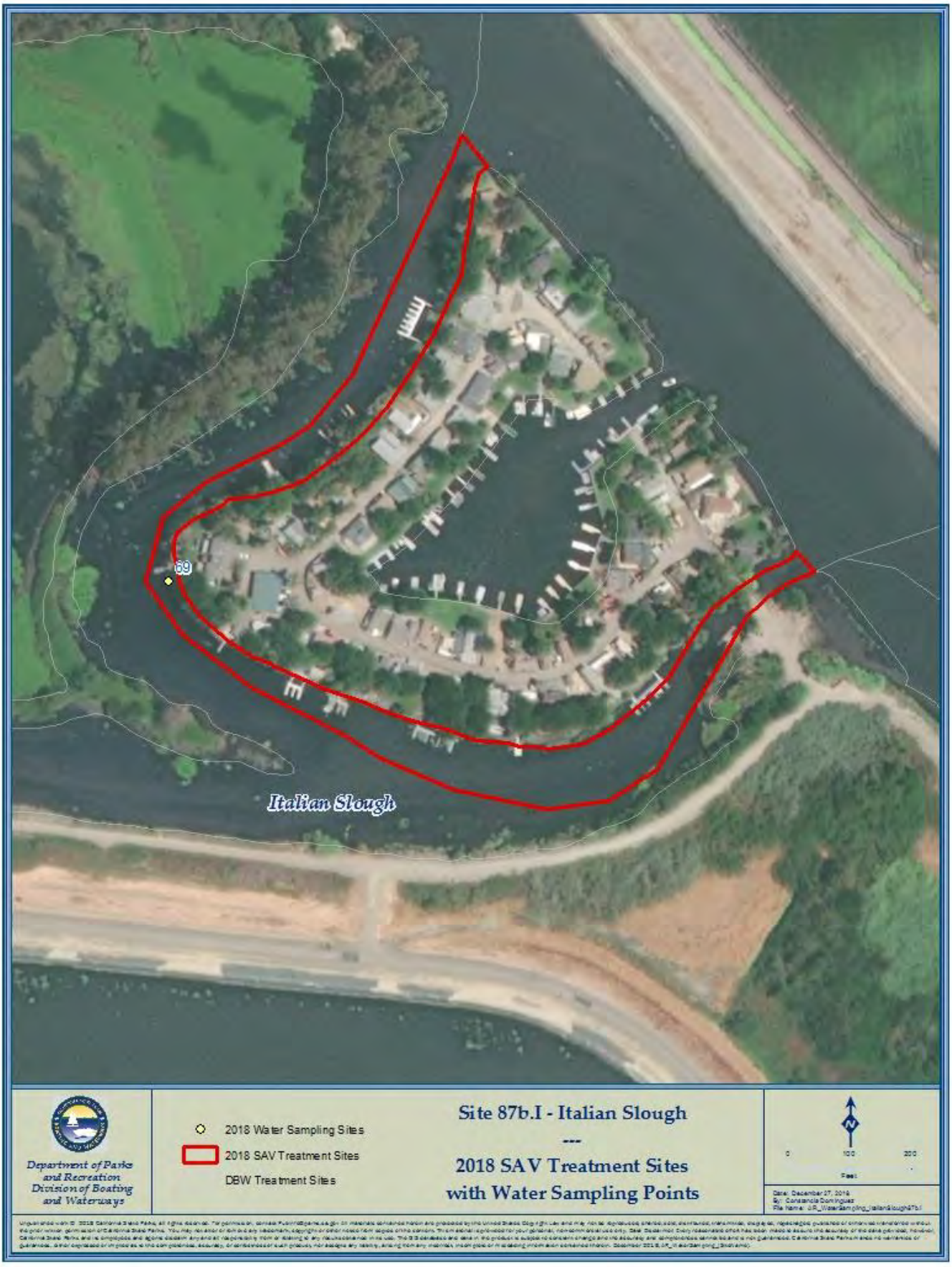
2018 SAV Treatment Sites with Water Sampling Points
0
500
1000
1500
Feet


68
67
66
Rivers End Marina
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 79 - Rivers End Marina

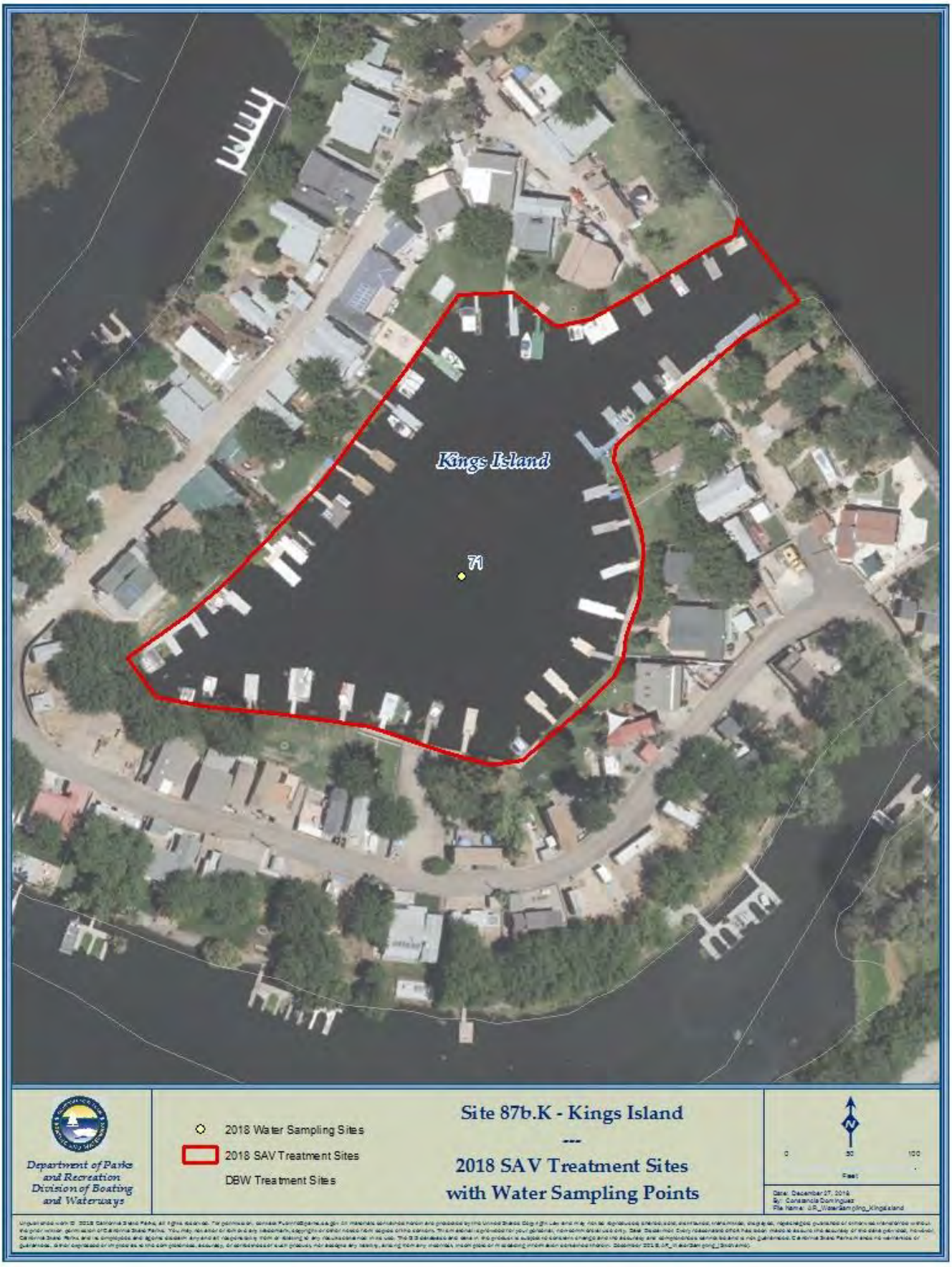
2018 SAV Treatment Sites with Water Sampling Points
0
200
400
Feet
Date: December 27, 2018
By: Constancia Dominguez
File Name: SR_WaterSampling_RiversEndMarina


70
Italian Slough
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 87a.I - Italian Slough

2018 SAV Treatment Sites
with Water Sampling Points
0
200
400
Feet


69
Italian Slough
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 87b.I - Italian Slough

2018 SAV Treatment Sites
with Water Sampling Points
0
100
200
Feet


Kings Island
71
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 87b.K - Kings Island

2018 SAV Treatment Sites with Water Sampling Points
N
0
50
100
Feet
Date: December 27, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_KingsIsland


Italian Slough / Lazy M Marina
73
72
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 88 - Italian Slough / Lazy M Marina

2018 SAV Treatment Sites with Water Sampling Points
0
200
400
Feet


Cruiser Haven
74
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 91a - Cruiser Haven

2018 SAV Treatment Sites with Water Sampling Points
0
500
Feet
Date: December 27, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_CruiserHaven


Old River - Diablo
75
76
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 92b - Old River- Diablo

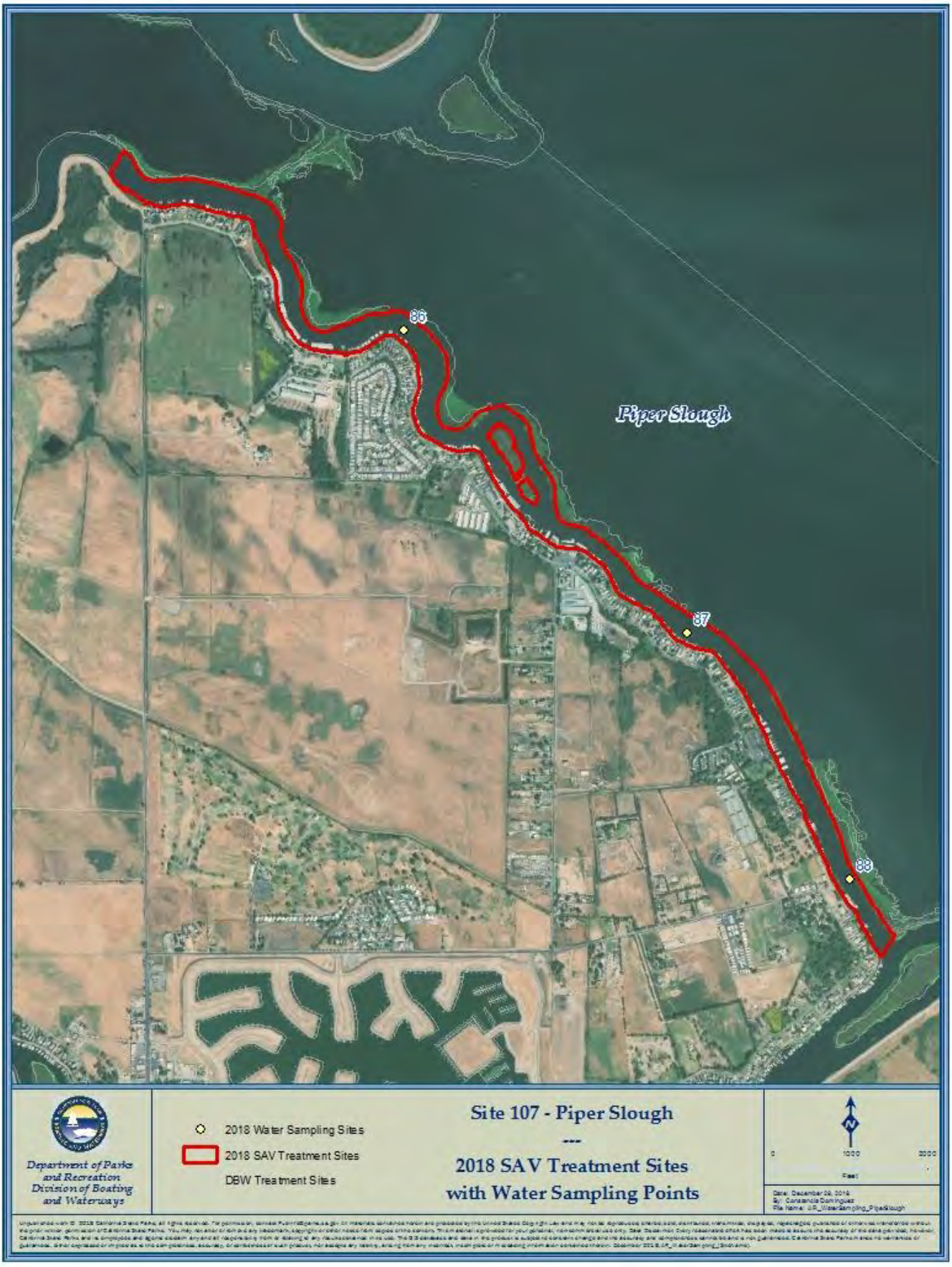
2018 SAV Treatment Sites with Water Sampling Points
0
200
400
600
Feet


Discovery Bay
77
78
79
80
81
82
83
84
85
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 93 - Discovery Bay

2018 SAV Treatment Sites with Water Sampling Points
N
0
500
1000
Feet


162
Rock Slough
161
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 97 - Rock Slough

2018 SAV Treatment Sites with Water Sampling Points
0 500 1000 1500 2000
Feet
Date: December 27, 2018
By: Constancia Dominguez
File Name: SR_WaterSampling_RockSlough


86
87
88
Piper Slough
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 107 - Piper Slough

2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
Feet


89
Sandmound Slough
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 108 - Sandmound Slough

2018 SAV Treatment Sites with Water Sampling Points
0
200
400
600
Feet


92
Sandmound Slough
91
90
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 109 - Sandmound Slough

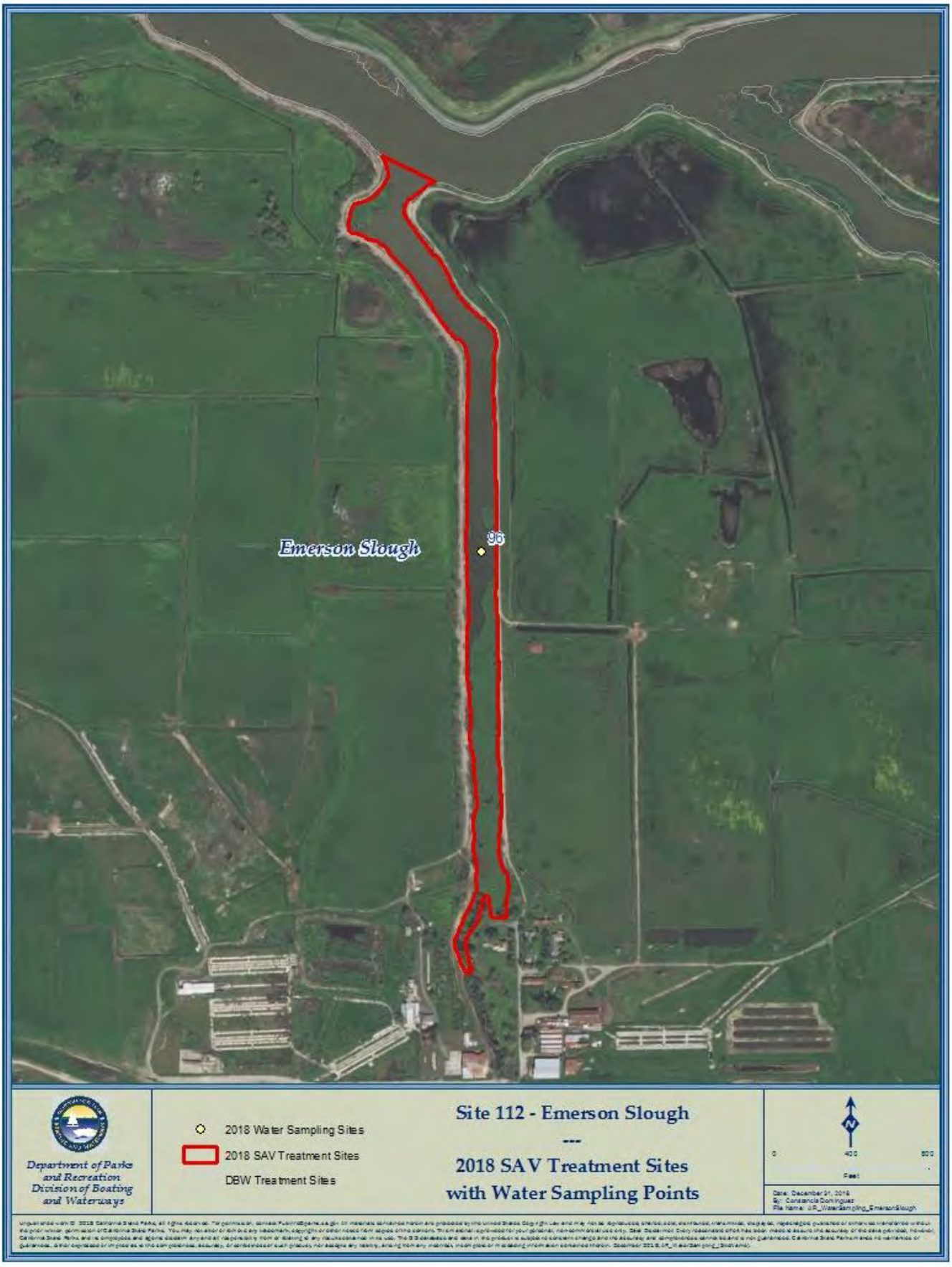
2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
Feet


Taylor Slough
94
93
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 110 - Taylor Slough

2018 SAV Treatment Sites with Water Sampling Points
N
0
1000
2000
Feet


Taylor Slough
95
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 111 - Taylor Slough

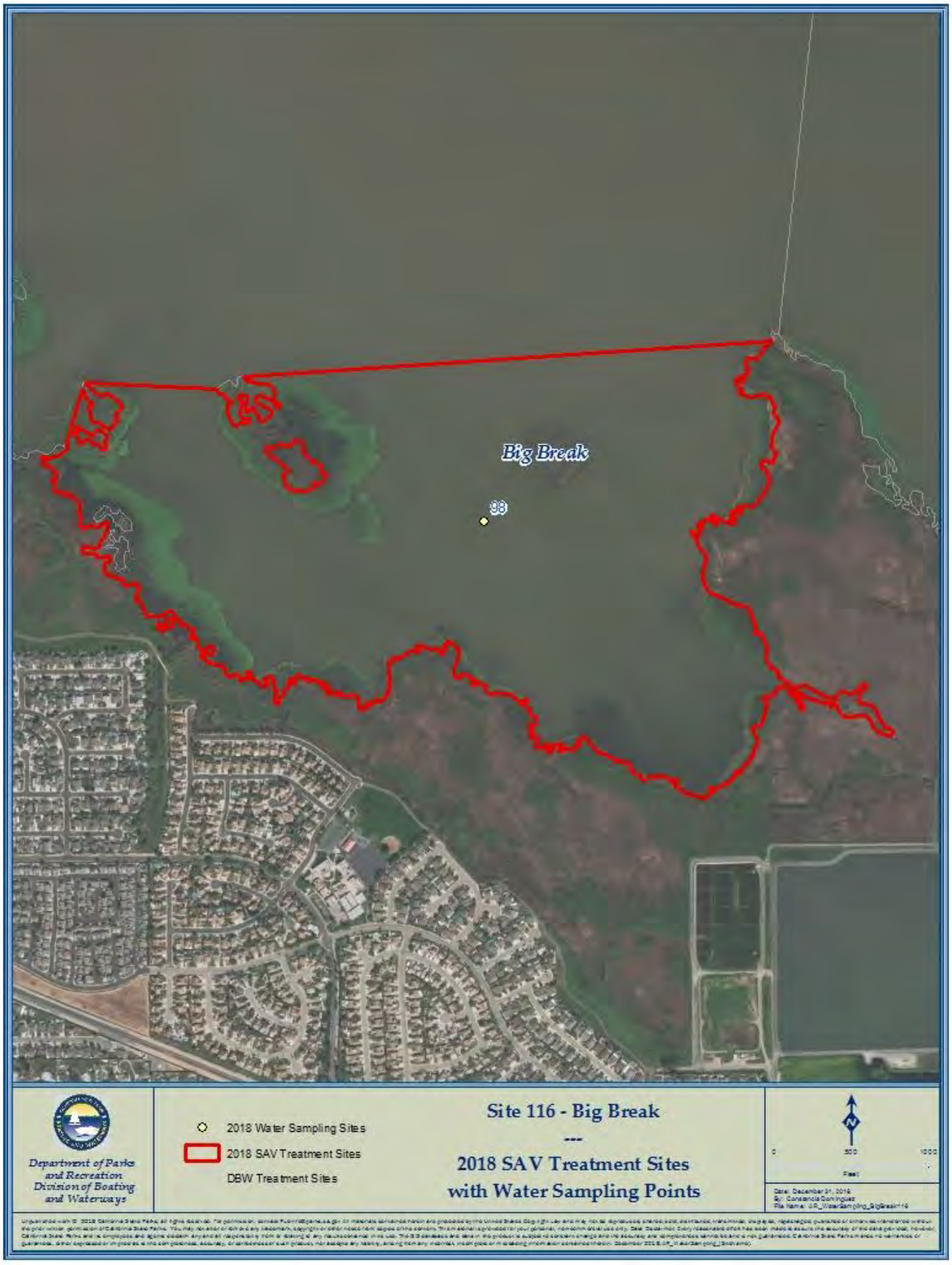
2018 SAV Treatment Sites with Water Sampling Points
0
200
400
Feet
Date: December 29, 2018
By: Constancia Dominguez
File Name: DR_WaterSampling_TaylorSlough11


