

# Executive Summary

Assembly Bill 2193 (signed January 1997) designated the Department of Boating and Waterways (DBW) as the lead agency to develop a control program for the aquatic weed *Egeria densa* (*Egeria*) in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh. The purpose of this Environmental Impact Report (EIR) is to document the potential environmental impacts of the DBW's proposed control program for *Egeria* in the Delta.

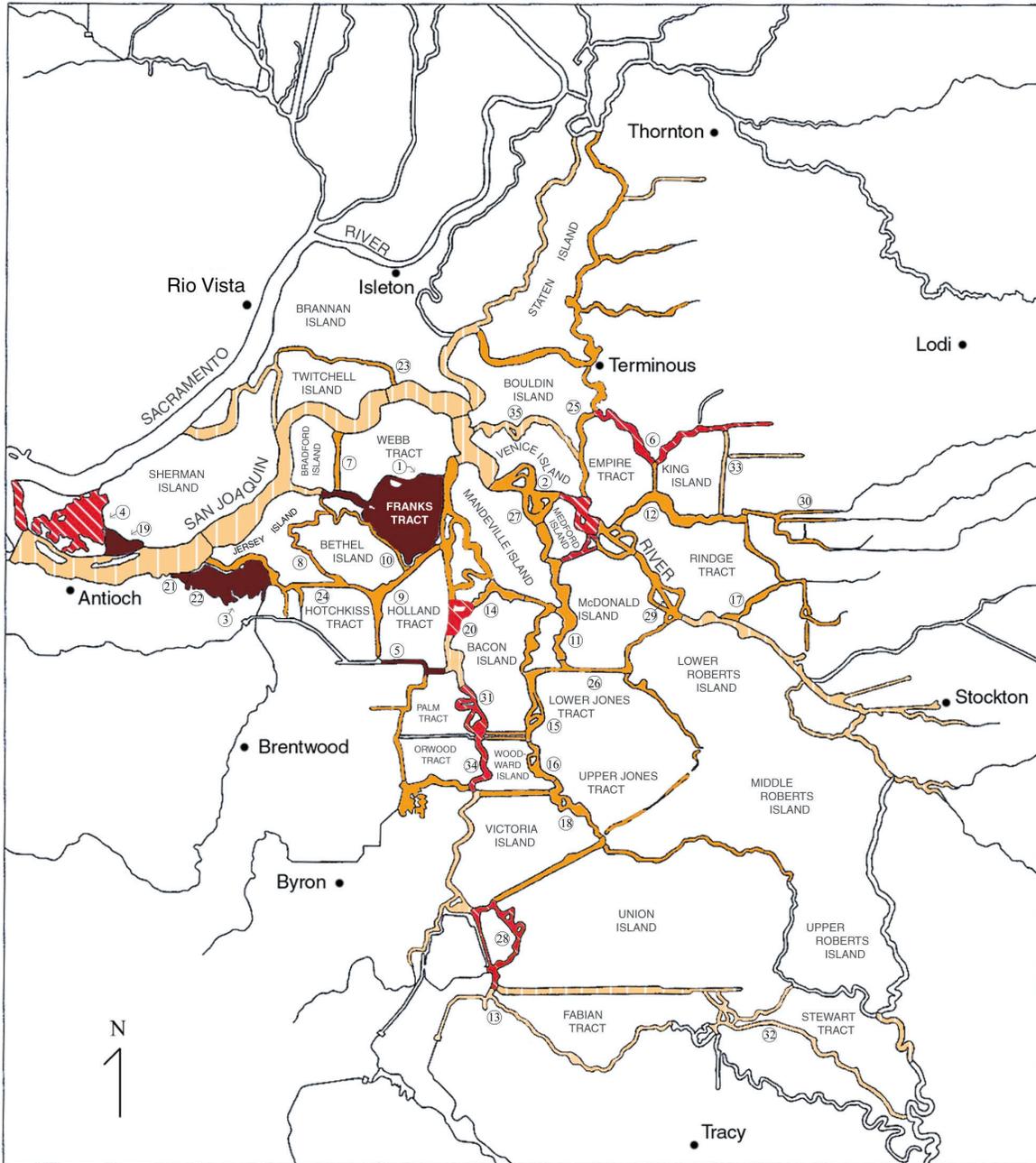
*Egeria* is a non-native submerged aquatic weed that grows in dense mats throughout the Delta. In the 40 years since *Egeria* was introduced to the Delta it has grown to infest approximately 3,900 surface acres, or eight percent of the 50,000 surface acres of Delta waterways (see **Exhibit E-1**, on the following page). No *Egeria* has been reported in the Suisun Marsh.