Emerson Slough
96
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 112 - Emerson Slough

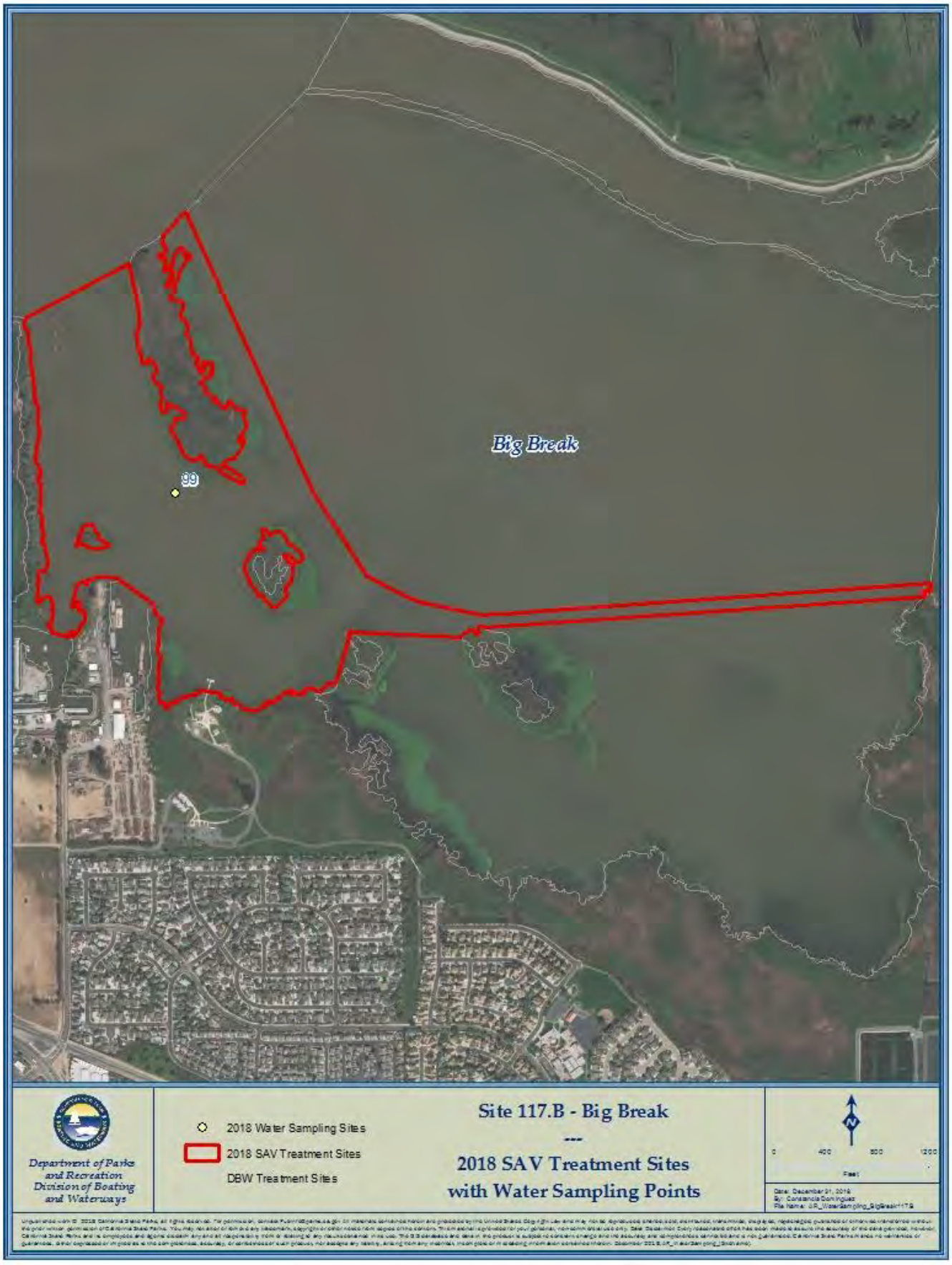
2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


Big Break
97
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 115 - Big Break

2018 SAV Treatment Sites
with Water Sampling Points
0
500
1000
Feet


Big Break
98
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 116 - Big Break

2018 SAV Treatment Sites
with Water Sampling Points
N
0
500
1000
Feet


Big Break
99
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 117.B - Big Break

2018 SAV Treatment Sites
with Water Sampling Points
0
400
800
1200
Feet


110
Delta Marina Rio Vista
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 140 - Delta Marina Rio Vista

2018 SAV Treatment Sites
with Water Sampling Points
0
100
200
Feet


Das Cliff House
111
112
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 141 - Das Cliff House

2018 SAV Treatment Sites with Water Sampling Points
N
0
100
200
300
Feet


Franks Tract
113
114
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 173 - Franks Tract

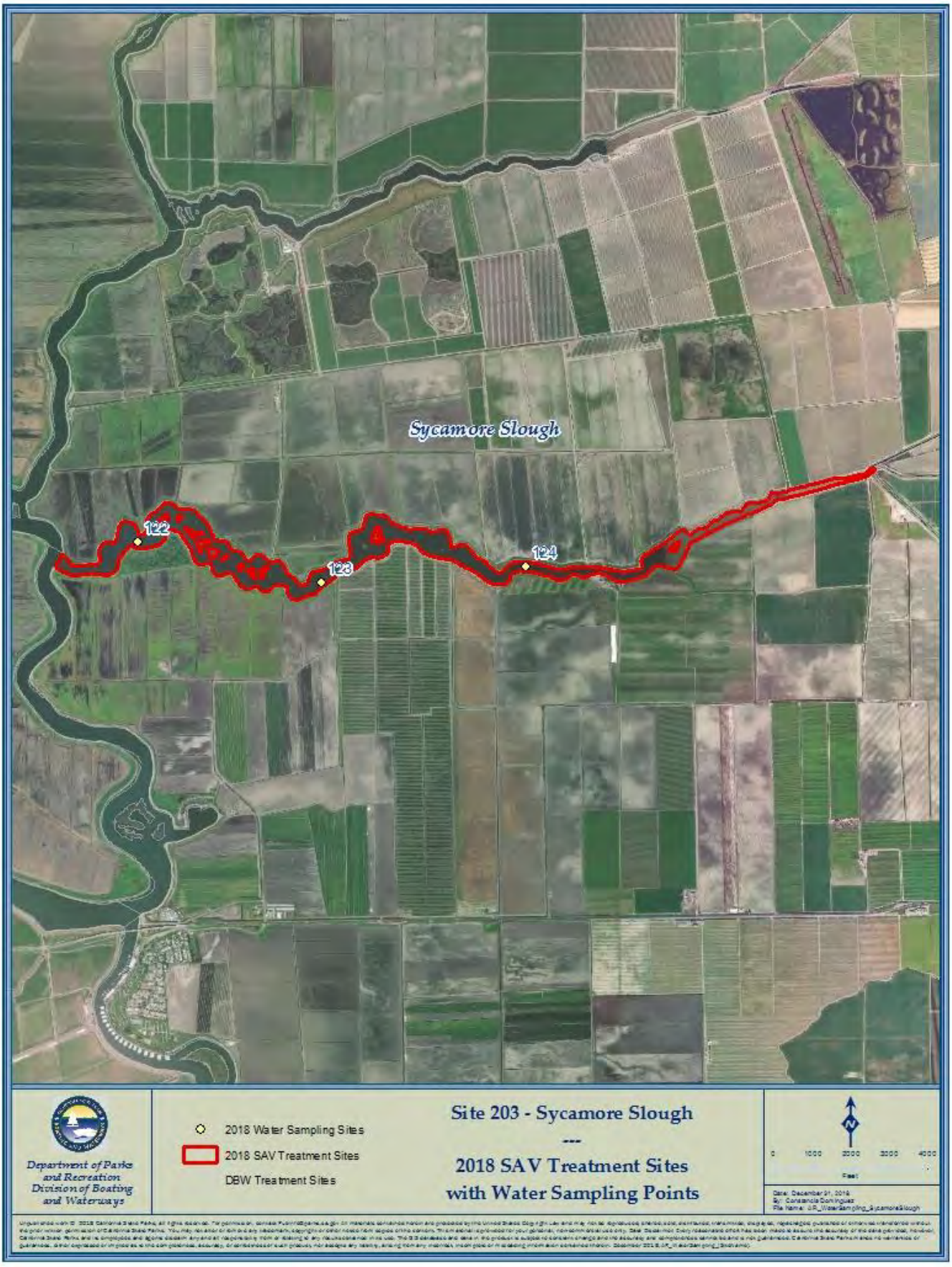
2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
Feet


115
116
Franks Tract
117
118
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 174 - Franks Tract

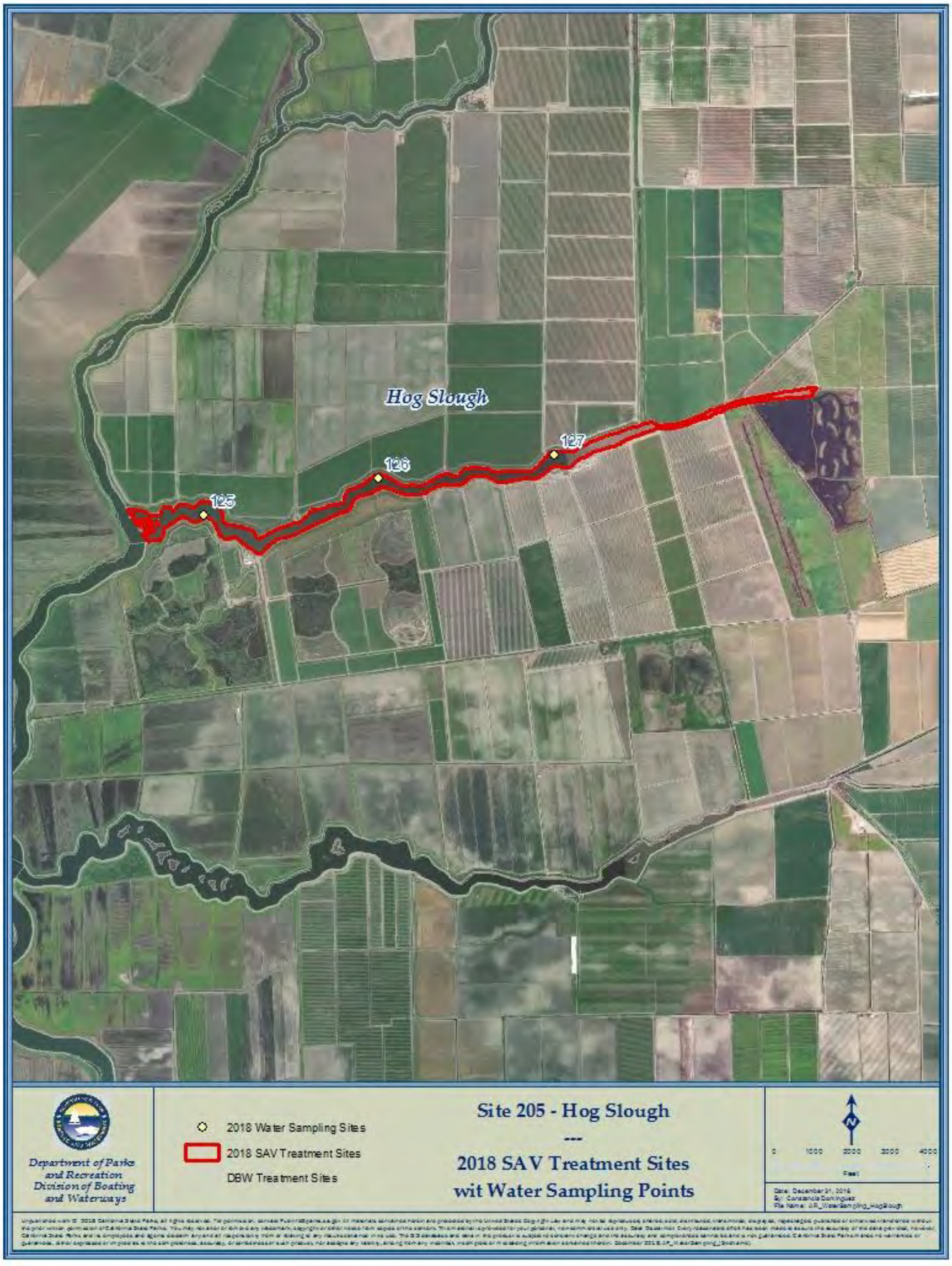
2018 SAV Treatment Sites with Water Sampling Points
0
1000
2000
Feet


Decker Island
120
121
119
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 176 - Decker Island

2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


Sycamore Slough
122
123
124
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 203 - Sycamore Slough

2018 SAV Treatment Sites with Water Sampling Points
0 1000 2000 3000 4000
Feet


Hog Slough
125
126
127
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 205 - Hog Slough

2018 SAV Treatment Sites
wit Water Sampling Points
0 1000 2000 3000 4000
Feet


Beaver Slough
129
128
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 207 - Beaver Slough

2018 SAV Treatment Sites with Water Sampling Points
0 1000 2000 3000 4000
Feet


24
23
22
B & W
Resort Marina
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 209a - B & W Resort Marina

2018 SAV Treatment Sites
with Water Sampling Points
N
0
200
Feet


The Meadows
131
130
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 214 - The Meadows

2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


132
The Meadows
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 216 - The Meadows

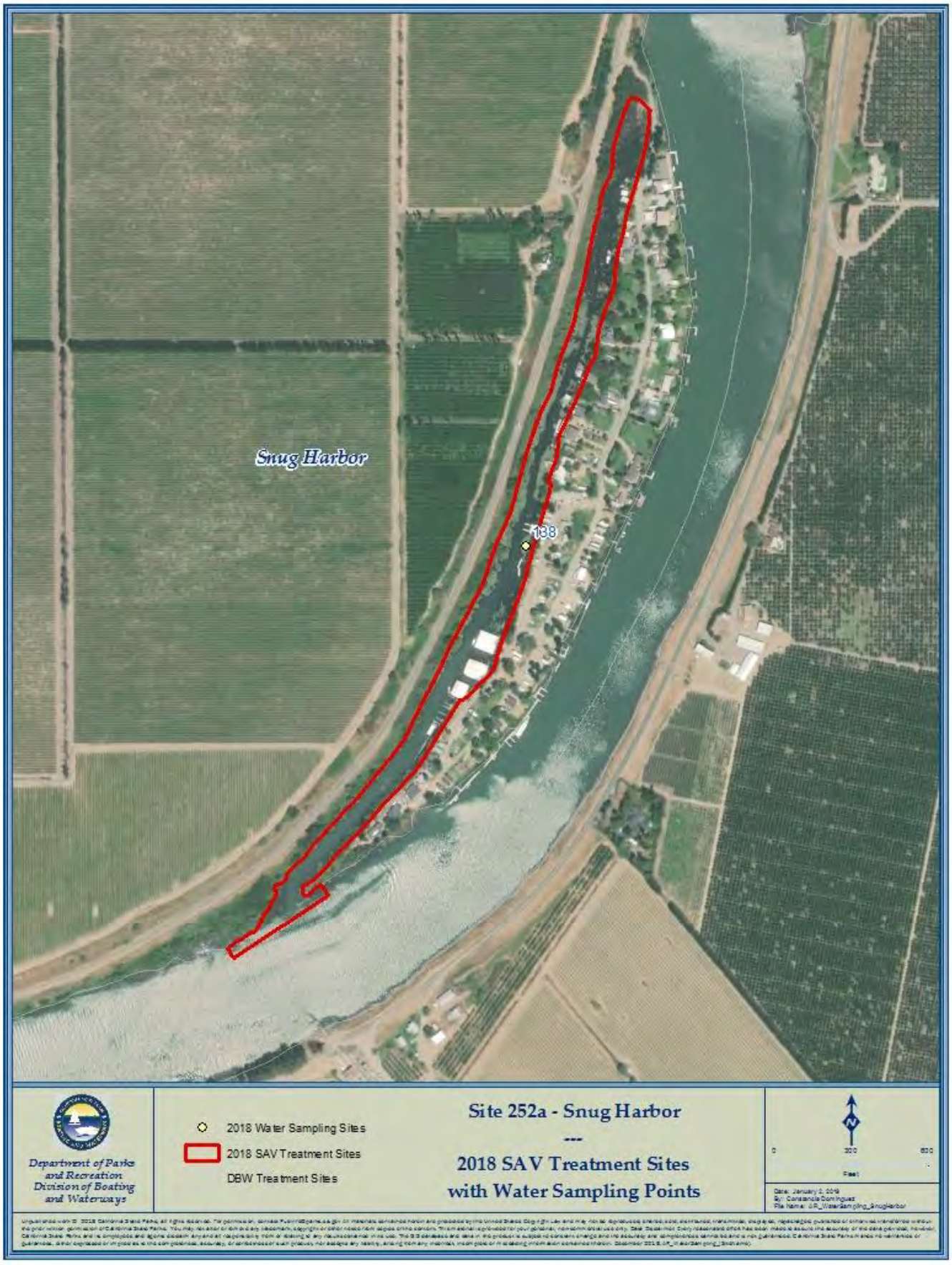
2018 SAV Treatment Sites with Water Sampling Points
0 200 400 600
Feet


Long Island Slough
134
135
133
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 241 - Long Island Slough

2018 SAV Treatment Sites with Water Sampling Points
0 200 400 600 800
Feet
Date: January 2, 2019
By: Constancio Dominguez
File Name: DR_WaterSampling_LongIslandSlough


Hidden Harbor Resort
136
137
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 251a - Hidden Harbor Resort

2018 SAV Treatment Sites with Water Sampling Points
0
150
300
Feet


Snug Harbor
138
Department of Parks and Recreation
Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 252a - Snug Harbor

2018 SAV Treatment Sites
with Water Sampling Points
0
300
600
Feet


Hogback
139
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 252b.H - Hogback

2018 SAV Treatment Sites with Water Sampling Points
0
100
200
Feet


Morgan (Steamboat) Slough
140
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 252b.M - Morgan (Steamboat) Slough

2018 SAV Treatment Sites with Water Sampling Points
N
0
150
Feet


Little Hastings Tract
146
147
144
145
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 272.L - Little Hastings Tract

2018 SAV Treatment Sites with Water Sampling Points
0
400
800
Feet


143
French Island
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 272 - French Island

2018 SAV Treatment Sites with Water Sampling Points
0
50
100
150
Feet
Date: January 2, 2019
By: Constancia Dominguez
File Name: SR_WaterSampling_FrenchIsland


Lindsey Slough
155
154
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 284.L - Lindsey Slough

2018 SAV Treatment Sites with Water Sampling Points
0
200
400
Feet


142
141
Oxbow Marina
Department of Parks and Recreation Division of Boating and Waterways
2018 Water Sampling Sites
2018 SAV Treatment Sites
DBW Treatment Sites
Site 286 - Oxbow Marina

2018 SAV Treatment Sites with Water Sampling Points
0
100
200
Feet

APPENDIX C

Maps of NPDES Sample Sites and Laboratory Data


Site 40.T
Little Potato Slough / Tower Park
A
B
C
Site 91a
Cruiser Haven
C
A
B
Department of Parks and Recreation Division of Boating and Waterways
2018 NPDES Sampling Points
2018 SAV Treatment Sites
DBW Treatment Sites
2018 SAV
NPDES Sampling Sites
Fluridone
N
0
1
2
Miles

NPDES Results for Little Potato Slough / Tower Park, Site #40.T

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Fluridone Concentration (ppb)
A	E40-030918-A	9-Mar-18	632343	4218081	12.20	0.183	0.07	9.85	7.18	0.2	0.15
B	E40-030918-B		632145	4217264	12.09	0.187	0.08	9.91	7.28	0.6	0.12
C	E40-030918-C		631990	4217345	12.03	0.198	0.08	9.88	7.17	3.9	0.12
A	E40-070918-A	9-Jul-18	632343	4218081	23.49	0.145	0.06	7.81	8.26	308.5	ND
B	E40-070918-B		632145	4217264	23.73	0.159	0.06	7.69	8.12	281.3	0.10
C	E40-070918-C		631990	4217345	23.63	0.158	0.06	7.61	8.22	276.4	0.20

NPDES Results for Cruiser Haven, Site $91a

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Fluridone Concentration (ppb)
A	E91a-030918-A	9-Mar-18	625796	4200020	12.71	0.393	0.17	9.90	7.11	10.6	0.11
B	E91a-030918-B		626363	4200000	12.94	0.358	0.15	10.72	7.43	8.1	0.18
C	E91a-030918-C		626312	4200302	13.15	0.371	0.16	12.26	7.70	4.3	0.15
A	E91a-071718-A	17-Jul-08	625796	4200020	NA	NA	NA	NA	NA	NA	2.40
B	E91a-071718-B		626363	4200000	23.79	0.234	0.10	7.93	8.19	NA	0.60
C	E91a-071718-C		626312	4200302	NA	NA	NA	NA	NA	NA	0.20
A	E91a-072318-A	Sondes not operational, not able to collect data									2.30
B	E91a-072318-B										0.40
C	E91a-072318-C										0.80
A	E91a-073018-A	30-Jul-18	625809	4200026	25.60	NA	NA	4.49	NA	NA	4.40
B	E91a-073018-B		626374	4200044	24.60	NA	NA	7.58	NA	NA	0.60
C	E91a-073018-C		626298	4200299	24.50	NA	NA	7.10	NA	NA	0.70
A	E91a-080618-A	6-Aug-18	625772	42000028	25.00	NA	NA	4.58	NA	NA	4.10
B	E91a-080618-B		626365	4200004	24.10	NA	NA	6.20	NA	NA	1.10
C	E91a-080618-C		626299	4200325	24.60	NA	NA	8.33	NA	NA	0.50
A	E91a-0814180-A	14-Aug-18	625785	4200015	25.52	0.323	0.14	5.24	8.26	322.6	0.90
B	E91a-0814180-B		626355	4200023	25.37	0.355	0.15	8.14	8.20	309.5	0.20
C	E91a-0814180-C		626301	4200308	24.99	0.350	0.15	7.03	8.07	298.8	0.40


B2
C
A
Site 109
Sandmound Slough
B1
Site 97
Rock Slough
A
C
B
Site 93.I
Indian Slough
Site 93.C
Cabrillo Bay
B1
C
B2
A
Site 93.S
Sand Princess Cove
C
A
C
A
Department of Parks and Recreation
Division of Boating and Waterways
2018 NPDES Sampling Points
Diquat Treatment Sites
DBW Treatment Sites
2018 SAV
NPDES Sampling Sites
Diquat
N
Miles

NPDES Results for Indian Slough, Site #93.I

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E93I-091118-A	11-Sep-18	623713	4197560	22.65	0.719	0.33	7.00	8.46	16.9	0.00
B1	E93I-091118-B1		622586	4197434	24.93	0.748	0.34	9.16	9.24	13.5	0.00
B2	E93I-091118-B2		624427	4197633	24.62	0.711	0.32	8.61	9.15	13.4	0.00
A	E93I-092518-A	25-Sep-18	623713	4197560	21.49	0.668	0.30	7.26	8.55	21.0	ND
B1	E93I-092518-B1		622586	4197434	23.11	0.810	0.37	9.19	9.16	16.7	ND
B2	E93I-092518-B2		624427	4197633	22.18	0.719	0.33	8.04	8.78	19.4	ND
C	E93I-092518-C	2-Oct-18	623604	4197579	21.80	0.759	0.35	7.73	8.75	18.8	ND

NPDES Results for Discovery Bay – Cabrillo Bay, Site #93.C

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E93C-082818-A	28-Aug-18	622646	4196788	24.18	0.024	0.01	8.89	8.76	8.1	ND
B	E93C-082818-B		622548	4197372	24.33	0.024	0.01	9.91	8.96	7.7	ND
C	E93C-090518-C	5-Sep-18	622606	4196776	24.90	0.025	0.01	8.75	8.64	8.8	ND
A	E93C-091818-A	18-Sep-18	622646	4196788	21.39	0.021	0.01	7.47	8.96	19.8	ND
B	E93C-091818-B		622548	4197372	21.86	0.022	0.01	8.39	8.97	21.3	ND
C	E93C-092518-C	25-Sep-18	622506	4196891	22.04	0.022	0.01	7.90	8.91	21.9	ND

NPDES Results for Discovery Bay – Cabrillo Bay (Back end of Bay), Site #93.B

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E93B-091118-A	11-Sep-18	622958	4196751	24.33	0.695	0.31	5.35	8.36	18.4	ND
B	E93B-091118-B		622586	4197372	24.93	0.748	0.34	9.16	9.24	13.5	ND
A	E93B-092518-A	25-Sep-18	622958	4196751	22.68	0.762	0.35	8.04	8.94	20.0	ND
B	E93B-092518-B		622586	4197434	23.11	0.810	0.37	9.19	9.16	16.7	ND
C	E93B-100218-C	2-Oct-18	622775	4196793	21.89	0.764	0.35	7.34	8.84	22.4	ND

NPDES Results for Discovery Bay – Sand & Princess Bay, Site #93.S

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E93S-091118-A	11-Sep-18	622425	4195989	24.28	0.708	0.32	8.27	9.11	19.2	ND
B	E93S-091118-B		622586	4197434	24.93	0.748	0.34	9.16	9.24	13.5	ND
A	E93S-092518-A	25-Sep-18	622425	4195989	22.67	0.761	0.35	7.37	8.89	21.4	ND
B	E93S-092518-B		622586	4197434	23.11	0.810	0.37	9.19	9.16	16.7	ND
C	E93S-100218-C	2-Oct-18	622775	4196793	22.04	0.782	0.36	7.92	8.96	22.9	ND

NPDES Results for Rock Slough, Site #97

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E97-100418-A	4-Oct-18	620976	4204257	21.37	0.783	0.36	3.37	7.98	22.7	ND
B	E97-100418-B		621495	4204118	22.25	0.766	0.35	5.87	8.27	19.5	ND
C	E97-101118-C	11-Oct-18	621094	4204072	19.89	0.773	0.35	7.64	8.55	22.0	ND
A	E97-101618-A	16-Oct-18	620976	4204257	17.49	0.771	0.35	7.63	7.66	20.9	ND
B	E97-101618-B		621495	4204118	18.80	0.737	0.33	8.46	8.23	21.0	ND
C	E97-101618-C	23-Oct-18	621109	4204071	17.80	0.751	0.34	7.53	8.45	26.9	ND

NPDES Results for Sandmound Slough, Site #109

Sample Location	Sample ID	Date	UTM Easting	UTM Northing	Water Temp (°C)	Conductivity (mS/cm)	Salinity (ppt)	DO (mg/L)	pH	Turbidity (NTU)	Diquat Concentration (ppb)
A	E109-101018-A	10-Oct-18	620847	4205823	19.59	0.949	0.44	8.27	8.78	20.8	ND
B1	E109-101018-B1		620978	4204753	20.63	0.808	0.37	8.50	8.56	17.7	ND
B2	E109-101018-B2		620740	4206039	19.56	1.129	0.53	7.57	8.45	18.9	ND
C	E109-101618-C	16-Oct-18	620799	4206293	18.43	1.101	0.52	9.38	8.82	18.9	ND
A	E109-102318-A	23-Oct-18	620847	4205823	18.12	0.874	0.40	7.00	8.34	23.7	ND
B1	E109-102318-B1		620978	4204753	18.45	0.798	0.37	7.59	8.41	23.2	ND
B2	E109-102318-B2		620740	4206039	17.70	1.191	0.56	7.86	8.43	24.1	ND
C	E109-103018-C	30-Oct-18	620807	4206287	17.31	1.101	0.52	7.82	7.99	24.5	ND

APPENDIX D

Herbicide Application Daily Logs for 2018 SAV

Table D-1. Daily Logs for March 2018 SAV

Date	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
3/26/2018	79	Alameda	14.40	15.20	1330	1400	14.30	9.50	0.00	0.00	44.00	10-15	8-10
3/12/2018	117	Contra Costa	14.80	15.20	1100	1430	9.30	9.50	720.00	0.00	0.00	15	2-4
3/12/2018	115	Contra Costa	15.20	15.10	1300	1430	9.60	9.40	968.00	0.00	0.00	15	2-4
3/12/2018	116	Contra Costa	14.80	15.20	1100	1300	9.30	9.60	1024.00	0.00	0.00	15	2-4
3/13/2018	91	Contra Costa	14.50	14.50	1030	1130	9.70	9.50	90.70	0.00	0.00	10-15	2-4
3/15/2018	93	Contra Costa	13.80	13.90	900	1130	11.00	11.50	0.00	486.00	0.00	15	2-4
3/15/2018	119	Contra Costa	14.00	14.30	1330	1400	9.10	8.40	40.00	0.00	0.00	15	4-6
3/15/2018	120	Contra Costa	14.20	14.30	1400	1500	8.90	8.90	101.30	0.00	0.00	15	4-6
3/15/2018	107	Contra Costa	15.00	14.70	930	1100	10.10	10.80	784.00	0.00	0.00	15	10
3/15/2018	110	Contra Costa	14.80	14.70	1100	1300	9.90	9.90	988.00	0.00	0.00	15	10
3/15/2018	111	Contra Costa	14.60	14.50	1300	1500	12.60	12.50	116.00	0.00	0.00	15	10
3/19/2018	117	Contra Costa	12.60	13.20	1030	1330	11.60	10.70	480.00	0.00	0.00	0	2-4
3/19/2018	115	Contra Costa	13.20	13.40	1230	1400	10.20	9.80	644.00	0.00	0.00	10	2-4
3/19/2018	116	Contra Costa	12.60	13.10	1100	1230	11.60	10.50	684.00	0.00	0.00	10	2-4
3/19/2018	87	Contra Costa	14.30	15.00	1300	1400	11.30	9.70	36.00	0.00	0.00	10	0-2
3/19/2018	88	Contra Costa	14.70	15.10	1130	1230	12.50	12.80	16.00	0.00	0.00	10	0-2
3/26/2018	87	Contra Costa	15.40	15.70	1230	1330	12.70	11.30	0.00	0.00	53.00	15	4-6
3/26/2018	88	Contra Costa	15.50	14.40	1130	1230	11.70	11.00	0.00	0.00	24.00	15	4-6
3/26/2018	117	Contra Costa	13.30	13.60	1000	1300	11.30	11.70	0.00	0.00	480.00	10	4-6
3/26/2018	115	Contra Costa	13.10	13.50	1230	1400	11.50	11.70	0.00	0.00	644.00	10	10+
3/26/2018	116	Contra Costa	13.30	13.10	1030	1230	11.30	11.60	0.00	0.00	684.00	10	10+
3/27/2018	107	Contra Costa	13.40	14.60	1000	1100	12.00	12.90	0.00	0.00	524.00	15	10+
3/27/2018	173	Contra Costa	14.90	15.20	1130	1430	10.60	10.60	0.00	0.00	832.00	10-15	4-6
3/27/2018	174	Contra Costa	13.40	14.60	1000	1400	10.50	10.80	0.00	0.00	3424.00	10	4-6
3/27/2018	110	Contra Costa	13.50	13.80	1100	1300	10.10	10.50	0.00	0.00	660.00	10	8-10
3/27/2018	111	Contra Costa	13.80	14.40	1300	1400	10.50	10.60	0.00	0.00	76.00	10	8-10
3/28/2018	91	Contra Costa	19.30	16.20	1230	1330	8.30	9.20	0.00	0.00	57.00	10	0-2
3/28/2018	93	Contra Costa	15.20	15.80	930	1200	11.50	12.20	0.00	486.00	0.00	10	2-4
3/29/2018	112	Contra Costa	15.50	15.50	1000	1030	9.60	9.60	0.00	0.00	56.00	10	2-4
3/29/2018	119	Contra Costa	15.20	15.20	1100	1130	9.20	9.20	0.00	0.00	24.00	10	2-4
3/29/2018	120	Contra Costa	15.20	15.40	1130	1500	9.30	9.30	0.00	0.00	64.00	10	2-4
3/12/2018	209	Sacramento	14.90	14.60	1330	1300	10.40	10.20	16.00	0.00	0.00	15	7.5
3/12/2018	286	Sacramento	15.30	15.20	1230	1400	10.40	9.30	92.00	0.00	0.00	15	8.5
3/13/2018	18	Sacramento	15.10	14.90	700	1030	8.10	12.60	240.00	0.00	0.00	15	4-6
3/13/2018	20	Sacramento	15.90	15.40	1100	1330	13.50	13.90	368.00	0.00	0.00	15	10+
3/14/2018	214	Sacramento	14.30	14.10	1100	1130	8.80	2.60	96.00	0.00	0.00	10	1.5
3/14/2018	216	Sacramento	13.90	14.30	1200	1330	10.60	10.50	120.00	0.00	0.00	10	3.1
3/15/2018	140	Sacramento	12.90	12.90	1030	1130	9.50	9.30	52.00	0.00	0.00	15	7.2
3/15/2018	141	Sacramento	12.40	13.00	1200	1230	8.70	17.40	44.00	0.00	0.00	15	10.8
3/15/2018	241	Sacramento	13.30	13.50	1300	1330	10.60	10.00	0.00	0.00	56.00	15	8.8
3/15/2018	252	Sacramento	13.80	14.30	900	1015	5.90	8.20	28.00	0.00	0.00	10-15	2-4
3/19/2018	18	Sacramento	15.30	15.70	800	1100	9.20	10.60	52.00	0.00	0.00	10	0-2
3/19/2018	20	Sacramento	16.00	16.10	1130	1300	10.60	10.10	244.00	0.00	0.00	10	0-2
3/19/2018	209	Sacramento	12.90	12.90	1130	1200	9.80	8.50	12.00	0.00	0.00	10	5.1
3/19/2018	286	Sacramento	12.50	12.80	1300	1300	9.00	9.40	60.00	0.00	0.00	10	3.8
3/21/2018	214	Sacramento	12.20	12.30	1000	1030	7.80	8.00	0.00	0.00	48.00	5	0-2
3/21/2018	216	Sacramento	12.90	12.80	1100	1200	9.20	8.40	0.00	0.00	60.00	5	6-8
3/26/2018	18	Sacramento	17.10	16.80	830	1000	9.10	10.30	0.00	0.00	160.00	10	10+
3/26/2018	20	Sacramento	16.70	16.80	1230	1330	8.60	9.40	0.00	0.00	244.00	10	10+
3/26/2018	209	Sacramento	11.50	11.50	930	1000	9.30	8.60	0.00	0.00	16.00	10-15	6-8
3/26/2018	286	Sacramento	12.40	12.70	1030	1100	9.50	9.30	0.00	0.00	60.00	10-15	10+
3/28/2018	141	Sacramento	11.30	11.40	800	830	11.70	11.60	0.00	0.00	44.00	10-20	2-4
3/28/2018	241	Sacramento	12.60	12.50	900	930	12.00	12.00	0.00	0.00	44.00	10-20	2-4
3/28/2018	252	Sacramento	12.70	14.40	1100	1200	11.80	11.30	0.00	0.00	20.00	10-20	2-4
3/28/2018	214	Sacramento	13.50	14.10	957	1043	5.80	6.10	0.00	0.00	96.00	10	2-4
3/28/2018	216	Sacramento	14.30	14.10	1139	1207	6.00	6.10	0.00	0.00	120.00	10	0-2
3/29/2018	22	Sacramento	17.50	17.00	1100	1130	17.80	16.40	0.00	0.00	140.00	10-20	2-4
3/12/2018	62	San Joaquin	13.50	14.10	1100	1400	7.98	7.56	372.00	0.00	0.00	15	6-8

Date	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
3/12/2018	8	San Joaquin	17.50	18.10	1300	1500	9.30	9.20	140.00	0.00	0.00	10-15	4-6
3/12/2018	10	San Joaquin	17.30	17.40	1030	1245	9.30	9.10	184.00	0.00	0.00	10-15	4-6
3/13/2018	14	San Joaquin	14.60	15.20	830	1300	8.30	9.50	384.00	0.00	0.00	0	2-4
3/13/2018	15	San Joaquin	14.90	14.90	1000	1100	9.20	9.30	108.00	0.00	0.00	0	2-4
3/13/2018	32	San Joaquin	15.40	14.70	830	1230	10.30	10.40	0.00	0.00	0.00	15	5.1
3/13/2018	92	San Joaquin	15.00	15.10	1130	1300	8.90	9.20	85.10	0.00	0.00	10-15	4-6
3/14/2018	34	San Joaquin	15.80	16.10	800	930	10.00	10.10	544.00	0.00	0.00	10-15	6-8
3/14/2018	36	San Joaquin	16.10	15.90	930	1130	13.40	12.90	120.00	0.00	0.00	10-15	2-4
3/14/2018	37	San Joaquin	15.90	15.30	1130	1430	10.10	9.90	1436.00	0.00	0.00	10-15	10+
3/14/2018	38	San Joaquin	14.20	14.40	930	1030	8.50	8.70	348.00	0.00	0.00	15	0-2
3/14/2018	40	San Joaquin	14.60	14.90	1100	1330	9.10	8.90	392.00	0.00	0.00	15	2-4
3/14/2018	30	San Joaquin	16.40	16.70	800	930	4.38	4.20	116.00	0.00	0.00	10	2-4
3/14/2018	31	San Joaquin	16.80	16.90	930	1200	8.88	8.50	228.00	0.00	0.00	10	2-4
3/14/2018	203	San Joaquin	14.80	14.40	1330	1430	9.00	8.90	828.00	0.00	0.00	10 ppb	2-4
3/14/2018	205	San Joaquin	9.50	14.40	1230	1300	14.40	9.50	652.00	0.00	0.00	10 ppb	2-4
3/14/2018	207	San Joaquin	14.70	14.60	1000	1230	9.50	9.40	288.00	0.00	0.00	10 ppb	2-4
3/15/2018	26	San Joaquin	13.90	14.10	900	1200	10.50	14.10	144.00	0.00	0.00	10	2-4
3/19/2018	40	San Joaquin	15.30	16.10	1330	1530	12.60	13.10	220.00	0.00	0.00	10	0-2
3/19/2018	8	San Joaquin	12.80	13.10	930	830	7.80	8.50	128.00	0.00	0.00	10	0-2
3/19/2018	10	San Joaquin	12.90	12.90	1200	1130	7.90	7.90	124.00	0.00	0.00	10	0-2
3/19/2018	87	San Joaquin	15.00	15.10	1400	1430	10.20	10.90	6.00	0.00	0.00	10	0-2
3/20/2018	14	San Joaquin	12.90	13.40	800	1100	9.60	9.20	256.00	0.00	0.00	10	0-2
3/20/2018	15	San Joaquin	13.20	13.20	1100	1200	8.90	8.80	72.00	0.00	0.00	10	0-2
3/20/2018	32	San Joaquin	13.40	13.10	900	1100	10.00	9.50	888.00	0.00	0.00	10	0-2
3/21/2018	34	San Joaquin	16.10	15.80	930	1100	10.80	9.10	0.00	0.00	272.00	5-10	10+
3/21/2018	37	San Joaquin	15.80	15.30	1100	1300	9.90	10.60	0.00	0.00	956.00	5-10	10+
3/21/2018	38	San Joaquin	16.10	16.10	1300	1430	9.10	9.00	0.00	0.00	232.00	5-10	10+
3/21/2018	203	San Joaquin	113.10	13.40	1330	1430	9.60	9.70	0.00	0.00	412.00	5-10	4-6
3/21/2018	205	San Joaquin	12.40	12.60	1100	1300	9.30	9.40	0.00	0.00	436.00	5-10	4-6
3/21/2018	207	San Joaquin	12.10	12.20	1000	1100	9.00	9.20	0.00	0.00	144.00	5-10	4-6
3/21/2018	30	San Joaquin	12.40	12.30	1030	1130	9.10	9.30	0.00	0.00	60.00	5	4-6
3/21/2018	31	San Joaquin	12.50	12.50	900	1000	9.30	9.40	0.00	0.00	112.00	5	4-6
3/26/2018	87	San Joaquin	15.50	15.30	1330	1400	10.40	10.90	0.00	0.00	10.00	15	4-6
3/26/2018	40	San Joaquin	16.30	16.80	1400	1530	9.10	9.30	0.00	0.00	36.00	10	10+
3/26/2018	8	San Joaquin	13.20	13.40	1100	1230	9.30	8.90	0.00	0.00	188.00	10-15	4-8
3/26/2018	10	San Joaquin	13.30	13.60	1300	1400	9.50	9.10	0.00	0.00	124.00	10-15	4-8
3/26/2018	61	San Joaquin	12.90	12.80	930	1030	9.00	9.30	0.00	0.00	248.00	10-15	4-8
3/27/2018	40	San Joaquin	16.30	16.10	930	1030	9.10	9.20	0.00	0.00	384.00	10-15	4-6
3/27/2018	14	San Joaquin	13.10	13.80	830	1100	7.30	8.50	0.00	0.00	256.00	10	0-2
3/27/2018	15	San Joaquin	13.90	14.30	1130	1230	8.70	9.10	0.00	0.00	72.00	10	0-2
3/27/2018	32	San Joaquin	13.10	15.40	900	1430	8.30	8.60	0.00	0.00	888.00	10	6-8
3/28/2018	92	San Joaquin	16.80	17.00	1330	1430	9.70	9.90	0.00	0.00	91.00	10	0-2
3/28/2018	34	San Joaquin	15.00	14.90	800	930	8.60	9.20	0.00	0.00	272.00	5-15	0-2
3/28/2018	36	San Joaquin	14.80	15.90	930	1030	9.90	10.80	0.00	0.00	40.00	5-15	0-2
3/28/2018	37	San Joaquin	16.00	15.10	1030	1300	9.10	8.80	0.00	0.00	480.00	5-15	0-2
3/28/2018	38	San Joaquin	14.50	15.10	1300	1530	9.40	8.70	0.00	0.00	348.00	5-15	0-2
3/28/2018	203	San Joaquin	13.60	13.90	1300	1430	8.00	7.60	0.00	0.00	828.00	10	2-4
3/28/2018	205	San Joaquin	13.00	13.40	1030	1200	8.10	8.00	0.00	0.00	436.00	10	2-4
3/28/2018	207	San Joaquin	12.60	12.80	930	1030	8.80	8.60	0.00	0.00	288.00	10	0-2
3/28/2018	30	San Joaquin	14.10	13.80	1030	1130	8.50	8.90	0.00	0.00	116.00	10	0-2
3/28/2018	31	San Joaquin	13.50	13.70	900	1000	8.10	8.30	0.00	0.00	228.00	10	0-2
3/29/2018	26	San Joaquin	13.40	13.60	1000	1130	7.20	7.40	0.00	0.00	72.00	5	2-4
3/15/2018	251	Solano	14.00	14.10	1145	1230	10.10	9.84	44.00	0.00	0.00	10-15	4-6
3/15/2018	252	Solano	14.30	14.40	1030	1115	9.13	9.35	28.00	0.00	0.00	10-15	4-6
3/19/2018	272	Solano	12.20	12.40	1200	1300	10.10	10.10	572.00	0.00	0.00	15	4-6
3/19/2018	284	Solano	12.80	12.70	1330	1400	10.00	9.80	64.00	0.00	0.00	15	4-6
3/20/2018	272	Solano	12.40	12.40	1030	1100	11.70	11.70	44.00	0.00	0.00	15	6-8
3/26/2018	272	Solano	13.40	13.40	1000	1130	12.20	12.20	0.00	0.00	44.00	15	10+
3/26/2018	284	Solano	14.70	8.30	1200	1230	8.90	14.50	0.00	0.00	64.00	15	10+
3/28/2018	140	Solano	13.30	13.30	730	800	11.70	11.70	0.00	0.00	36.00	10-20	2-4
3/28/2018	251	Solano	11.90	11.90	1000	1030	12.80	12.80	0.00	0.00	44.00	10-20	2-4
3/28/2018	252	Solano	11.70	11.70	1030	1100	12.90	12.80	0.00	0.00	28.00	10-20	2-4
3/29/2018	176	Solano	14.30	14.50	1000	1030	12.30	12.40	0.00	0.00	136.00	10-20	0-2
									16931.10	972.00	17135.00		