Future growth and spread of *Egeria* in the Delta is uncertain. Though *Egeria* has spread at a rate of approximately 100 acres per year, its rate of spread varies year-to-year depending on environmental conditions. In drought years, *Egeria* appears to grow more quickly, while in years with heavy precipitation it appears to grow more slowly. *Egeria* hinders navigation, disrupts recreational activities, clogs agricultural irrigation intakes, slows water conveyance, displaces native vegetation, and upsets the balance of the aquatic environment.

The primary objective of the proposed program is to improve navigation in currently infested areas of the Delta by reducing the growth and spread of *Egeria*. **Chapter 1**, the project description, summarizes project objectives, project scope, proposed control area and Delta sites selected, control methods proposed for each site, pre- and post-treatment monitoring measures, and intended uses of this EIR.

The DBW consulted a number of regulatory agencies, environmental groups, and stakeholders in developing both the EDCP and this EIR. The DBW formed the *Egeria densa* Task Force (a group of federal, state, and local agencies and other stakeholders) early in this process. The DBW used this Task Force for consultation purposes. The DBW also invited interested parties to public meetings and obtained written comments on various topics related to the EDCP and this EIR. The Task Force and other key stakeholders are identified in Exhibit 1-10 of Chapter 1.

# Egeria Infestation Levels and Locations of Proposed Treatment Sites in the Sacramento-San Joaquin Delta

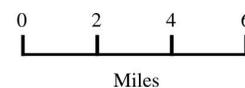
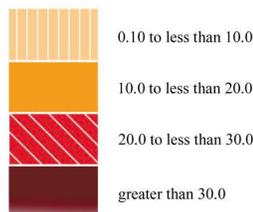


Percent of Water Body Surface Area Covered with *Egeria*

Sources: CIR Aerial Photographs flown 16 September 1997 at 1:24,000 scale and Sacramento-San Joaquin Delta Atlas by Department of Water Resources (1993).

Cartography: SFSU Romberg Tiburon Center for Environmental Studies and NewPoint Group, Inc.

Note: Circled numbers represent areas that the DBW has prioritized to treat as part of the proposed EDCP.



The project set forth in this EIR includes the following two components:

- 1) The EDCP, a five-year program for controlling *Egeria*, using:
  - ❑ Reward® (diquat dibromide), a registered aquatic herbicide, EPA Registration Number 10182-404
  - ❑ Sonar, a registered aquatic herbicide, including two forms
    1. Sonar® A.S. (liquid formulation of fluridone), EPA Registration Number 67690-4
    2. Sonar® SRP (granular formulation of fluridone), EPA Registration Number 67690-3
  - ❑ Mechanical harvesting
- 2) Two-year research trials using the aquatic herbicide Komeen (active ingredient, copper), a registered aquatic herbicide, EPA Registration Number 1812-312.

The DBW conducted limited preliminary research trials on Reward, Sonar, Komeen, and Mechanical Harvesting to assess the potential environmental impacts and efficacy levels for these methods on Delta waters. **Volume II** of this EIR includes research reports from these preliminary trials.