Table D-2. Daily Logs for April 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
4/2/2018	9122	79	Alameda	17.10	17.20	930	1030	7.18	7.35	0	0	0	0	0.00	0.00	24.00	5	6-8
4/9/2018	0006	79	Alameda	16.80	16.30	830	930	6.25	7.70	0	0	0	0	0.00	0.00	44.00	7.5-10	0-2
4/17/2018	0006	79	Alameda	15.90	16.30	900	1100	8.20	7.90	0	0	0	0	0.00	0.00	24.00	5-7.5	4-6
4/2/2018	0090	117	Contra Costa	17.20	18.20	930	1330	9.00	8.10	0	0	0	0	0.00	0.00	696.00	10-15	2-4
4/2/2018	8789	115	Contra Costa	17.60	17.80	1030	1200	9.20	9.20	613489	4208768	613419	4208219	0.00	0.00	644.00	10	2-4
4/2/2018	8789	116	Contra Costa	0.00	18.10	0	1330	0.00	9.30	613188	4208080	611977	4207904	0.00	0.00	684.00	10	0.0
4/3/2018	0037	107	Contra Costa	17.20	16.00	930	1030	11.60	11.00	0	0	0	0	0.00	0.00	784.00	15	2-4
4/3/2018	0055	91	Contra Costa	18.60	17.60	1230	1330	9.20	9.10	626297	4199970	626310	4199995	0.00	0.00	0.00	5-15	0-2
4/3/2018	0055	93	Contra Costa	19.30	19.10	930	1200	10.00	11.40	622458	4197201	622558	4195022	0.00	486.00	0.00	5-15	4-6
4/3/2018	0080	174	Contra Costa	16.80	16.70	900	1300	12.80	11.60	620964	4212064	0	0	0.00	0.00	2568.00	15	2-4
4/3/2018	0090	174	Contra Costa	16.40	17.10	930	1330	9.90	10.20	0	0	0	0	0.00	0.00	2600.00	15	2-4
4/3/2018	8789	110	Contra Costa	17.70	17.70	1200	1230	9.90	9.90	0	0	0	0	0.00	0.00	660.00	10-15	6-8
4/3/2018	8789	111	Contra Costa	17.70	17.70	1230	1330	9.80	9.90	0	0	0	0	0.00	0.00	76.00	10-15	6-8
4/3/2018	8789	173	Contra Costa	16.70	16.90	1000	1130	9.60	9.70	0	0	0	0	0.00	0.00	1248.00	10-15	4-6
4/4/2018	0055	87	Contra Costa	18.60	18.30	1130	1230	10.00	9.90	625894	4191230	625499	4190945	0.00	0.00	36.00	10	0-2
4/4/2018	0055	88	Contra Costa	19.50	18.80	1000	1100	8.90	9.60	623076	4188808	622878	4188593	0.00	0.00	16.00	10	2-4
4/5/2018	9012	112	Contra Costa	15.50	15.60	1130	1200	9.10	9.10	615956	4207827	616068	4207194	0.00	0.00	84.00	15	8-10
4/5/2018	9012	119	Contra Costa	15.20	15.20	1200	1230	9.10	9.20	609739	4208721	609791	4208448	0.00	0.00	40.00	15	8-10
4/5/2018	9012	120	Contra Costa	15.30	14.90	1230	1400	9.20	9.30	609511	4208730	609042	4208745	0.00	0.00	92.00	15	8-10
4/9/2018	0055	87	Contra Costa	18.80	19.30	1130	1300	9.30	9.40	0	0	0	0	0.00	0.00	53.00	15	0-2
4/9/2018	0055	88	Contra Costa	18.20	18.60	1000	1100	9.30	9.50	0	0	0	0	0.00	0.00	24.00	15	2-4
4/9/2018	0090	117	Contra Costa	16.30	17.00	930	1130	9.60	10.60	0	0	0	0	0.00	0.00	52.00	7.5	2-4
4/9/2018	8789	115	Contra Costa	16.40	16.30	1230	1330	9.70	9.70	614905	4208143	613561	4208116	0.00	0.00	484.00	7.5	4-6
4/9/2018	8789	116	Contra Costa	16.30	16.30	1000	1200	9.40	9.60	613132	4208074	612063	4207915	0.00	0.00	512.00	7.5	2-4
4/10/2018	0037	107	Contra Costa	17.80	17.60	930	1000	12.10	12.00	0	0	0	0	0.00	0.00	392.00	7.5-20	4-6
4/10/2018	0055	91	Contra Costa	9.40	20.20	1230	1330	8.70	8.20	0	0	0	0	0.00	0.00	91.00	7.5-10	4-6
4/10/2018	0055	93	Contra Costa	18.80	19.40	1000	1200	9.50	11.90	0	0	0	0	0.00	486.00	0.00	7.5-10	2-4
4/10/2018	0088	174	Contra Costa	16.80	16.90	900	1200	12.80	11.10	0	0	0	0	0.00	0.00	1284.00	0	4-6
4/10/2018	0090	174	Contra Costa	18.00	18.20	930	1230	10.20	11.40	0	0	0	0	0.00	0.00	1284.00	7.5 ppb	2-4
4/10/2018	8789	110	Contra Costa	17.70	17.70	1100	1130	9.90	9.90	0	0	0	0	0.00	0.00	496.00	7.5	6-8
4/10/2018	8789	111	Contra Costa	17.50	17.70	1130	1230	9.90	10.00	0	0	0	0	0.00	0.00	56.00	7.5	8-10
4/10/2018	8789	173	Contra Costa	18.00	17.90	930	1000	10.10	10.30	0	0	0	0	0.00	0.00	624.00	7.5	6-8
4/13/2018	9011	112	Contra Costa	17.00	17.60	1300	1400	8.20	9.90	0	0	0	0	0.00	0.00	44.00	7.5	2-4
4/13/2018	9011	119	Contra Costa	15.30	15.30	900	1000	9.20	9.20	0	0	0	0	0.00	0.00	20.00	7.5	6-8
4/13/2018	9011	120	Contra Costa	15.50	16.80	1000	1200	9.40	9.40	0	0	0	0	0.00	0.00	48.00	7.5	6-8
4/16/2018	0090	117	Contra Costa	15.20	15.10	930	1230	10.40	9.10	0	0	0	0	0.00	0.00	332.00	7.5-10	2-4
4/16/2018	3738	115	Contra Costa	15.30	15.10	1000	1100	10.40	10.40	612060	4207909	613192	4208094	0.00	0.00	484.00	7.5	6-8
4/16/2018	3738	116	Contra Costa	15.20	15.20	1100	1200	10.40	10.50	613549	4208096	614954	4208149	0.00	0.00	512.00	7.5	8-10
4/17/2018	0037	107	Contra Costa	12.60	12.60	900	1000	12.20	12.20	0	0	0	0	0.00	0.00	392.00	7.5	2-4
4/17/2018	0090	174	Contra Costa	15.80	16.10	930	1230	8.90	9.20	0	0	0	0	0.00	0.00	2560.00	15	2-4
4/17/2018	0800	173	Contra Costa	16.00	16.20	1000	1040	10.00	10.60	0	0	0	0	0.00	0.00	568.00	15	0-2
4/17/2018	0800	174	Contra Costa	16.00	16.20	900	1200	10.00	10.60	0	0	0	0	0.00	0.00	2000.00	15	0-2
4/17/2018	8789	173	Contra Costa	15.80	16.00	1000	1200	8.90	9.20	622948	4209727	623234	4210080	0.00	0.00	1248.00	15	4-6
4/19/2018	0006	87	Contra Costa	15.90	16.50	1130	1400	6.23	7.01	0	0	0	0	0.00	0.00	52.00	10-15	10+
4/19/2018	0055	91	Contra Costa	17.70	17.60	1330	1430	7.70	11.60	0	0	0	0	0.00	0.00	91.00	7.5-10	2-4
4/19/2018	0055	93	Contra Costa	17.40	17.80	930	1130	9.60	11.30	0	0	0	0	0.00	486.00	0.00	7.5-10	2-4
4/23/2018	0065	87	Contra Costa	19.40	21.70	1130	1230	9.30	9.30	0	0	0	0	0.00	0.00	71.00	15-20	0-2
4/23/2018	0065	88	Contra Costa	22.70	21.30	1000	1100	11.60	12.10	0	0	0	0	0.00	0.00	24.00	15-20	0-2
4/23/2018	0090	117	Contra Costa	18.40	18.20	1000	1030	9.10	9.40	0	0	0	0	0.00	0.00	16.00	7.5	2-4
4/24/2018	0055	91	Contra Costa	20.80	21.00	1230	1330	8.80	9.00	0	0	0	0	0.00	0.00	136.00	10-15	0-2
4/24/2018	0055	93	Contra Costa	20.40	23.70	930	1200	9.50	10.50	0	0	0	0	0.00	5.00	0.00	10-15	0-2
4/24/2018	0080	174	Contra Costa	19.20	19.20	930	1230	9.40	9.30	0	0	0	0	0.00	0.00	2576.00	0	6-8
4/24/2018	0090	174	Contra Costa	18.60	19.00	930	1230	9.10	8.90	0	0	0	0	2568.00	0.00	0.00	7.5	2-4
4/26/2018	9012	112	Contra Costa	17.20	17.20	1000	1030	9.30	9.30	615941	4207830	616077	4206747	0.00	0.00	44.00	7.5	10+
4/26/2018	9012	119	Contra Costa	17.20	17.20	1100	1130	9.30	9.30	609739	4208712	609743	4208428	0.00	0.00	20.00	7.5	10+
4/26/2018	9012	120	Contra Costa	17.30	17.50	1130	1300	9.30	9.30	609512	4208716	608925	4208713	0.00	0.00	32.00	7.5	10+
4/30/2018	0055	87	Contra Costa	19.50	19.60	1230	1330	9.70	9.10	0	0	0	0	0.00	0.00	36.00	10	2-4
4/30/2018	0055	88	Contra Costa	17.90	18.10	1100	1200	10.50	9.80	0	0	0	0	0.00	0.00	16.00	10	4-6
4/30/2018	0090	117	Contra Costa	18.10	18.60	930	1100	9.00	9.00	0	0	0	0	0.00	0.00	348.00	7.5	2-4
4/30/2018	3738	115	Contra Costa	18.00	18.50	1130	1330	9.00	8.90	0	0	0	0	0.00	0.00	512.00	7.5	4-6
4/30/2018	3738	116	Contra Costa	17.80	18.70	1030	1115	8.90	9.10	0	0	0	0	0.00	0.00	484.00	7.5	4-6
4/2/2018	0080	18	Sacramento	14.90	16.00	730	1130	9.20	8.10	0	0	0	0	0.00	0.00	240.00	5-15	0-2
4/2/2018	0080	20	Sacramento	15.90	16.20	1300	1400	11.50	9.30	0	0	0	0	0.00	0.00	124.00	5-15	4-6
4/2/2018	9011	209	Sacramento	14.60	15.10	900	930	9.30	8.10	0	0	0	0	0.00	0.00	16.00	10-15	4-6
4/2/2018	9011	286	Sacramento	15.00	16.10	1030	1200	9.40	9.30	0	0	0	0	0.00	0.00	60.00	10-15	4-6
4/4/2018	0037	141	Sacramento	14.20	14.20	730	800	11.80	11.80	0	0	0	0	0.00	0.00	44.00	10-20	0-2
4/4/2018	0037	241	Sacramento	13.70	13.60	800	830	11.60	11.60	0	0	0	0	0.00	0.00	44.00	10-20	0-2
4/4/2018	0037	251	Sacramento	14.50	14.40	830	900	11.40	11.40	0	0	0	0	0.00	0.00	44.00	10-20	0-2
4/4/2018	0037	252	Sacramento	15.20	16.40	930	1000	11.50	11.70	0	0	0	0	0.00	0.00	28.00	10-20	0-2
4/4/2018	9011	214	Sacramento	15.90	16.60	900	1000	8.50	8.50	0	0	0	0	0.00	0.00	96.00	10	0-2
4/4/2018	9011	216	Sacramento	16.90	16.90	1100	1130	8.60	9.80	0	0	0	0	0.00	0.00	12.00	10	4-6
4/5/2018	0037	20	Sacramento	15.60	15.40	1030	1230	11.60	11.50	0	0	0	0	0.00	0.00	44.00	10-20	10+
4/9/2018	0080	18	Sacramento	16.40	16.00	1200	1500	9.90	10.80	0	0	0	0	0.00	0.00	166.00	5-15	0-2
4/9/2018	0080	20	Sacramento	16.20	16.50	1430	1530	10.80	10.70	0	0	0	0	0.00	0.00	124.00	5-15	0-2
4/9/2018	9011	209	Sacramento	13.20	13.70	930	1030	10.00	9.80	0	0	0	0	0.00	0.00	16.00	7.5-15	2-4
4/9/2018	9011	286	Sacramento	16.80	15.80	1200	1300	9.10	9.40	0	0	0	0	0.00	0.00	44.00	7.5-15	0-2
4/10/2018	0037	22	Sacramento	15.30	15.40	1100	1130	12.10	11.90	0	0	0	0	0.00	0.00	164.00	7.5-20	4-6
4/10/2018	0037	176	Sacramento	15.20	15.20	1200	1230	14.80	14.80	0	0	0	0	0.00	0.00	136.00	7.5-20	4-6
4/10/2018	9011	214	Sacramento	17.50	17.00	1100	1200	5.40	5.80	0	0	0	0	0.00	0.00	48.00	5	0-2
4/10/2018	9011	216	Sacramento	17.90	16.70	1230	1300	8.40	6.20	0	0	0	0	0.00	0.00	60.00	5	8-10
4/13/2018	0006	252	Sacramento	15.90	16.20	1200	1500	6.50	8.00	0	0	0	0	0.00	0.00	8.00	5-15	8-10
4/13/2018	0037	141	Sacramento	12.50	12.50	830	900	13.70	13.70	0	0	0	0	0.00	0.00	44.00	7.5-20	6-8
4/13/2018	0037	241	Sacramento	12.80	12.70	930	1000	12.80	12.60	0	0	0	0	0.00	0.00	52.00	7.5-20	6-8
4/16/2018	9011	209	Sacramento	13.90	14.20	830	900	8.70	8.40	0	0	0	0	0.00	0.00	16.00	7.5-15	2-4
4/16/2018	9011	286	Sacramento	14.00	13.30	930	1030	9.40	9.00	0	0	0	0	0.00	0.00	44.00	7.5-15	2-4

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
4/18/2018	0037	241	Sacramento	11.00	11.70	900	930	12.50	12.40	0	0	0	0	0.00	0.00	52.00	5-20	0-2
4/18/2018	0037	252	Sacramento	13.00	14.40	1030	1100	11.70	11.80	0	0	0	0	0.00	0.00	20.00	5-20	0-2
4/18/2018	0080	18	Sacramento	16.10	16.40	930	1130	8.10	8.80	0	0	0	0	0.00	0.00	240.00	7.3-15	0-2
4/18/2018	0080	20	Sacramento	16.40	16.40	1300	1400	9.60	9.90	0	0	0	0	0.00	0.00	184.00	7.3-15	0-2
4/18/2018	9011	214	Sacramento	14.20	15.00	1000	1030	8.50	7.90	0	0	0	0	0.00	0.00	84.00	10	2-4
4/23/2018	0080	18	Sacramento	18.00	18.00	1200	1430	7.90	8.20	0	0	0	0	0.00	0.00	93.00	0	0-2
4/25/2018	0037	241	Sacramento	16.20	16.30	900	930	11.50	11.50	0	0	0	0	0.00	0.00	56.00	5-20	6-8
4/25/2018	0037	252	Sacramento	16.80	18.00	1000	1100	10.60	11.40	0	0	0	0	0.00	0.00	12.00	5-20	6-8
4/25/2018	8929	214	Sacramento	19.30	19.70	1000	1100	8.20	8.40	0	0	0	0	0.00	0.00	48.00	5	2-4
4/25/2018	8929	216	Sacramento	20.40	20.20	1100	1200	9.10	9.50	0	0	0	0	0.00	0.00	60.00	5	4-6
4/26/2018	9011	22	Sacramento	16.80	18.20	1000	1230	8.50	9.20	0	0	0	0	0.00	0.00	140.00	10-20	4-6
4/26/2018	9011	176	Sacramento	16.30	16.60	930	1000	8.80	9.40	0	0	0	0	0.00	0.00	136.00	10-20	10+
4/30/2018	0080	18	Sacramento	18.90	19.30	1100	1430	9.10	8.70	0	0	0	0	0.00	0.00	240.00	5-15	2-4
4/30/2018	0080	20	Sacramento	19.40	19.40	1430	1530	11.60	9.90	0	0	0	0	0.00	0.00	160.00	5-15	0-2
4/2/2018	0080	40	San Joaquin	16.00	16.10	1500	1630	8.60	10.60	0	0	0	0	0.00	0.00	384.00	5-15	4-6
4/2/2018	3420	8	San Joaquin	14.50	14.60	1100	1230	8.10	7.80	0	0	0	0	0.00	0.00	188.00	15	4-6
4/2/2018	3420	10	San Joaquin	14.70	14.60	1330	1430	8.20	8.10	0	0	0	0	0.00	0.00	184.00	15	4-6
4/2/2018	3420	62	San Joaquin	14.30	14.40	930	1030	8.80	8.30	0	0	0	0	0.00	0.00	372.00	15	4-6
4/3/2018	0055	92	San Joaquin	18.70	19.20	1330	1430	9.00	13.20	626104	4201810	625299	4201717	0.00	0.00	0.00	5-15	0-2
4/3/2018	3420	14	San Joaquin	14.20	14.50	930	1430	9.50	8.70	0	0	0	0	0.00	0.00	384.00	15	2-4
4/3/2018	3420	15	San Joaquin	14.40	14.30	1030	1200	9.20	9.30	0	0	0	0	0.00	0.00	108.00	15	2-4
4/3/2018	9011	32	San Joaquin	16.80	18.30	830	1400	7.10	9.00	0	0	0	0	0.00	0.00	1336.00	15	0-2
4/4/2018	0055	87	San Joaquin	18.90	18.20	1230	1330	9.70	10.10	626002	4191106	625955	4191092	0.00	0.00	6.00	10	0-2
4/4/2018	0080	34	San Joaquin	16.00	16.00	830	930	10.60	10.00	0	0	0	0	0.00	0.00	0.00	10-15	4-6
4/4/2018	0080	36	San Joaquin	16.10	9.10	930	1000	9.10	10.00	0	0	0	0	0.00	0.00	0.00	10-15	0-2
4/4/2018	0080	37	San Joaquin	16.10	16.10	1030	1300	8.80	9.00	0	0	0	0	0.00	0.00	0.00	10-15	4-6
4/4/2018	0080	38	San Joaquin	16.10	16.10	1300	1430	11.80	11.80	0	0	0	0	0.00	0.00	0.00	10-15	4-6
4/4/2018	0090	203	San Joaquin	15.40	16.10	1300	1430	8.70	8.00	0	0	0	0	0.00	0.00	828.00	10-15	2-4
4/4/2018	0090	205	San Joaquin	15.10	15.20	1100	1230	8.90	8.70	0	0	0	0	0.00	0.00	652.00	10-15	2-4
4/4/2018	0090	207	San Joaquin	14.70	14.90	930	1030	9.70	9.00	0	0	0	0	0.00	0.00	288.00	10-15	2-4
4/4/2018	3420	30	San Joaquin	14.80	14.90	1100	1200	9.10	9.30	0	0	0	0	0.00	0.00	60.00	5	2-4
4/4/2018	3420	31	San Joaquin	15.10	14.80	930	1030	9.30	9.00	0	0	0	0	0.00	0.00	112.00	5	2-4
4/5/2018	0090	26	San Joaquin	18.60	18.70	930	1030	8.40	8.90	0	0	0	0	0.00	0.00	72.00	5	2-4
4/9/2018	0006	62	San Joaquin	17.70	17.80	1000	1130	7.04	8.00	0	0	0	0	0.00	0.00	188.00	7.5-10	2-4
4/9/2018	0055	87	San Joaquin	19.10	19.40	1300	1400	8.90	9.10	0	0	0	0	0.00	0.00	10.00	15	0-2
4/9/2018	0080	40	San Joaquin	16.10	16.00	900	1100	10.60	8.90	0	0	0	0	0.00	0.00	356.00	5-15	0-2
4/9/2018	3420	8	San Joaquin	15.10	15.30	830	1000	8.10	8.80	0	0	0	0	0.00	0.00	188.00	7.5-15	0-2
4/9/2018	3420	10	San Joaquin	15.50	15.30	1030	1200	8.20	9.10	0	0	0	0	0.00	0.00	88.00	7.5-15	0-2
4/10/2018	0055	92	San Joaquin	18.60	18.80	1330	1430	9.90	9.70	0	0	0	0	0.00	0.00	43.00	7.5-10	4-6
4/10/2018	3420	14	San Joaquin	15.40	15.40	1000	1230	7.80	9.10	0	0	0	0	0.00	0.00	252.00	5-10	0-2
4/10/2018	3420	15	San Joaquin	15.30	15.30	830	930	7.50	7.80	0	0	0	0	0.00	0.00	52.00	5-10	0-2
4/10/2018	3420	26	San Joaquin	15.40	15.50	1300	1400	9.10	9.30	0	0	0	0	0.00	0.00	72.00	5-10	2-4
4/13/2018	0037	38	San Joaquin	15.30	15.30	1100	1200	15.70	15.60	0	0	0	0	0.00	0.00	348.00	7.5-20	8-10
4/16/2018	3420	8	San Joaquin	15.10	15.00	900	1030	10.10	10.10	0	0	0	0	0.00	0.00	188.00	7.5-15	2-4
4/16/2018	3420	10	San Joaquin	15.40	15.50	1100	1230	9.50	8.70	0	0	0	0	0.00	0.00	88.00	7.5-15	2-4
4/17/2018	0006	62	San Joaquin	15.90	16.90	1130	1430	7.34	8.79	0	0	0	0	0.00	0.00	188.00	5-7.5	2-4
4/18/2018	0090	38	San Joaquin	15.90	16.20	930	1030	9.50	9.00	0	0	0	0	0.00	0.00	348.00	15	2-4
4/18/2018	0090	40	San Joaquin	16.10	16.50	1030	1230	9.00	8.50	0	0	0	0	0.00	0.00	384.00	15	2-4
4/19/2018	0006	87	San Joaquin	15.40	16.10	900	1030	8.70	7.77	0	0	0	0	0.00	0.00	16.00	10-15	10+
4/19/2018	0055	92	San Joaquin	16.60	17.50	1200	1300	7.90	10.00	0	0	0	0	0.00	0.00	43.00	7.5-10	4-6
4/19/2018	3420	14	San Joaquin	15.40	16.90	830	1130	8.40	8.00	633699	4210075	633892	4210803	0.00	0.00	376.00	7.5-15	4-6
4/19/2018	3420	15	San Joaquin	15.80	15.70	1000	1030	8.80	9.20	631923	4211027	631923	4211280	0.00	0.00	72.00	7.5-15	4-6
4/23/2018	0065	87	San Joaquin	21.40	21.60	1230	1330	8.90	9.10	0	0	0	0	0.00	0.00	10.00	15-20	0-2
4/23/2018	0080	40	San Joaquin	16.90	17.10	900	1100	8.10	8.80	0	0	0	0	0.00	0.00	356.00	0	0-2
4/23/2018	3420	10	San Joaquin	14.80	14.90	830	1200	8.80	8.90	0	0	0	0	0.00	0.00	0.00	7.5	2-4
4/24/2018	0055	92	San Joaquin	21.40	21.00	1330	1430	9.90	9.70	0	0	0	0	0.00	0.00	57.00	10-15	0-2
4/25/2018	0080	38	San Joaquin	18.50	18.70	730	930	8.60	7.90	0	0	0	0	0.00	0.00	276.00	15	6-8
4/25/2018	3420	14	San Joaquin	15.50	15.80	900	1100	8.10	8.90	0	0	0	0	0.00	0.00	252.00	7.5-10	2-4
4/25/2018	3420	15	San Joaquin	15.90	15.90	1115	1200	9.10	9.20	0	0	0	0	0.00	0.00	52.00	7.5-10	4-6
4/26/2018	0090	26	San Joaquin	19.30	19.80	900	1000	7.70	7.10	0	0	0	0	0.00	0.00	72.00	7.5 ppb	2-4
4/30/2018	0055	87	San Joaquin	19.40	19.50	1330	1430	8.90	9.30	0	0	0	0	0.00	0.00	6.00	10	2-4
4/30/2018	0080	40	San Joaquin	18.10	19.10	900	1100	8.30	9.30	0	0	0	0	0.00	0.00	360.00	5-15	2-4
4/30/2018	3420	8	San Joaquin	18.10	18.50	900	1100	9.10	9.50	645074	4202063	644738	4202341	0.00	0.00	0.00	10	2-4
4/30/2018	3420	10	San Joaquin	18.50	18.50	1100	1130	9.20	9.30	639793	4205943	639776	4205941	0.00	0.00	0.00	10	2-4
4/2/2018	0037	272	Solano	14.80	15.40	900	1030	12.70	11.80	0	0	0	0	0.00	0.00	616.00	15	4-6
4/2/2018	0037	284	Solano	16.80	16.80	1100	1130	13.50	13.70	0	0	0	0	0.00	0.00	64.00	15	6-8
4/4/2018	0037	140	Solano	16.10	16.10	1100	1130	11.30	11.30	0	0	0	0	0.00	0.00	52.00	10-20	4-6
4/4/2018	0037	252	Solano	16.80	16.80	900	930	11.50	11.50	0	0	0	0	0.00	0.00	28.00	10-20	0-2
4/5/2018	0037	176	Solano	15.90	15.80	1030	1130	12.10	12.10	0	0	0	0	0.00	0.00	136.00	10-20	10+
4/9/2018	0037	272	Solano	12.50	13.40	900	1030	12.60	12.60	0	0	0	0	0.00	0.00	572.00	15	0-2
4/9/2018	0037	284	Solano	16.70	16.40	1100	1130	9.40	9.80	0	0	0	0	0.00	0.00	64.00	15	2-4
4/13/2018	0006	251	Solano	16.10	16.30	800	930	7.20	8.20	0	0	0	0	0.00	0.00	44.00	5-15	8-10
4/13/2018	0006	252	Solano	16.90	16.70	1000	1130	6.00	6.10	0	0	0	0	0.00	0.00	12.00	5-15	8-10
4/13/2018	0037	140	Solano	12.70	12.70	800	830	12.20	12.20	0	0	0	0	0.00	0.00	24.00	7.5-20	6-8
4/18/2018	0037	140	Solano	12.70	12.70	800	830	12.20	12.20	0	0	0	0	0.00	0.00	36.00	5-20	0-2
4/18/2018	0037	251	Solano	13.00	13.10	930	1000	12.60	12.40	0	0	0	0	0.00	0.00	44.00	5-20	0-2
4/18/2018	0037	252	Solano	13.50	13.50	1000	1000	11.80	11.90	0	0	0	0	0.00	0.00	12.00	5-20	0-2
4/19/2018	0037	272	Solano	12.20	12.40	830	1000	12.40	12.00	0	0	0	0	0.00	0.00	632.00	15-20	4-6
4/19/2018	0037	284	Solano	13.70	13.70	1030	1100	11.60	11.60	0	0	0	0	0.00	0.00	88.00	15-20	4-6
4/23/2018	2907	272	Solano	16.10	17.60	830	930	12.20	12.50	0	0	0	0	0.00	0.00	616.00	15-20	0-2
4/23/2018	2907	284	Solano	18.60	19.00	1000	1030	10.90	10.70	0	0	0	0	0.00	0.00	64.00	15-20	6-8
4/25/2018	0037	140	Solano	15.70	15.70	800	830	12.10	12.10	0	0	0	0	0.00	0.00	24.00	5-20	6-8
4/25/2018	0037	251	Solano	16.70	16.70	930	930	10.70	10.70	0	0	0	0	0.00	0.00	44.00	5-20	6-8
4/25/2018	0037	252	Solano	17.10	17.20	930	1000	13.20	13.10	0	0	0	0	0.00	0.00	12.00	5-20	4-6
4/30/2018	0037	272	Solano	14.10	15.50	830	1000	12.00	11.40	0	0	0	0	0.00	0.00	616.00	15	6-8
														2568.00	1463.00	45052.00		

Table D-3. Daily Logs for May 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
5/14/2018	8835	79	Alameda	17.20	17.00	900	1100	6.20	6.80	0	0	0	0	0.00	0.00	24.00	5	10+
5/29/2018	0006	79	Alameda	24.20	24.10	900	1100	8.10	7.20	0	0	0	0	0.00	0.00	0.00	5	0-2
5/1/2018	0055	91	Contra Costa	20.40	20.50	1330	1430	9.20	9.70	0	0	0	0	0.00	0.00	0.00	10-15	4-6
5/1/2018	0055	93	Contra Costa	19.80	20.70	930	1200	9.50	11.10	0	0	0	0	0.00	486.00	0.00	10-15	6-8
5/1/2018	0080	174	Contra Costa	19.60	19.70	900	1230	12.60	10.10	0	0	0	0	0.00	0.00	1284.00	7.5	10+
5/1/2018	0090	174	Contra Costa	0.00	0.00	930	1230	0.00	0.00	623423	411723	623260	4211723	0.00	0.00	1280.00	7.5	4-6
5/1/2018	3738	173	Contra Costa	17.20	17.40	1030	1230	9.60	9.60	622955	4209875	621745	4211211	0.00	0.00	624.00	7.5	8-10
5/3/2018	0055	112	Contra Costa	0.00	0.00	930	945	0.00	0.00	0	0	0	0	0.00	0.00	44.00	7.5	10+
5/3/2018	0055	119	Contra Costa	0.00	0.00	1015	1030	0.00	0.00	0	0	0	0	0.00	0.00	20.00	7.5	10+
5/3/2018	0055	120	Contra Costa	0.00	0.00	1045	1200	0.00	0.00	0	0	0	0	0.00	0.00	32.00	7.5	10+
5/7/2018	0055	87	Contra Costa	21.70	21.10	1130	1300	9.30	9.90	0	0	0	0	0.00	0.00	53.00	5-15	0-2
5/7/2018	0055	88	Contra Costa	20.40	20.70	1000	1100	8.40	9.70	0	0	0	0	0.00	0.00	8.00	5-15	0-2
5/7/2018	0090	117	Contra Costa	18.30	18.70	930	1030	9.40	9.80	0	0	0	0	0.00	0.00	228.00	5	2-4
5/7/2018	8789	115	Contra Costa	0.00	0.00	1045	1145	0.00	0.00	0	0	0	0	0.00	0.00	324.00	5	8-10
5/7/2018	8789	116	Contra Costa	0.00	0.00	930	1030	0.00	0.00	0	0	0	0	0.00	0.00	340.00	5	8-10
5/8/2018	0025	107	Contra Costa	18.40	18.40	800	900	10.90	11.10	0	0	0	0	0.00	0.00	260.00	5	2-4
5/8/2018	0055	91	Contra Costa	22.40	23.00	1300	1330	9.30	9.20	0	0	0	0	0.00	0.00	45.00	5	2-4
5/8/2018	0055	93	Contra Costa	21.70	22.40	1030	1230	9.60	9.40	0	0	0	0	0.00	340.00	0.00	5	0-2
5/8/2018	0090	174	Contra Costa	19.20	19.50	930	1230	9.70	10.40	0	0	0	0	0.00	0.00	840.00	5	2-4
5/8/2018	8088	173	Contra Costa	19.90	20.00	1000	1300	8.10	9.90	0	0	0	0	0.00	0.00	107.00	5	0-2
5/8/2018	8088	174	Contra Costa	19.90	20.00	930	1300	8.10	9.90	0	0	0	0	0.00	0.00	764.00	5	0-2
5/8/2018	8789	110	Contra Costa	0.00	0.00	1100	1130	0.00	0.00	619178	4208198	618843	4208265	0.00	0.00	328.00	5	10+
5/8/2018	8789	111	Contra Costa	0.00	0.00	1130	1200	0.00	0.00	616556	4210578	616442	4210679	0.00	0.00	40.00	5	10+
5/8/2018	8789	173	Contra Costa	0.00	0.00	930	1030	0.00	0.00	623007	4209930	622292	4210671	0.00	0.00	416.00	5	4-6
5/10/2018	3420	112	Contra Costa	19.20	19.10	1130	1200	9.00	9.30	0	0	0	0	0.00	0.00	56.00	5-10	6-8
5/10/2018	3420	120	Contra Costa	18.90	19.30	900	1100	9.50	9.10	0	0	0	0	0.00	0.00	28.00	5-10	2-4
5/14/2018	0055	87	Contra Costa	21.40	22.00	1230	1330	8.90	8.50	0	0	0	0	0.00	0.00	36.00	10	0-2
5/14/2018	0055	88	Contra Costa	20.10	21.10	1100	1200	8.30	8.80	0	0	0	0	0.00	0.00	16.00	10	2-4
5/14/2018	0090	117	Contra Costa	17.90	17.90	930	1130	9.30	9.40	0	0	0	0	0.00	0.00	348.00	7.5	4-6
5/14/2018	8789	115	Contra Costa	17.70	17.80	1000	1100	8.90	9.10	0	0	0	0	0.00	0.00	484.00	7.5	10+
5/14/2018	8789	116	Contra Costa	17.90	18.00	1100	1200	9.00	9.10	0	0	0	0	0.00	0.00	512.00	7.5	10+
5/15/2018	0006	93	Contra Costa	23.60	24.10	1145	1400	8.80	8.45	0	0	0	0	0.00	486.00	0.00	5	2-4
5/15/2018	0025	107	Contra Costa	17.60	17.40	830	930	10.40	10.50	0	0	0	0	0.00	0.00	392.00	7.5	10+
5/15/2018	0090	173	Contra Costa	18.60	18.90	1200	1230	7.80	8.20	0	0	0	0	0.00	0.00	438.36	7.5	4-6
5/15/2018	0090	174	Contra Costa	18.60	18.90	900	1155	7.80	8.20	0	0	0	0	0.00	0.00	2129.64	7.5	4-6
5/15/2018	8789	110	Contra Costa	17.90	18.00	1200	1245	7.90	7.90	0	0	0	0	0.00	0.00	496.00	7.5	10+
5/15/2018	8789	111	Contra Costa	18.20	18.10	1245	1315	7.90	7.90	0	0	0	0	0.00	0.00	56.00	7.5	10+
5/15/2018	8789	173	Contra Costa	17.80	18.00	915	1115	8.10	8.20	0	0	0	0	0.00	0.00	624.00	7.5	10+
5/16/2018	0055	91	Contra Costa	21.90	24.30	1000	1100	7.10	7.90	0	0	0	0	0.00	0.00	45.00	5-7.5	4-6
5/17/2018	9012	112	Contra Costa	18.50	18.60	930	1000	8.10	8.10	0	0	0	0	0.00	0.00	44.00	7.5	8-10
5/17/2018	9012	119	Contra Costa	18.30	18.30	1045	1100	8.50	8.50	0	0	0	0	0.00	0.00	20.00	7.5	10+
5/17/2018	9012	120	Contra Costa	18.10	18.50	1115	1245	8.60	8.60	0	0	0	0	0.00	0.00	48.00	7.5	10+
5/21/2018	0055	88	Contra Costa	20.10	20.40	1030	1130	7.80	7.20	0	0	0	0	0.00	0.00	16.00	10	0-2
5/21/2018	0090	117	Contra Costa	17.60	18.00	900	1030	9.50	10.10	0	0	0	0	0.00	0.00	472.00	10-15	2-4
5/21/2018	8789	115	Contra Costa	17.80	17.80	800	830	9.40	9.30	614886	4208098	613579	4208095	0.00	0.00	324.00	5-7.5	4-6
5/21/2018	8789	116	Contra Costa	17.70	18.00	900	1030	9.60	9.60	613192	4208049	612025	4207920	0.00	0.00	512.00	5-7.5	4-6
5/22/2018	0025	107	Contra Costa	19.80	19.40	900	1130	9.00	9.30	0	0	0	0	0.00	0.00	1044.00	20	2-4
5/22/2018	0055	93	Contra Costa	21.20	22.00	1000	1330	6.82	7.47	0	0	0	0	0.00	911.00	0.00	7.5	0-2
5/22/2018	0090	173	Contra Costa	21.00	21.40	1300	1430	9.70	9.90	0	0	0	0	0.00	0.00	624.00	7.5	6-8
5/22/2018	0090	174	Contra Costa	20.20	20.60	900	1300	8.70	8.40	0	0	0	0	0.00	0.00	2568.00	7.5	2-4
5/22/2018	8789	108	Contra Costa	19.80	19.90	1000	1030	7.90	8.10	0	0	0	0	140.00	0.00	0.00	10-15	6-8
5/22/2018	8789	109	Contra Costa	19.90	20.30	1030	1200	8.30	8.00	0	0	0	0	324.00	0.00	0.00	10-15	6-8
5/22/2018	8789	110	Contra Costa	20.60	20.90	1300	1430	7.90	8.10	0	0	0	0	0.00	0.00	988.00	10-15	8-10
5/22/2018	8789	111	Contra Costa	20.10	20.50	1230	1300	8.30	8.50	0	0	0	0	0.00	0.00	116.00	10-15	8-10
5/23/2018	0055	87	Contra Costa	17.70	20.20	900	1000	7.10	7.70	0	0	0	0	0.00	0.00	52.00	7.5-15	6-8
5/23/2018	0055	91	Contra Costa	21.50	22.00	1130	1300	6.50	8.10	0	0	0	0	0.00	0.00	68.00	7.5-15	2-4
5/24/2018	0055	112	Contra Costa	19.70	19.90	1000	1030	7.70	8.10	0	0	0	0	0.00	0.00	56.00	10-15	+10
5/24/2018	0055	119	Contra Costa	20.30	20.20	1100	1115	7.30	7.40	0	0	0	0	0.00	0.00	40.00	10-15	+10
5/24/2018	0055	120	Contra Costa	20.00	20.90	1115	1300	7.50	8.00	0	0	0	0	0.00	0.00	92.00	10-15	+10
5/29/2018	0025	107	Contra Costa	22.60	22.50	900	1100	10.30	10.40	0	0	0	0	0.00	0.00	784.00	15	2-4
5/29/2018	0055	87	Contra Costa	24.80	24.50	1030	1230	8.40	7.90	0	0	0	0	0.00	0.00	53.00	10-15	0-2
5/29/2018	0055	88	Contra Costa	22.20	23.30	930	1030	7.63	7.48	0	0	0	0	0.00	0.00	16.00	10-15	0-2
5/29/2018	9012	108	Contra Costa	22.70	22.80	1000	1130	8.90	9.00	622278	4208853	621485	4208062	140.00	0.00	0.00	10	0-2
5/29/2018	9012	109	Contra Costa	22.90	23.00	1130	1330	8.80	8.70	621352	4207976	620800	4206366	432.00	0.00	0.00	10	2-4
5/30/2018	0025	97	Contra Costa	21.90	23.10	1045	1400	8.53	7.57	0	0	0	0	516.00	0.00	0.00	10	4-6
5/30/2018	0055	93	Contra Costa	23.30	24.30	930	1400	9.50	11.10	622070	4195290	622720	4196803	0.00	911.00	0.00	7.5	10+
5/30/2018	0090	115	Contra Costa	22.70	22.80	900	1030	8.90	9.00	0	0	0	0	0.00	0.00	324.00	5-15	2-4
5/30/2018	0090	116	Contra Costa	22.70	22.90	1043	1030	8.70	8.70	0	0	0	0	0.00	0.00	512.00	5-15	4-6
5/30/2018	0090	117	Contra Costa	23.00	23.10	1145	1330	8.90	8.90	0	0	0	0	0.00	0.00	472.00	5-15	6-8
5/30/2018	9012	115	Contra Costa	21.30	21.00	900	1030	9.20	8.90	0	0	0	0	0.00	0.00	324.00	5-7.5	6-8
5/30/2018	9012	116	Contra Costa	21.40	21.60	1030	1200	9.00	8.90	0	0	0	0	0.00	0.00	512.00	5-7.5	6-8
5/31/2018	0055	91	Contra Costa	21.90	22.50	1100	1230	8.10	7.50	0	0	0	0	0.00	0.00	68.00	7.5	4-6
5/31/2018	9012	112	Contra Costa	22.30	21.70	930	1030	8.60	8.60	0	0	0	0	0.00	0.00	64.00	10-15	8-10
5/31/2018	9012	119	Contra Costa	20.90	21.00	1100	1115	8.80	8.80	0	0	0	0	0.00	0.00	40.00	10-15	8-10
5/31/2018	9012	120	Contra Costa	21.10	21.30	1115	1345	9.00	8.80	0	0	0	0	0.00	0.00	92.00	10-15	8-10
5/1/2018	9011	209	Sacramento	19.00	18.80	1300	1330	11.00	8.80	0	0	0	0	0.00	0.00	12.00	5-10	2-4
5/1/2018	9011	286	Sacramento	19.70	18.80	1400	1430	8.90	9.20	0	0	0	0	0.00	0.00	32.00	5-10	4-6
5/2/2018	0025	241	Sacramento	16.50	16.40	830	900	9.20	9.20	0	0	0	0	0.00	0.00	44.00	10	4-6
5/2/2018	0025	252	Sacramento	17.60	18.90	1000	1100	8.60	12.10	0	0	0	0	0.00	0.00	20.00	10	4-6
5/2/2018	9011	214	Sacramento	20.00	23.50	1230	1330	13.00	7.60	0	0	0	0	0.00	0.00	44.00	5	2-4
5/3/2018	0025	22	Sacramento	16.30	17.50	900	930	11.90	12.20	0	0	0	0	0.00	0.00	324.00	15-20	10+
5/3/2018	0025	176	Sacramento	16.30	16.40	800	900	11.90	11.90	0	0	0	0	0.00	0.00	4.00	15-20	10+
5/7/2018	8088	18	Sacramento	20.00	19.20	1130	1330	7.90	8.00	0	0	0	0	0.00	0.00	160.00	5-15	0-2
5/7/2018	8088	20	Sacramento	19.90	19.80	1330	1430	10.40	7.20	0	0	0	0	0.00	0.00	124.00	5-15	0-2
5/7/2018	9011	209	Sacramento	19.10	19.00	1028	1049	9.10	8.40	0	0	0	0	0.00	0.00	16.00	5-15	2-4
5/7/2018	9011	286	Sacramento	19.10	19.70	1134	1235	8.60	8.80	0	0	0	0	0.00	0.00	32.00	5-15	4-6