The proposed EDCP covered by this EIR is for five years. The DBW does not intend to continue the EDCP if the program does not meet its objectives. Should the DBW determine at any point during the five-year period that the EDCP is ineffective, the DBW would recommend to the legislature and appropriate regulatory agencies that EDCP activities cease. Should the five-year period reveal the EDCP is effective, the DBW would submit supplemental environmental documentation that supports continuation of the EDCP.

The DBW intends to treat a relatively small portion of total Delta water body surface acres, but nearly half of the Delta water body surface acres infested with *Egeria*. The DBW proposes to treat 1,733 acres per year, just 3 percent of total Delta waterways, but nearly 44 percent of the area infested with *Egeria*, as shown in **Table E-1**, on the following page.

Table E-1

**Sites and Acreage Necessary for Control  
Over the Five-Year EDCP**

	Sites	% of Sites Identified with <i>Egeria</i>	Water body Surface Acreage	% of Total Delta Acreage	% of Acreage Infested with <i>Egeria</i>
Entire Delta	N/A	N/A	50,000	100%	N/A
Sites Identified With <i>Egeria</i> Infestation	75	100%	3,909	7.8	100%
Priority Sites to Control for Navigation	35	47	3,066	6.1	78
Sites with Acreage Proposed to Control for Navigation	<b>35</b>	47	<b>1,733</b>	<b>3.5</b>	<b>44</b>

These 1,733 acres correspond to 35 sites in the Delta. These sites are identified with circled numbers in Exhibit E-1. Numbers shown are not in order of priority for treatment. Exhibit E-1 also shows the percent of water body surface acreage infested with *Egeria* at sites across the Delta.

The estimated acreage to be treated by each EDCP control method is shown in **Table E-2**. The DBW would use Reward for a majority, or approximately three fourths, of the treatment acreage. The DBW would use Sonar for slow-moving backwater areas, while mechanical harvesting would be used for emergencies to gain immediate control of an area.

Table E-2

**Estimated Acreage Controlled  
For Each EDCP Control Method**

Control Method	Acreage (Yrs 1-2)	Percent of Total Acreage	Acreage (Yrs 3-5)	Percent of Total Acreage
Reward - Diquat <sup>a</sup>	1,224	78%	1,324	76%
Sonar A.S. - Fluridone <sup>b</sup>	177	11	227	13
Sonar SRP - Fluridone <sup>b</sup>	130	8	130	8
Mechanical Harvesting	52	3	52	3
<b>Total</b>	<b>1,583</b>	<b>100</b>	<b>1,733</b>	<b>100</b>

<sup>a</sup> A total of 100 acres shown for Reward would be treated with Komeen under the two year research trials proposed in years 1 and 2.

<sup>b</sup> Another 50 acres shown for Sonar AS would be treated with Komeen under the two year research trials proposed in years 1 and 2.

Based on the proposed EDCP, the DBW would annually apply approximately 10,600 gallons of Reward, 300 gallons of Sonar A.S., and 13,500 pounds of Sonar SRP to Delta waters.

The DBW expects efficacy levels to vary based on the control method and the site conditions. For Reward, efficacy levels over the five-year period could range from 30 to 50 percent (where 100 percent equals full control). For Sonar, efficacy levels could equal 70 to 80 percent, however Sonar can only be used in slow-moving, quiescent waters. Finally, mechanical harvesting would result in only temporary control because harvested areas will regrow.

Control method efficacy is partially dependent on environmental conditions. For example, Reward efficacy is limited in highly turbid water because the active ingredient binds with particulate material in the water column. Sonar is not effective in fast-moving waters because, as a systemic herbicide, it requires a prolonged contact period. Mechanical harvesting generates plant fragments which, if uncollected, can result in infestation of new areas. (Further, disposal of *Egeria* fragments is problematic.)

*Egeria* control is a difficult management problem. There are potential environmental impacts associated with each EDCP control method and the Two-Year Komeen Research Trials. Impacts are characterized herein as one of the following:

- ❑ Unavoidable Significant Impact
- ❑ Avoidable Significant Impact
- ❑ Less than Significant Impact
- ❑ No Impact.