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
5/9/2018	0025	22	Sacramento	18.60	21.30	830	1330	11.40	10.40	0	0	0	0	0.00	0.00	140.00	10-20	10+
5/9/2018	3420	214	Sacramento	19.10	19.30	900	1100	8.50	8.70	0	0	0	0	0.00	0.00	48.00	5	2-4
5/9/2018	3420	216	Sacramento	19.20	19.40	1200	1400	8.60	8.40	0	0	0	0	0.00	0.00	60.00	5	4-6
5/10/2018	9011	141	Sacramento	19.90	21.10	1500	1515	8.40	9.30	0	0	0	0	0.00	0.00	44.00	5-20	4-6
5/10/2018	9011	241	Sacramento	21.30	21.30	1245	1245	11.60	15.20	0	0	0	0	0.00	0.00	56.00	5-20	0-2
5/10/2018	9011	252	Sacramento	21.20	19.90	1019	1105	9.70	9.50	0	0	0	0	0.00	0.00	8.00	5-20	2-4
5/14/2018	0080	18	Sacramento	20.00	20.10	1200	1430	7.60	7.90	0	0	0	0	0.00	0.00	240.00	5-15	10+
5/14/2018	0080	20	Sacramento	20.50	20.90	1430	1530	9.60	9.00	0	0	0	0	0.00	0.00	184.00	5-15	10+
5/14/2018	9011	209	Sacramento	18.40	19.10	941	1025	8.00	7.60	0	0	0	0	0.00	0.00	16.00	7.5-15	8-10
5/14/2018	9011	286	Sacramento	19.30	21.40	1103	1221	8.30	10.50	0	0	0	0	0.00	0.00	44.00	7.5-15	10+
5/16/2018	0025	22	Sacramento	16.80	18.60	800	1500	11.60	10.50	0	0	0	0	0.00	0.00	68.00	15-20	10+
5/16/2018	9011	214	Sacramento	19.30	19.30	1400	1400	9.30	5.90	0	0	0	0	0.00	0.00	48.00	5	2-4
5/16/2018	9011	216	Sacramento	20.30	20.90	1430	1500	10.10	9.20	0	0	0	0	0.00	0.00	60.00	5	6-8
5/17/2018	0025	141	Sacramento	17.30	17.40	800	830	10.60	10.50	0	0	0	0	0.00	0.00	44.00	5-20	8-10
5/17/2018	0025	241	Sacramento	18.00	18.00	900	930	10.70	10.70	0	0	0	0	0.00	0.00	56.00	5-20	10+
5/17/2018	0025	252	Sacramento	19.80	20.80	1030	1100	9.10	11.90	0	0	0	0	0.00	0.00	8.00	5-20	4-6
5/21/2018	9011	209	Sacramento	18.90	19.30	900	930	7.20	7.30	0	0	0	0	0.00	0.00	8.00	7.5-10	2-4
5/21/2018	9011	286	Sacramento	19.50	20.40	1000	1130	7.70	9.70	0	0	0	0	0.00	0.00	60.00	7.5-10	4-6
5/22/2018	9011	18	Sacramento	19.30	21.50	900	1230	8.40	8.80	0	0	0	0	0.00	0.00	68.00	7.5-20	2-4
5/23/2018	0025	141	Sacramento	17.40	17.40	830	900	7.70	7.70	0	0	0	0	0.00	0.00	60.00	10-20	10+
5/23/2018	0025	241	Sacramento	19.50	19.40	900	930	8.80	9.50	0	0	0	0	0.00	0.00	56.00	10-20	10+
5/23/2018	0025	252	Sacramento	19.00	19.30	1030	1030	8.50	8.70	0	0	0	0	0.00	0.00	24.00	10-20	10+
5/23/2018	8929	214	Sacramento	20.30	20.90	1100	1200	9.70	11.70	0	0	0	0	0.00	0.00	72.00	7.5	4-6
5/23/2018	8929	216	Sacramento	21.50	21.00	1200	1300	9.40	1.80	0	0	0	0	0.00	0.00	92.00	7.5	8-10
5/24/2018	0090	22	Sacramento	19.30	19.80	1100	1400	9.20	10.00	0	0	0	0	0.00	0.00	220.00	20 ppb	4-6
5/24/2018	0090	176	Sacramento	19.40	19.60	1130	1200	9.00	8.20	0	0	0	0	0.00	0.00	136.00	20 ppb	6-8
5/29/2018	9011	286	Sacramento	21.30	23.50	1009	1116	8.20	8.40	0	0	0	0	0.00	0.00	60.00	10	2-4
5/30/2018	0006	252	Sacramento	23.20	19.10	900	1330	7.20	9.70	0	0	0	0	0.00	0.00	24.00	7.5-15	10+
5/30/2018	9011	209	Sacramento	21.70	21.20	1236	1252	9.50	7.70	0	0	0	0	0.00	0.00	8.00	7.5	10+
5/30/2018	9011	214	Sacramento	20.60	20.60	909	944	8.40	7.70	0	0	0	0	0.00	0.00	72.00	7.5	0-2
5/30/2018	9011	216	Sacramento	21.30	21.70	1015	1103	9.10	12.20	0	0	0	0	0.00	0.00	92.00	7.5	6-8
5/31/2018	9011	18	Sacramento	20.80	21.50	1142	1325	8.50	10.20	0	0	0	0	0.00	0.00	192.00	7.5-20	2.8
5/31/2018	9011	20	Sacramento	19.20	20.60	958	1115	7.50	10.40	0	0	0	0	0.00	0.00	184.00	7.5-20	10+
5/1/2018	0055	92	San Joaquin	19.50	20.10	1230	1330	9.30	10.30	0	0	0	0	0.00	0.00	0.00	10-15	4-6
5/1/2018	3420	14	San Joaquin	17.90	18.40	900	1130	9.10	9.50	0	0	0	0	0.00	0.00	380.00	10-15	2-4
5/1/2018	3420	15	San Joaquin	18.50	18.60	1130	1230	9.30	9.20	0	0	0	0	0.00	0.00	72.00	10-15	6-8
5/1/2018	9011	32	San Joaquin	16.20	18.30	914	1100	7.30	10.40	0	0	0	0	0.00	0.00	344.00	5-10	10+
5/2/2018	0080	37	San Joaquin	0.00	0.00	900	1030	0.00	0.00	0	0	0	0	0.00	0.00	372.00	5-10	4-6
5/2/2018	0080	38	San Joaquin	0.00	0.00	1130	1300	0.00	0.00	0	0	0	0	0.00	0.00	180.00	5-10	4-6
5/2/2018	0090	203	San Joaquin	18.20	18.40	1100	1230	9.60	9.10	0	0	0	0	0.00	0.00	412.00	5	2-4
5/2/2018	0090	205	San Joaquin	17.20	17.40	930	1030	9.60	9.40	0	0	0	0	0.00	0.00	216.00	5	2-4
5/3/2018	0090	26	San Joaquin	19.00	19.30	900	1000	7.30	7.50	0	0	0	0	0.00	0.00	72.00	5	2-4
5/7/2018	0055	87	San Joaquin	21.50	23.30	1300	1400	9.10	9.60	0	0	0	0	0.00	0.00	10.00	5-15	2-4
5/7/2018	3420	8	San Joaquin	18.70	19.20	800	930	7.70	7.90	0	0	0	0	0.00	0.00	55.00	5-10	2-4
5/7/2018	3420	10	San Joaquin	19.40	19.40	1030	1130	8.50	9.60	0	0	0	0	0.00	0.00	80.00	5-10	2-4
5/7/2018	8088	40	San Joaquin	20.00	19.80	930	1100	7.70	10.00	0	0	0	0	0.00	0.00	348.00	5-15	0-2
5/7/2018	8835	62	San Joaquin	20.50	19.90	900	1230	8.92	7.82	0	0	0	0	0.00	0.00	124.00	5	8-10
5/8/2018	0055	92	San Joaquin	21.80	22.30	1330	1400	9.60	7.50	0	0	0	0	0.00	0.00	28.00	5	4-6
5/8/2018	3420	14	San Joaquin	19.20	19.60	900	1130	8.80	8.00	0	0	0	0	0.00	0.00	340.00	5-10	2-4
5/8/2018	3420	15	San Joaquin	19.00	19.10	815	845	9.60	9.70	0	0	0	0	0.00	0.00	36.00	5-10	2-4
5/8/2018	8929	32	San Joaquin	19.60	21.60	800	1030	9.50	9.40	0	0	0	0	0.00	0.00	344.00	5	0-2
5/9/2018	0080	34	San Joaquin	19.90	20.10	830	930	10.60	9.90	0	0	0	0	0.00	0.00	212.00	5-15	2-4
5/9/2018	0080	36	San Joaquin	20.10	20.20	930	1000	11.10	10.10	0	0	0	0	0.00	0.00	40.00	5-15	4-6
5/9/2018	0080	37	San Joaquin	19.80	20.10	1000	1100	10.80	9.10	0	0	0	0	0.00	0.00	372.00	5-15	2-4
5/9/2018	0080	38	San Joaquin	20.50	20.40	1100	1200	9.70	9.70	0	0	0	0	0.00	0.00	272.00	5-15	2-4
5/9/2018	0090	203	San Joaquin	16.50	17.00	900	1100	10.00	10.40	0	0	0	0	0.00	0.00	412.00	5	4-6
5/9/2018	0090	207	San Joaquin	17.40	18.20	1115	1230	9.20	9.00	0	0	0	0	0.00	0.00	144.00	5	6-8
5/9/2018	9122	30	San Joaquin	20.80	21.50	830	930	8.52	8.30	0	0	0	0	0.00	0.00	60.00	5	2-4
5/9/2018	9122	31	San Joaquin	21.30	21.70	930	1115	8.41	8.81	0	0	0	0	0.00	0.00	112.00	5	4-6
5/10/2018	0025	26	San Joaquin	21.00	21.40	930	1130	8.58	8.64	0	0	0	0	0.00	0.00	72.00	5	2-4
5/14/2018	0055	87	San Joaquin	22.00	21.90	1330	1400	8.10	7.90	0	0	0	0	0.00	0.00	3.00	10	0-2
5/14/2018	0080	40	San Joaquin	21.10	20.00	830	1130	10.00	12.50	0	0	0	0	0.00	0.00	356.00	5-15	10+
5/14/2018	3420	8	San Joaquin	20.10	20.10	830	945	9.30	9.60	0	0	0	0	0.00	0.00	188.00	7.5-15	4-6
5/14/2018	3420	10	San Joaquin	21.10	21.40	1030	1230	9.00	8.60	0	0	0	0	0.00	0.00	88.00	7.5-15	4-6
5/15/2018	3420	14	San Joaquin	21.20	21.60	830	1130	9.00	8.60	0	0	0	0	0.00	0.00	376.00	7.5-15	4-6
5/15/2018	3420	15	San Joaquin	21.70	22.10	1200	1230	8.40	8.10	0	0	0	0	0.00	0.00	52.00	7.5-15	6-8
5/15/2018	9011	32	San Joaquin	18.50	21.40	730	1330	8.40	9.30	0	0	0	0	0.00	0.00	520.00	7.5	8-10
5/16/2018	0055	92	San Joaquin	20.50	20.30	900	1000	7.80	6.30	0	0	0	0	0.00	0.00	43.00	5-7.5	4-6
5/16/2018	0090	203	San Joaquin	15.30	15.60	930	1030	10.20	10.50	0	0	0	0	0.00	0.00	412.00	5	4-6
5/16/2018	0090	207	San Joaquin	15.90	16.10	1100	1230	9.80	9.00	0	0	0	0	0.00	0.00	144.00	5	4-6
5/16/2018	0800	34	San Joaquin	20.10	20.00	730	830	9.60	8.90	0	0	0	0	0.00	0.00	212.00	5-10	4-6
5/16/2018	0800	36	San Joaquin	20.10	20.70	830	900	10.20	9.90	0	0	0	0	0.00	0.00	60.00	5-10	10+
5/16/2018	0800	37	San Joaquin	20.60	20.50	900	1030	8.60	9.10	0	0	0	0	0.00	0.00	560.00	5-10	10+
5/16/2018	0800	38	San Joaquin	20.60	20.50	1030	1100	8.80	9.70	0	0	0	0	0.00	0.00	180.00	5-10	10+
5/16/2018	9011	30	San Joaquin	19.10	19.80	930	1030	8.30	8.40	0	0	0	0	0.00	0.00	60.00	5	2-4
5/16/2018	9011	31	San Joaquin	19.80	19.80	1030	1130	8.30	7.80	0	0	0	0	0.00	0.00	112.00	5	6-8
5/17/2018	0090	26	San Joaquin	20.10	20.30	930	1030	7.00	7.20	0	0	0	0	0.00	0.00	72.00	5	2-4
5/21/2018	0006	62	San Joaquin	18.80	18.20	900	1130	7.20	7.70	0	0	0	0	0.00	0.00	124.00	5	0-2
5/21/2018	3420	8	San Joaquin	21.20	22.40	800	930	8.50	8.50	0	0	0	0	0.00	0.00	92.00	5-10	0-2
5/21/2018	3420	10	San Joaquin	22.50	22.70	1000	1130	8.30	9.30	0	0	0	0	0.00	0.00	80.00	5-10	0-2
5/21/2018	8088	40	San Joaquin	21.60	21.60	900	1130	9.10	8.90	0	0	0	0	0.00	0.00	240.00	5-10	0-2
5/22/2018	3420	14	San Joaquin	19.80	20.20	830	1100	7.50	8.60	0	0	0	0	0.00	0.00	288.00	7.5-15	0-2
5/22/2018	3420	15	San Joaquin	20.30	20.60	1130	1200	8.80	9.10	0	0	0	0	0.00	0.00	72.00	7.5-15	0-2
5/22/2018	9011	32	San Joaquin	25.90	23.20	1230	1330	9.40	14.40	0	0	0	0	0.00	0.00	520.00	7.5-20	6-8

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
5/23/2018	0055	87	San Joaquin	19.80	19.10	1000	1100	8.30	8.50	0	0	0	0	0.00	0.00	8.00	7.5-15	8-10
5/23/2018	0055	92	San Joaquin	23.30	23.50	1300	1400	7.10	6.80	0	0	0	0	0.00	0.00	44.00	7.5-15	2-4
5/23/2018	0090	203	San Joaquin	18.50	18.90	930	1030	8.70	8.20	0	0	0	0	0.00	0.00	412.00	5-15	6-8
5/23/2018	0090	205	San Joaquin	18.20	18.60	1100	1200	9.20	9.00	0	0	0	0	0.00	0.00	216.00	5-15	6-8
5/23/2018	0090	207	San Joaquin	18.70	18.30	1230	1330	9.10	9.40	0	0	0	0	0.00	0.00	432.00	5-15	6-8
5/23/2018	8088	30	San Joaquin	22.00	22.10	1300	1330	10.00	10.10	0	0	0	0	0.00	0.00	88.00	5-15	2-4
5/23/2018	8088	31	San Joaquin	21.80	21.40	1330	1400	9.60	8.10	0	0	0	0	0.00	0.00	112.00	5-15	0-2
5/23/2018	8088	34	San Joaquin	21.90	21.90	800	930	9.60	9.90	0	0	0	0	0.00	0.00	316.00	5-15	0-2
5/23/2018	8088	36	San Joaquin	21.80	21.90	930	1000	10.00	9.70	0	0	0	0	0.00	0.00	60.00	5-15	2-4
5/23/2018	8088	37	San Joaquin	21.90	22.00	1000	1130	9.10	8.80	0	0	0	0	0.00	0.00	560.00	5-15	2-4
5/23/2018	8088	38	San Joaquin	21.70	21.80	1130	1230	10.00	9.60	0	0	0	0	0.00	0.00	272.00	5-15	6-8
5/29/2018	0006	62	San Joaquin	25.00	25.20	1130	1445	6.70	6.80	0	0	0	0	0.00	0.00	0.00	5	2-4
5/29/2018	0055	87	San Joaquin	24.50	25.90	1300	1400	8.10	7.40	0	0	0	0	0.00	0.00	10.00	10-15	0-2
5/29/2018	0090	8	San Joaquin	21.30	21.20	800	830	8.50	9.10	645194	4202216	644746	4202367	0.00	0.00	76.00	5-10	0-2
5/29/2018	0090	10	San Joaquin	21.90	22.30	900	1030	9.00	8.50	643185	4204701	639820	4205975	0.00	0.00	80.00	5-10	0-2
5/30/2018	3420	14	San Joaquin	22.50	22.50	900	1115	9.20	9.10	0	0	0	0	0.00	0.00	288.00	7.5-15	0-2
5/30/2018	3420	15	San Joaquin	22.60	22.80	1130	1230	8.80	8.60	0	0	0	0	0.00	0.00	72.00	7.5-15	2-4
5/30/2018	8088	38	San Joaquin	22.60	22.30	1300	1400	9.70	8.80	0	0	0	0	0.00	0.00	272.00	15	4-6
5/30/2018	9011	32	San Joaquin	25.10	23.60	1404	1525	13.60	8.10	0	0	0	0	0.00	0.00	520.00	7.5	10+
5/31/2018	0055	92	San Joaquin	21.50	24.10	930	1030	7.40	7.90	0	0	0	0	0.00	0.00	43.00	7.5	6-8
5/31/2018	8088	34	San Joaquin	22.10	21.60	730	830	9.10	8.80	0	0	0	0	0.00	0.00	212.00	5-15	0-2
5/31/2018	8088	36	San Joaquin	22.40	22.30	830	900	9.10	9.30	0	0	0	0	0.00	0.00	40.00	5-15	0-2
5/31/2018	8088	37	San Joaquin	22.50	22.50	900	1000	10.00	7.90	0	0	0	0	0.00	0.00	560.00	5-15	4-6
5/31/2018	8088	38	San Joaquin	22.20	22.30	1300	1400	9.30	8.80	0	0	0	0	0.00	0.00	272.00	5-15	0-2
5/31/2018	8088	40	San Joaquin	22.80	22.90	1030	1330	9.20	9.30	0	0	0	0	0.00	0.00	240.00	5-15	0-2
5/2/2018	0025	140	Solano	15.70	15.70	800	830	11.20	11.20	0	0	0	0	0.00	0.00	36.00	10	4-6
5/2/2018	0025	251	Solano	17.10	17.20	900	930	10.20	10.00	0	0	0	0	0.00	0.00	32.00	10	4-6
5/2/2018	0025	252	Solano	17.50	17.60	930	1000	10.60	10.60	0	0	0	0	0.00	0.00	28.00	10	4-6
5/7/2018	0025	272	Solano	16.50	17.50	800	930	11.10	12.40	0	0	0	0	0.00	0.00	616.00	5-15	4-6
5/7/2018	0025	284	Solano	16.90	18.10	1000	1030	11.90	9.70	0	0	0	0	0.00	0.00	20.00	5-15	4-6
5/9/2018	0025	176	Solano	18.20	18.50	830	930	12.00	12.20	0	0	0	0	0.00	0.00	136.00	10-20	10+
5/10/2018	9011	140	Solano	21.30	21.50	1420	1445	8.30	8.50	0	0	0	0	0.00	0.00	16.00	5-20	6-8
5/10/2018	9011	251	Solano	20.20	20.40	1158	1217	8.50	10.80	0	0	0	0	0.00	0.00	16.00	5-20	4-6
5/10/2018	9011	252	Solano	20.20	20.60	1118	1135	11.10	7.80	0	0	0	0	0.00	0.00	12.00	5-20	4-6
5/14/2018	0025	272	Solano	17.80	17.80	830	1000	11.30	10.90	0	0	0	0	0.00	0.00	616.00	10-15	10+
5/14/2018	0025	284	Solano	17.60	17.80	1000	1030	11.60	11.20	0	0	0	0	0.00	0.00	64.00	10-15	10+
5/16/2018	0025	176	Solano	16.50	16.30	800	900	11.80	11.90	0	0	0	0	0.00	0.00	136.00	15-20	10+
5/17/2018	0025	140	Solano	17.30	17.30	830	830	10.20	10.20	0	0	0	0	0.00	0.00	24.00	5-20	10+
5/17/2018	0025	251	Solano	18.90	18.70	1000	1000	10.40	10.20	0	0	0	0	0.00	0.00	16.00	5-20	6-8
5/17/2018	0025	252	Solano	19.70	19.40	1000	1000	10.30	10.00	0	0	0	0	0.00	0.00	12.00	5-20	4-6
5/23/2018	0025	140	Solano	17.90	17.90	730	800	9.00	9.00	0	0	0	0	0.00	0.00	68.00	10-20	10+
5/23/2018	0025	251	Solano	19.50	19.50	1130	1200	9.10	9.10	0	0	0	0	0.00	0.00	32.00	10-20	10+
5/23/2018	0025	252	Solano	19.00	19.50	1100	1130	8.60	8.60	0	0	0	0	0.00	0.00	28.00	10-20	10+
5/24/2018	0025	272	Solano	18.10	17.90	800	930	8.90	9.70	0	0	0	0	0.00	0.00	60.00	20	10+
5/24/2018	0025	284	Solano	17.20	17.10	1030	1100	8.90	8.80	0	0	0	0	0.00	0.00	88.00	20	10+
5/30/2018	0006	251	Solano	18.60	18.70	1100	1200	9.10	8.90	0	0	0	0	0.00	0.00	24.00	7.5-15	10+
5/30/2018	0006	252	Solano	18.90	19.00	1000	1030	7.80	9.00	0	0	0	0	0.00	0.00	28.00	7.5-15	10+
														1552.00	3134.00	43707.00		

Table D-4. Daily Logs for June 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	FluridoneQ	FluridonePR	FluridoneO	Herbicide Rate	Wind Speed
6/5/2018	9122	79	Alameda	22.10	22.80	1145	1430	7.98	8.84	0	0	0	0	0.00	0.00	24.00	5	4-6
6/11/2018	006	79	Alameda	20.20	20.00	1300	1400	6.80	7.60	626765	4185670	626783	4185755	0.00	0.00	24.00	5.0	10+
6/18/2018	8835	79	Alameda	21.90	22.10	1230	1400	6.84	7.04	626873	4185683	626767	4185683	0.00	0.00	24.00	5	6-8
6/25/2018	0006	79	Alameda	23.02	22.90	1230	1430	7.20	6.50	0	0	0	0	0.00	45.00	0.00	10-15	4-6
6/4/2018	0055	87	Contra Costa	23.50	23.70	1130	1230	7.60	7.40	0	0	0	0	0.00	0.00	53.00	10-15	2-4
6/4/2018	0055	88	Contra Costa	22.40	23.00	1000	1100	7.00	7.70	0	0	0	0	0.00	0.00	16.00	10-15	0-2
6/4/2018	9012	115	Contra Costa	22.80	22.70	930	1045	8.70	8.70	0	0	0	0	0.00	0.00	324.00	5-15	10+
6/4/2018	9012	116	Contra Costa	22.90	22.70	1045	1200	8.60	8.50	0	0	0	0	0.00	0.00	512.00	5-15	10+
6/4/2018	9012	117	Contra Costa	23.00	23.10	1200	1330	8.60	8.50	0	0	0	0	0.00	0.00	472.00	5-15	10+
6/5/2018	0025	107	Contra Costa	22.30	22.60	900	1030	8.40	8.00	0	0	0	0	0.00	0.00	784.00	15	10+
6/5/2018	0055	93	Contra Costa	23.70	24.10	1000	1330	7.40	7.90	0	0	0	0	0.00	608.00	0.00	5	0-2
6/5/2018	9012	108	Contra Costa	23.00	23.30	1000	1030	7.90	7.70	0	0	0	0	104.00	0.00	0.00	5-7.5	10+
6/5/2018	9012	109	Contra Costa	23.10	23.40	1030	1100	7.80	8.00	0	0	0	0	324.00	0.00	0.00	5-7.5	10+
6/5/2018	9012	110	Contra Costa	24.00	24.30	1200	1300	8.20	8.10	0	0	0	0	0.00	0.00	328.00	5-7.5	10+
6/5/2018	9012	111	Contra Costa	24.10	24.00	1300	1330	7.90	8.30	0	0	0	0	0.00	0.00	10.00	5-7.5	10+
6/6/2018	0055	91	Contra Costa	23.70	23.40	1100	1230	6.63	6.24	0	0	0	0	0.00	0.00	68.00	7.5	2-4
6/7/2018	0055	112	Contra Costa	22.80	22.60	1000	1030	8.00	7.50	0	0	0	0	0.00	0.00	56.00	10-15	10+
6/7/2018	0055	119	Contra Costa	22.60	22.60	1100	1115	7.70	7.80	0	0	0	0	0.00	0.00	40.00	10-15	10+
6/7/2018	0055	120	Contra Costa	22.80	23.00	1115	1300	7.90	7.90	0	0	0	0	0.00	0.00	92.00	10-15	10+
6/11/2018	0055	115	Contra Costa	21.50	21.60	930	1030	7.70	7.80	614945	4208128	613624	4208116	0.00	0.00	324.00	5-7.5	2-4
6/11/2018	0055	116	Contra Costa	21.70	21.80	1100	1330	8.00	8.10	613135	4208077	612126	4207906	0.00	0.00	512.00	5-7.5	4-6
6/11/2018	0090	117	Contra Costa	21.70	22.60	930	1100	7.60	7.90	0	0	0	0	0.00	0.00	472.00	10-15	2-4
6/12/2018	0037	107	Contra Costa	22.40	23.00	800	930	8.10	8.30	0	0	0	0	0.00	0.00	524.00	10	2-4
6/12/2018	0090	174	Contra Costa	21.20	22.00	930	1230	8.50	8.90	0	0	0	0	0.00	0.00	840.00	5	2-4
6/12/2018	0800	173	Contra Costa	24.00	24.00	900	1030	9.60	8.80	622734	4210232	622418	4210554	0.00	0.00	416.00	5	0-2
6/12/2018	0800	174	Contra Costa	24.10	24.10	1030	1200	10.10	10.10	622482	420937	622481	4210939	0.00	0.00	856.00	5	0-2
6/12/2018	9012	108	Contra Costa	21.30	21.30	915	1000	8.60	8.60	0	0	0	0	0.00	0.00	140.00	7.5-15	4-6
6/12/2018	9012	109	Contra Costa	21.40	21.40	1000	1045	8.70	8.90	0	0	0	0	0.00	0.00	432.00	7.5-15	2-4
6/12/2018	9012	110	Contra Costa	21.20	21.30	1100	1200	8.50	8.50	0	0	0	0	0.00	0.00	496.00	7.5-15	4-6
6/12/2018	9012	111	Contra Costa	21.40	21.50	1200	1300	8.40	8.60	0	0	0	0	0.00	0.00	116.00	7.5-15	4-6
6/13/2018	0025	91	Contra Costa	23.80	24.30	1400	1500	7.82	8.81	0	0	0	0	0.00	0.00	68.00	5-7.5	2-4
6/13/2018	0025	93	Contra Costa	22.80	23.20	945	1300	8.25	7.95	0	0	0	0	0.00	609.00	0.00	5-7.5	2-4
6/13/2018	9123	87	Contra Costa	23.70	23.60	1130	1230	7.20	7.40	0	0	0	0	0.00	0.00	52.00	10-15	0-2
6/13/2018	9123	88	Contra Costa	23.80	24.30	1300	1330	8.10	7.00	0	0	0	0	0.00	0.00	16.00	10-15	0-2
6/14/2018	0025	97	Contra Costa	22.60	23.40	830	1200	7.82	8.15	624525	4203726	623487	4203885	0.00	0.00	516.00	0	2-4
6/14/2018	9012	112	Contra Costa	21.00	20.90	930	1030	8.80	8.90	616072	4207576	616051	4207564	0.00	0.00	56.00	10-15	10+
6/14/2018	9012	119	Contra Costa	20.40	21.20	1030	1100	8.70	8.90	609706	4208481	609708	4208501	0.00	0.00	40.00	10-15	10+
6/14/2018	9012	120	Contra Costa	21.20	21.60	1100	1330	8.70	8.90	609279	4208728	608968	4208716	0.00	0.00	92.00	10-15	10+
6/18/2018	0025	87	Contra Costa	23.10	24.40	1130	1230	7.76	6.88	0	0	0	0	0.00	53.00	0.00	15	0-2
6/18/2018	0025	88	Contra Costa	23.70	22.40	1000	1100	6.94	7.14	0	0	0	0	0.00	24.00	0.00	15	0-2
6/18/2018	0090	117	Contra Costa	21.40	22.40	900	1130	9.10	9.10	0	0	0	0	0.00	696.00	0.00	15	6-8
6/18/2018	9012	115	Contra Costa	22.20	22.60	1130	1330	8.80	8.60	0	0	0	0	0.00	645.00	0.00	10-15	8-10
6/18/2018	9012	116	Contra Costa	21.40	22.00	930	1130	9.00	8.70	0	0	0	0	0.00	1026.00	0.00	10-15	6-8
6/19/2018	0025	93	Contra Costa	24.70	25.30	930	1330	8.03	7.52	0	0	0	0	0.00	608.00	0.00	5	0-2
6/19/2018	0037	107	Contra Costa	22.60	22.80	800	1030	8.00	8.10	0	0	0	0	0.00	783.00	0.00	15	10+
6/19/2018	0090	174	Contra Costa	22.10	23.40	930	1230	8.10	8.90	0	0	0	0	0.00	0.00	780.00	15	2-4
6/19/2018	0800	173	Contra Costa	25.30	25.10	1100	1200	9.70	9.60	0	0	0	0	0.00	0.00	404.00	5	4-6
6/19/2018	0800	174	Contra Costa	24.60	25.10	900	1100	10.20	9.10	0	0	0	0	0.00	0.00	1072.00	5	2-4
6/19/2018	9012	108	Contra Costa	23.10	23.20	930	1030	8.10	8.40	0	0	0	0	0.00	0.00	140.00	5-15	6-8
6/19/2018	9012	109	Contra Costa	23.20	23.10	1030	1100	8.20	8.30	0	0	0	0	0.00	0.00	216.00	5-15	8-10
6/19/2018	9012	110	Contra Costa	23.60	23.70	1130	1215	8.90	8.90	0	0	0	0	0.00	990.00	0.00	5-15	8-10
6/19/2018	9012	111	Contra Costa	24.00	23.60	1215	1330	8.40	8.80	0	0	0	0	0.00	117.00	0.00	5-15	8-10
6/21/2018	0025	91	Contra Costa	24.70	24.10	1200	1430	6.70	7.55	0	0	0	0	0.00	91.00	0.00	10-15	0-2
6/21/2018	9012	112	Contra Costa	21.00	21.10	900	1000	8.80	8.90	616005	4207646	616067	4207186	0.00	84.00	0.00	15	8-10
6/21/2018	9012	119	Contra Costa	21.20	21.20	1000	1100	8.60	8.90	609748	4208595	609708	4208480	0.00	39.00	0.00	15	8-10
6/21/2018	9012	120	Contra Costa	20.10	21.90	1100	1330	8.80	8.40	609503	4208681	608938	4208718	0.00	93.00	0.00	15	8-10
6/25/2018	0025	87	Contra Costa	24.90	25.20	1030	1130	6.90	7.70	0	0	0	0	0.00	53.00	0.00	15	4-6
6/25/2018	0025	88	Contra Costa	25.70	26.30	1230	1330	11.03	9.40	0	0	0	0	0.00	24.00	0.00	15	2-4
6/25/2018	0090	117	Contra Costa	21.30	22.00	930	1130	9.20	8.40	0	0	0	0	0.00	696.00	0.00	15	4-6
6/25/2018	9012	115	Contra Costa	22.00	22.20	930	1045	8.10	8.00	0	0	0	0	0.00	966.00	0.00	15	8-10
6/25/2018	9012	116	Contra Costa	22.30	22.50	1100	1315	7.90	7.80	0	0	0	0	0.00	1026.00	0.00	15	8-10
6/26/2018	0025	173	Contra Costa	22.80	23.20	900	1300	8.20	7.90	0	0	0	0	0.00	1247.00	0.00	15	2-4
6/26/2018	0037	107	Contra Costa	23.50	23.60	830	1000	8.10	8.30	0	0	0	0	0.00	783.00	0.00	15	6-8
6/26/2018	0090	174	Contra Costa	22.10	23.20	930	1330	8.20	8.90	0	0	0	0	0.00	5136.00	0.00	15	2-4
6/26/2018	9012	108	Contra Costa	22.90	23.20	1130	1200	7.90	7.80	0	0	0	0	0.00	0.00	104.00	7.5-15	2-4
6/26/2018	9012	109	Contra Costa	23.10	23.30	1200	1300	7.70	7.60	0	0	0	0	0.00	0.00	324.00	7.5-15	4-6
6/26/2018	9012	110	Contra Costa	23.00	23.10	930	1030	7.60	7.70	0	0	0	0	0.00	990.00	0.00	7.5-15	2-4
6/26/2018	9012	111	Contra Costa	23.10	23.20	1030	1100	7.50	7.70	0	0	0	0	0.00	117.00	0.00	7.5-15	2-4
6/27/2018	0025	91	Contra Costa	24.10	24.70	900	1030	7.30	7.50	626218	4200054	625669	4200085	0.00	91.00	0.00	7.5	0-2
6/27/2018	0025	97	Contra Costa	25.20	25.60	1200	1400	7.60	7.80	621239	4204145	623722	4203679	0.00	0.00	0.00	7.5	2-4
6/28/2018	9012	112	Contra Costa	22.00	22.10	915	1000	8.40	8.40	0	0	0	0	0.00	84.00	0.00	15	6-8
6/28/2018	9012	119	Contra Costa	22.00	22.20	1030	1045	8.30	8.00	0	0	0	0	0.00	39.00	0.00	15	6-8
6/28/2018	9012	120	Contra Costa	22.10	22.50	1100	1315	8.30	8.00	0	0	0	0	0.00	96.00	0.00	15	6-8
6/11/2018	9011	286	Merced	21.60	24.00	1303	1403	8.00	10.00	0	0	0	0	0.00	0.00	44.00	7.5	4-6
6/4/2018	3420	18	Sacramento	21.30	21.60	1130	1330	8.20	9.30	0	0	0	0	0.00	0.00	176.00	7.5-15	2-4
6/4/2018	9011	20	Sacramento	22.20	23.50	1024	1135	7.00	9.00	0	0	0	0	0.00	0.00	184.00	7.5	10+
6/4/2018	9011	209	Sacramento	23.50	22.90	1449	1501	10.40	10.10	0	0	0	0	0.00	0.00	8.00	7.5	10+
6/4/2018	9011	286	Sacramento	22.90	22.30	1326	1419	8.40	10.50	0	0	0	0	0.00	0.00	44.00	7.5	10+
6/6/2018	0025	141	Sacramento	22.00	22.00	900	930	8.30	8.30	0	0	0	0	0.00	0.00	60.00	10-20	6-8
6/6/2018	0025	241	Sacramento	20.40	20.40	930	1000	9.20	9.20	0	0	0	0	0.00	0.00	56.00	10-20	8-10
6/6/2018	0025	252	Sacramento	22.00	23.40	1130	1200	8.40	7.00	0	0	0	0	0.00	0.00	20.00	10-20	10+
6/6/2018	9011	214	Sacramento	22.40	23.30	1017	1100	11.70	15.00	0	0	0	0	0.00	0.00	72.00	7.5	4-6
6/6/2018	9011	216	Sacramento	23.40	23.60	1209	1302	10.70	12.80	0	0	0	0	0.00	0.00	92.00	7.5	6-8
6/7/2018	0006	22	Sacramento	19.70	19.90	900	1500	7.20	6.30	0	0	0	0	0.00	0.00	220.00	20	6-8