The Environmental Checklist, located prior to Chapter 1, summarizes the combined impacts of the EDCP and Two-Year Komeen Trials, while **Chapters 3 and 4** provide a detailed discussion of the impacts of the EDCP, and Two-Year Komeen Trials, respectively. The impacts assessment in these chapters is organized into 16 general resource categories. **Chapter 2** provides a description of the environmental setting of the Delta, and is also organized into these 16 resource categories.

The discussion of each impact is organized as follows:

- ❑ Significance Threshold
- ❑ Environmental Impacts/Consequences
- ❑ Significance Determination
- ❑ Mitigation Measures.

In some cases, the discussion of environmental impacts/consequences is provided at the general resource category level. However, where necessary, the environmental impacts/consequences discussion for some of the general resource categories is broken into subcategories. For cases where environmental impacts would be different for each EDCP control method, the environmental impacts/consequences discussion is split into a separate discussion for each control method (e.g., separate impacts for Reward, Sonar and Mechanical Harvesting).

The impacts analysis for the EDCP is found in Chapter 3. It is organized around the general resource categories found in the Environmental Checklist. **Exhibit E-2**, beginning on page E-8, provides a summary of this analysis. Unavoidable and avoidable significant impacts from the EDCP are as follows, listed by EDCP control method.

### Reward

#### *Unavoidable significant impacts to:*

- ❑ Water Quality, due to toxicity.
- ❑ Biological Resources based on: 1) impacts to intertidal wetland plant communities; 2) toxicity to aquatic invertebrates; 3) impacts to fish from loss of prey base; 4) impacts to reptiles and amphibians; and 5) impacts to birds.

#### *Avoidable significant impacts to:*

- ❑ Water Quality due to the potential for: 1) short-term dissolved oxygen reductions; 2) herbicide-treated water to contaminate drinking water supplies; and 3) increases in trihalomethane (THM) formation.
- ❑ Biological Resources, based on impacts to habitat from short-term localized reductions in dissolved oxygen.
- ❑ Agricultural Resources, if treated water is used for irrigation.
- ❑ Utilities and Service Systems, if debris from treatment clogs public water supply intakes.
- ❑ Human Health and Hazardous Materials due to the potential for adverse impacts from exposure to concentrated Reward in drinking water supplies and catastrophic spills.

## Sonar

### *Unavoidable significant impacts to:*

- Water Quality due to toxicity.
- Biological Resources, based on impacts to intertidal wetland plant communities, and to reptiles, amphibians, and birds using Delta channels and banks.

### *Avoidable significant impacts to:*

- Water Quality, based on the potential for increases in THM formation.
- Agricultural Resources, if treated water is used for irrigation.
- Utilities and Service Systems, if debris from treatment clogs public water supply intakes.
- Human Health and Hazardous Materials due to the potential for adverse impacts from exposure to concentrated formulations of Sonar and catastrophic spills.

## Mechanical Harvesting

### *Unavoidable significant impacts to:*

- Water Quality, based on short-term localized increases in turbidity
- Biological Resources based on: 1) impacts to wetland, intertidal, and riparian plant communities; 2) temporary decreases in aquatic invertebrate abundance; 3) removal and physical destruction of fish; 4) impacts to fish from loss of prey base; and 5) impacts to reptiles, and amphibians from staging equipment on banks.

### *Avoidable significant impacts to:*

- Water Quality, due to *Egeria* fragmentation, and turbidity increases near treatment plant intakes.
- Biological Resources, based on adverse impacts to birds using channel banks, and potential impacts to the Valley elderberry longhorn beetle.
- Agricultural Resources, if fragments from harvesting clog irrigation intakes.
- Utilities and Service Systems, if debris from treatment clogs public water supply intakes.

## Environmental Impacts of the EDCP (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
1	<b>Hydrology and Water Quality</b>				
	<b>General Water Quality</b>				
	Toxicity	Unavoidable Significant Impact	Reward and Sonar use conflict with the Basin Plan standards regarding toxicity, which state that Delta waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.	No mitigation available	Unavoidable Significant Impact
	Dissolved Oxygen (DO)	Avoidable Significant Impact	Reward use could result in a short-term, localized reduction in DO to concentrations that are less than the numeric standards specified in the Basin Plan.	Prior to any herbicide treatment, the DBW would measure DO concentration at treatment site. If concentrations were less than 5 ppm, treatment would be postponed until levels increased above this limit. The DBW would treat no more than 20 acres per day at a given treatment site. During late summer and fall (when DO in the hypolimnion is typically lowest), no more than 20 acres would be treated at a given treatment site over a 14-day period.	Less than Significant Impact
	Sediments	Less than Significant Impact	Reward is not biologically available once it reaches the sediments and will degrade over time.	No mitigation necessary.	Less than Significant Impact
	Turbidity	Unavoidable Significant Impact	Mechanical harvester maneuvering can cause temporary localized increases in turbidity.	No mitigation available.	Unavoidable Significant Impact
	Floating Material	Avoidable Significant Impact	Plant fragments generated during mechanical harvesting can become a nuisance if a substantial quantity of fragments remain uncollected.	A fragment collection vessel would follow each mechanical harvester operating at a treatment site. The DBW would not conduct harvesting on extremely windy days.	Less than Significant Impact
	<b>Drinking Water Quality</b>				
	Chemical Constituents	Avoidable Significant Impact	Reward treatments that occur near water treatment facility intakes could adversely impact drinking water supplies if an influx of herbicide-treated water contaminated drinking water supplies.	At least, two weeks prior to treatments, the DBW would contact appropriate drinking water utilities and the CA Department of Health Services to inform them that treatment is to occur. The DBW would establish a one mile buffer zone around water treatment facility intakes within which herbicide application would not occur without consultation and agreement from the water agency. If required, in addition to regular monitoring activities (measurements of DO, herbicide residues, turbidity, etc.), the DBW would consult with the DHS to coordinate monitoring of BOD, TOC, DOC, and UVA-254 as necessary.	Less than Significant Impact
	Trihalomethane Formulation	Avoidable Significant Impact	Herbicide treatments that occur near water treatment facility intakes could increase the potential for THM formation due to the increase in dissolved organic compounds released from decaying plant material.	Same as for Drinking Water Quality-Chemical Constituents above.	Less than Significant Impact
	Turbidity	Avoidable Significant Impact	Mechanical harvesting near water treatment plant intakes could temporarily increase turbidity levels.	Same as for Drinking Water Quality-Chemical Constituents above.	Less than Significant Impact

## Environmental Impacts of the EDCP (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
2	<b>Biological Resources</b>				
	Plants				
	Native Aquatic Plants and Algae	Less than Significant Impact	Loss of native aquatic plants would be minimal since treatment is focused on sites with a high relative abundance (approximately 85 percent) of <i>Egeria</i> . Further, removal of <i>Egeria</i> would create new habitat for native aquatic plants. Algae would not be impacted by Sonar treatments or mechanical harvesting. Treatment with Reward may result in short-term, localized decreases in algal abundance. However, algal abundance would be expected to rebound rapidly due to redistribution of algal cells by water flow. Further, increases in light penetration in the water column following removal of <i>Egeria</i> would facilitate algal growth.	No mitigation necessary.	Less than Significant Impact
	Intertidal Wetland Plant Communities	Unavoidable Significant Impact	Wetland and special status Intertidal plants could be adversely impacted or killed due to inundation by herbicides or staging of mechanical harvesting equipment. These special status plants include Mason's lilaeopsis, Delta mudwort, Rose mallow, Delta tulle pea, and Northern California black walnut. Wetland plants include tules and cattails.	Prior to an herbicide application, channel banks would be surveyed by a qualified botanist to determine whether sensitive plant species are present. If the site has a high percentage of sensitive plants, the site may not be treated. If possible, herbicide applications would occur during low tide to decrease the likelihood that sensitive plants would be inundated by herbicide-treated water. Herbicide applications would focus on the mid-channel region to decrease the possibility that concentrated herbicides would come in contact with sensitive plants growing along channel banks. Following herbicide treatment, channel banks would be surveyed to determine whether a loss of sensitive plants has occurred. If substantial loss is evident, changes would be made to the treatment protocol. Prior to mechanical harvesting, channel banks would be surveyed. The area around any sensitive plants would be flagged and no staging, or movement of harvester equipment, would be allowed within the flagged area.	Unavoidable Significant Impact
	Terrestrial Plants	No impact	Project operations would not affect plants that occur upland of channel banks. Further, disposal of harvested <i>Egeria</i> would occur on fallow agricultural land, and thus would not impact any sensitive plant species.	No mitigation necessary.	No impact