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	0	0	104	Herbicide Rate	Wind Speed
6/11/2018	0800	18	Sacramento	24.10	24.70	1000	1400	7.90	11.60	0	0	0	0	0.00	0.00	176.00	7.5-15	4-6
6/11/2018	0800	20	Sacramento	24.10	24.10	830	930	8.60	9.30	0	0	0	0	0.00	0.00	184.00	7.5-15	2-4
6/11/2018	9011	209	Sacramento	22.10	21.00	1201	1216	8.80	7.90	0	0	0	0	0.00	0.00	8.00	7.5	6-8
6/13/2018	0637	241	Sacramento	20.60	20.60	730	800	9.20	9.40	0	0	0	0	0.00	0.00	56.00	10-20	4-6
6/13/2018	0637	252	Sacramento	23.50	23.70	930	1000	7.60	7.70	0	0	0	0	0.00	0.00	20.00	10-20	4-6
6/13/2018	9011	214	Sacramento	22.90	24.00	1002	1002	7.00	7.70	0	0	0	0	0.00	0.00	72.00	7.5	0-2
6/13/2018	9011	216	Sacramento	25.20	26.50	1114	1202	8.90	9.10	0	0	0	0	0.00	0.00	92.00	7.5	2-4
6/14/2018	0037	22	Sacramento	21.70	21.60	900	1000	9.00	9.10	0	0	0	0	0.00	0.00	220.00	20	8-10
6/14/2018	0037	176	Sacramento	21.70	21.40	800	900	9.20	9.00	0	0	0	0	0.00	0.00	136.00	20	6-8
6/18/2018	0800	18	Sacramento	24.30	23.90	930	1230	8.80	8.10	0	0	0	0	0.00	195.00	0.00	10-20	2-4
6/18/2018	0800	20	Sacramento	24.10	24.30	800	900	9.10	8.90	0	0	0	0	0.00	246.00	0.00	10-20	2-4
6/18/2018	9011	209	Sacramento	21.40	21.90	930	1001	7.00	6.90	0	0	0	0	0.00	12.00	0.00	10-15	6-8
6/18/2018	9011	286	Sacramento	21.80	24.40	1037	1209	7.90	7.50	0	0	0	0	0.00	90.00	0.00	10-15	2-4
6/20/2018	0037	141	Sacramento	22.00	22.00	900	930	8.70	8.40	0	0	0	0	0.00	15.00	0.00	5-20	10+
6/20/2018	0037	241	Sacramento	21.50	21.50	930	1000	9.00	9.00	0	0	0	0	0.00	0.00	44.00	5-20	10+
6/20/2018	0037	252	Sacramento	23.60	23.80	1200	1230	7.20	7.50	0	0	0	0	0.00	30.00	0.00	5-20	10+
6/20/2018	9011	214	Sacramento	21.40	22.20	917	945	8.90	8.60	0	0	0	0	0.00	96.00	0.00	10	0-2
6/20/2018	9011	216	Sacramento	22.40	22.60	1011	1048	9.40	10.20	0	0	0	0	0.00	120.00	0.00	10	4-6
6/21/2018	0037	22	Sacramento	21.50	22.10	930	1030	9.20	8.60	0	0	0	0	0.00	0.00	220.00	20	10+
6/21/2018	0037	176	Sacramento	21.90	21.70	800	900	9.00	9.10	0	0	0	0	0.00	0.00	136.00	20	8-10
6/25/2018	8088	18	Sacramento	25.60	26.00	1000	1400	10.60	9.10	625405	4217601	623966	4220167	0.00	195.00	0.00	10-20	0-2
6/25/2018	8088	20	Sacramento	25.80	25.70	1100	1230	8.80	9.30	621556	4218712	621436	4219268	0.00	369.00	0.00	10-20	0-2
6/25/2018	9011	209	Sacramento	22.00	22.50	930	1030	7.30	7.10	0	0	0	0	0.00	18.00	0.00	15	2-4
6/25/2018	9011	286	Sacramento	23.00	24.50	1030	1230	8.20	8.10	0	0	0	0	0.00	120.00	0.00	15	4-6
6/27/2018	0037	241	Sacramento	23.50	23.50	830	900	8.70	8.70	0	0	0	0	0.00	0.00	56.00	15	6-8
6/27/2018	0037	252	Sacramento	23.50	23.70	1030	1100	8.10	7.90	0	0	0	0	0.00	30.00	0.00	15	10+
6/27/2018	9011	214	Sacramento	23.30	24.40	1130	1200	8.80	8.40	0	0	0	0	0.00	96.00	0.00	10	4-6
6/27/2018	9011	216	Sacramento	25.00	24.10	1230	1330	10.50	9.80	0	0	0	0	0.00	120.00	0.00	10	8-10
6/28/2018	0025	22	Sacramento	22.50	22.10	800	930	8.20	9.00	0	0	0	0	0.00	120.00	0.00	20	10+
6/4/2018	0055	87	San Joaquin	24.00	23.90	1230	1300	8.00	7.90	0	0	0	0	0.00	0.00	10.00	10-15	2-4
6/4/2018	3420	8	San Joaquin	20.20	20.50	830	930	8.20	9.30	0	0	0	0	0.00	0.00	92.00	7.5-15	2-4
6/4/2018	3420	10	San Joaquin	20.60	21.20	1000	1030	9.10	9.30	0	0	0	0	0.00	0.00	36.00	7.5-15	2-4
6/5/2018	3420	14	San Joaquin	21.30	21.70	800	1015	8.50	8.40	0	0	0	0	0.00	0.00	288.00	7.5-15	2-4
6/5/2018	3420	15	San Joaquin	21.50	21.60	1030	1130	9.10	9.30	0	0	0	0	0.00	0.00	72.00	7.5-15	2-4
6/5/2018	9011	32	San Joaquin	22.00	25.10	804	1201	8.30	9.00	0	0	0	0	0.00	0.00	520.00	7.5	2-4
														428.00	19731.00	15353.00		

Table D-5. Daily Logs for July 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
7/2/2018	0006	79	Alameda	23.20	22.70	1000	1130	6.80	7.20	626777	4185676	626883	4185663	0.00	0.00	124.00	5	4-6
7/2/2018	0025	87	Contra Costa	25.80	25.20	1300	1330	7.43	7.66	0	0	0	0	0.00	0.00	53.00	7.5-15	0-2
7/2/2018	0025	88	Contra Costa	24.90	24.80	1230	1300	7.99	7.56	0	0	0	0	0.00	0.00	16.00	7.5-15	0-2
7/2/2018	0025	91	Contra Costa	25.60	25.50	1100	1200	6.62	4.18	0	0	0	0	0.00	0.00	68.00	7.5-15	0-2
7/2/2018	0090	117	Contra Costa	21.20	21.40	930	1100	7.90	8.00	0	0	0	0	0.00	0.00	444.00	10	4-6
7/3/2018	0025	93	Contra Costa	26.60	27.10	1000	1430	8.53	7.90	0	0	0	0	0.00	609.00	0.00	5	0-2
7/3/2018	9012	108	Contra Costa	22.90	23.00	1030	1130	8.20	8.40	0	0	0	0	0.00	0.00	324.00	7.5	4-6
7/3/2018	9012	109	Contra Costa	23.20	23.20	1130	1230	7.90	8.00	0	0	0	0	0.00	0.00	104.00	7.5	4-6
7/3/2018	9123	97	Contra Costa	23.40	24.20	930	1400	8.60	8.42	0	0	0	0	0.00	0.00	384.00	7.5	2-4
7/10/2018	0025	108	Contra Costa	24.20	24.30	930	1015	8.00	8.10	621474	4208047	622289	4208856	0.00	0.00	104.00	7.5	2-4
7/10/2018	0025	109	Contra Costa	24.30	24.40	1030	1130	7.90	8.10	620506	4207676	621353	4208004	0.00	0.00	324.00	7.5	2-4
7/10/2018	0025	110	Contra Costa	24.00	24.20	1145	1300	8.00	7.80	616595	4210407	618463	4208650	0.00	0.00	496.00	7.5	4
7/10/2018	0025	111	Contra Costa	24.10	24.30	1300	1330	7.90	7.70	616273	4210661	616601	4210444	0.00	0.00	56.00	7.5	2-4
7/11/2018	3420	93	Contra Costa	24.50	25.10	900	1300	8.80	8.00	0	0	0	0	0.00	348.00	0.00	5	0-2
7/12/2018	0025	97	Contra Costa	26.10	26.20	930	1200	6.32	7.75	0	0	0	0	0.00	0.00	257.00	5	2-4
7/12/2018	9012	112	Contra Costa	23.60	25.00	1015	1100	8.30	8.50	0	0	0	0	0.00	0.00	44.00	7.5	8-10
7/17/2018	0025	108	Contra Costa	22.80	22.90	900	1000	7.50	7.70	0	0	0	0	0.00	0.00	104.00	7.5	8-10
7/17/2018	0025	109	Contra Costa	23.00	23.10	1015	1215	7.60	7.80	0	0	0	0	0.00	0.00	324.00	7.5	8-10
7/18/2018	0025	93	Contra Costa	26.00	26.90	1030	1330	7.70	8.30	0	0	0	0	0.00	348.00	0.00	5	0-2
7/18/2018	9122	97	Contra Costa	26.80	27.40	800	1300	8.42	8.60	624364	4203711	621489	4204162	0.00	0.00	384.00	7.5	2-4
7/24/2018	0025	108	Contra Costa	23.20	23.30	900	1030	7.90	8.40	0	0	0	0	0.00	0.00	104.00	7.5	4-6
7/24/2018	0025	109	Contra Costa	23.30	23.40	1030	1130	8.40	8.40	0	0	0	0	0.00	0.00	324.00	7.5	6-8
7/25/2018	0025	93	Contra Costa	25.10	24.90	900	1200	7.70	7.10	622431	4197167	622494	4195058	0.00	249.00	0.00	3.5	0-2
7/25/2018	9122	97	Contra Costa	26.30	27.10	930	1330	8.84	8.53	0	0	0	0	0.00	0.00	384.00	7.5	2-4
7/2/2018	8088	18	Sacramento	24.90	24.90	1000	1200	10.80	9.10	0	0	0	0	0.00	0.00	176.00	7.5-15	10+
7/2/2018	8088	20	Sacramento	25.10	25.00	1200	1400	9.60	8.10	0	0	0	0	0.00	0.00	184.00	7.5-15	10+
7/2/2018	9011	216	Sacramento	25.30	24.50	1430	1500	10.40	10.50	0	0	0	0	0.00	0.00	92.00	10	2-4
7/10/2018	0037	22	Sacramento	21.90	21.60	830	900	7.80	7.50	0	0	0	0	0.00	99.00	0.00	20	10+
7/10/2018	0037	176	Sacramento	21.80	21.70	730	830	8.50	8.30	0	0	0	0	0.00	0.00	136.00	20	10+
7/2/2018	0006	62	San Joaquin	24.00	23.90	1200	1530	6.60	7.10	637718	4199849	637771	4199791	0.00	0.00	24.00	5	6-8
7/2/2018	0025	87	San Joaquin	25.60	25.70	1330	1400	7.24	7.70	0	0	0	0	0.00	0.00	10.00	7.5-15	0-2
7/2/2018	0025	92	San Joaquin	24.60	24.80	1030	1100	7.10	7.44	0	0	0	0	0.00	0.00	43.00	7.5-15	0-2
7/2/2018	3420	8	San Joaquin	24.20	24.30	1130	1200	9.30	9.60	0	0	0	0	0.00	0.00	104.00	5-10	0-2
7/2/2018	3420	10	San Joaquin	24.10	24.10	1030	1100	9.60	9.50	0	0	0	0	0.00	0.00	44.00	5-10	0-2
7/2/2018	3420	26	San Joaquin	23.60	23.80	900	930	9.20	9.30	0	0	0	0	0.00	0.00	72.00	5-10	0-2
7/3/2018	0080	30	San Joaquin	25.10	25.20	900	1000	9.60	9.30	0	0	0	0	0.00	0.00	60.00	5-15	2-4
7/3/2018	0080	31	San Joaquin	25.10	25.30	1000	1100	12.10	9.00	0	0	0	0	0.00	0.00	112.00	5-15	2-4
7/3/2018	0080	38	San Joaquin	25.10	25.00	800	900	8.10	8.40	0	0	0	0	0.00	0.00	272.00	5-15	2-4
7/3/2018	0080	40	San Joaquin	25.10	25.10	1200	1400	12.60	8.30	0	0	0	0	0.00	0.00	248.00	5-15	2-4
7/3/2018	0090	203	San Joaquin	21.40	21.80	830	1000	7.10	7.90	0	0	0	0	0.00	0.00	412.00	5 ppb	4-6
7/3/2018	0090	205	San Joaquin	21.70	22.00	1030	1100	7.60	8.00	0	0	0	0	0.00	0.00	216.00	5 ppb	4-6
7/3/2018	0090	207	San Joaquin	22.20	22.40	1200	1230	7.60	7.10	0	0	0	0	0.00	0.00	144.00	5 ppb	4-6
7/11/2018	0037	26	San Joaquin	23.50	23.60	730	800	7.50	7.50	0	0	0	0	0.00	0.00	78.00	5	2-4
7/2/2018	0037	272	Solano	21.50	21.60	1030	1130	7.70	7.70	0	0	0	0	0.00	0.00	60.00	15-20	4-6
7/2/2018	0037	284	Solano	21.70	21.80	1200	1300	7.60	7.50	0	0	0	0	0.00	0.00	64.00	15-20	8-10
7/3/2018	0037	272	Solano	20.70	21.00	1000	1100	7.90	8.60	0	0	0	0	0.00	570.00	0.00	15	10+
7/9/2018	0037	252	Solano	22.80	22.80	1030	1030	8.40	8.40	0	0	0	0	0.00	0.00	28.00	20	10+
7/9/2018	0037	272	Solano	21.80	21.80	900	930	8.20	8.20	0	0	0	0	0.00	0.00	60.00	20	10+
														0.00	2223.00	7061.00		

Table D-6. Daily Logs for August 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
8/1/2018	9012	109	Contra Costa	24.90	25.30	1000	1200	7.30	8.00	0	0	0	0	0.00	0.00	432.00	10	4-6
8/1/2018	9122	97	Contra Costa	27.20	26.40	915	1200	9.25	8.47	0	0	0	0	0.00	0.00	384.00	7.5	2-4
8/7/2018	9012	108	Contra Costa	25.00	24.30	900	945	7.50	7.70	0	0	0	0	0.00	0.00	208.00	15	2-4
8/7/2018	9012	109	Contra Costa	24.50	24.90	945	1115	8.00	8.20	0	0	0	0	0.00	0.00	648.00	15	4-6
8/8/2018	9123	97	Contra Costa	23.20	25.30	900	1100	7.10	7.81	0	0	0	0	0.00	0.00	384.00	7.5	0–2
8/14/2018	9012	108	Contra Costa	22.90	23.40	1100	1145	7.70	7.70	0	0	0	0	0.00	0.00	104.00	7.5	8-10
8/14/2018	9012	109	Contra Costa	23.10	23.90	930	1045	7.50	7.20	0	0	0	0	0.00	0.00	324.00	7.5	4-6
8/21/2018	0055	97	Contra Costa	24.70	25.40	900	1230	7.50	7.10	0	0	0	0	0.00	0.00	384.00	7.5	2-4
8/21/2018	9012	108	Contra Costa	24.70	24.70	1100	1200	8.20	7.60	0	0	0	0	0.00	0.00	104.00	7.5	10+
8/21/2018	9012	109	Contra Costa	24.50	25.00	915	1045	7.90	7.70	0	0	0	0	0.00	0.00	324.00	7.5	8-10
8/28/2018	9012	108	Contra Costa	20.50	20.50	945	1130	8.20	8.00	0	0	0	0	0.00	0.00	140.00	7.5-10	10+
8/28/2018	9012	109	Contra Costa	20.20	20.30	815	930	8.10	8.20	0	0	0	0	0.00	0.00	324.00	7.5-10	4-6
8/30/2018	9122	97	Contra Costa	21.80	22.30	930	1200	8.88	8.94	0	0	0	0	0.00	0.00	384.00	7.5	2-4
														0.00	0.00	4144.00		

Table D-7. Daily Logs for September 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
9/4/2018	9122	108	Contra Costa	21.00	21.20	915	1000	8.10	8.00	0	0	0	0	0.00	0.00	208.00	7.5-15	8-10
9/4/2018	9122	109	Contra Costa	20.70	21.10	1015	1130	8.10	8.20	0	0	0	0	0.00	0.00	324.00	7.5-15	8-10
9/6/2018	0055	97	Contra Costa	24.40	24.70	1000	1200	8.30	8.10	0	0	0	0	0.00	0.00	384.00	7.5	10+
9/11/2018	0055	97	Contra Costa	24.50	24.70	1230	1430	8.40	8.20	0	0	0	0	0.00	0.00	384.00	7.5	6-8
9/18/2018	0055	97	Contra Costa	21.70	22.00	1230	1430	8.80	9.20	0	0	0	0	0.00	0.00	384.00	7.5-20	4-6
9/18/2018	0055	108	Contra Costa	20.00	20.10	915	1015	10.30	10.00	0	0	0	0	0.00	0.00	276.00	7.5-20	4-6
9/18/2018	0055	109	Contra Costa	20.30	20.10	1030	1200	9.90	10.20	0	0	0	0	0.00	0.00	324.00	7.5-20	4-6
9/17/2018	0037	272	Solano	22.40	22.30	930	1130	8.20	8.00	0	0	0	0	380.00	0.00	0.00	10	10+
														380.00	0.00	2284.00		

Table D-8. Daily Logs for October 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
10/2/2018	3420	97	Contra Costa	18.60	18.80	900	1045	8.90	9.30	0	0	0	0	0.00	513.00	0.00	10	0-2
10/2/2018	9012	108	Contra Costa	20.10	20.10	1000	1030	8.40	8.60	0	0	0	0	0.00	0.00	207.00	10-15	6-8
10/2/2018	9012	109	Contra Costa	20.20	20.10	845	1000	8.50	8.20	0	0	0	0	0.00	0.00	432.00	10-15	2-4
10/1/2018	0037	272	Solano	20.30	20.10	1030	1230	9.70	9.60	0	0	0	0	0.00	0.00	380.00	10	2-4
10/11/2018	0037	272	Solano	16.90	17.40	1000	1430	8.00	9.20	0	0	0	0	0.00	0.00	572.00	15	8-10
10/17/2018	0037	272	Solano	16.10	17.90	930	1300	10.30	10.50	0	0	0	0	0.00	0.00	760.00	20	2-4
10/24/2018	0037	272	Solano	15.20	15.90	1030	1230	9.00	9.10	0	0	0	0	0.00	0.00	760.00	20	2-4
														0.00	513.00	3111.00		

Table D-9. Daily Logs for November 2018 SAV

Date	Vessel Identification	Site ID	County	Before Temp	After Temp	Time Arrived	Time Departed	DO Before	DO After	Beg Easting	Beg Northing	End Easting	End Northing	Fluridone Q	Fluridone PR	Fluridone O	Herbicide Rate	Wind Speed
11/26/2018	0037	272	Solano	11.30	11.10	1030	1300	10.80	10.50	0	0	0	0	0.00	762.00	0.00	20	2-4
														0.00	762.00	0.00		

APPENDIX E

SAV Species Currently Controlled by DBW

For more information visit our website at www.dbw.parks.ca.gov/

Brazilian waterweed (*Egeria densa*)

Photo credit: DBW

Curlyleaf pondweed (*Potemogeton crispus*)

Photo credit: DBW

Coontail
(*Ceratophyllum demersum*)

Photo Credit: DBW

Eurasian Watermilfoil
(*Myriophyllum spicatum*)

Photo Credit: DBW

Fanwort
(*Cabomba caroliniana*)

Photo Credit: DBW