## Environmental Impacts of the EDCP (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
Invertebrates					
	Aquatic Invertebrates	Unavoidable Significant Impact	Reward and mechanical harvesting could cause a temporary decrease in the abundance of invertebrates. Reward is moderately toxic to aquatic invertebrates and mechanical harvesting can result in their removal and physical destruction. The decrease in invertebrate abundance would likely be temporary. It is expected that planktonic invertebrates would be reintroduced to treatment areas inadvertently through water flow. Further, benthic and plant-dwelling organisms likely would recolonize treatment areas relatively rapidly once regrowth of plants began.	No more than 20 acres would be treated with Reward on any given day in a given treatment site. For treatment sites larger than 20 acres, upstream portions would be treated first, and downstream portions would be treated at least 14 days later. Mechanical harvesting sites would be no larger than 10 acres in size. Harvesters would not cut vegetation more than five feet below water level, thus leaving one to three feet of standing vegetation. These measures would decrease the overall loss of invertebrates and would minimize impediments to recolonization.	Unavoidable Significant Impact
	Insects	Avoidable Significant Impact	EDCP operations could harm the Valley elderberry longhorn beetles if project operations adversely impacted elderberry shrubs.	Prior to treatment, surveys would be conducted to determine whether sensitive species are present. EDCP treatments would not occur along channel bluffs where elderberry shrubs could be adversely impacted.	Less Than Significant Impact
Fish					
	Fish: Direct Impacts	Unavoidable Significant Impact	Mechanical harvesting can result in the removal and physical destruction of fish present in <i>Egeria</i> beds. Special status species that could be impacted include all four runs of chinook salmon, steelhead, delta smelt, splittail, green sturgeon, longfin smelt, and Pacific River lamprey. Reward and Sonar use would have no direct adverse impacts on fish.	All requirements identified by the regulatory agencies, such as the USFWS, NMFS, and CDFG, would be adhered to. These could involve, for example, suspension of harvesting operation for specific periods of time to avoid disrupting fish migration or spawning, or avoiding certain habitat conditions. Prior to mechanical harvesting, IEP Real Time Monitoring data would be obtained and evaluated (if available and relevant to the project site) to determine whether any sensitive fish species had been identified in the treatment area. If required by regulatory agencies, a pretreatment fish survey following the protocol for pop-net use established by McGowan (1998) would be conducted by a qualified biologist one to two days prior to commencement of treatment. If the number of special status fish identified through IEP data or pop-net surveys were above a certain threshold level, treatment would be postponed until additional surveys indicated fewer sensitive fish were present in the area. The threshold level would be established through consultation with the appropriate regulatory agencies. For the first two years of the EDCP, a representative sample of the harvested material would be examined by a qualified biologist to assess any incidental taking of threatened, endangered or special status species. This information would be reported to the appropriate regulatory agencies and adjustments to program protocol could be made in order to minimize impacts.	Unavoidable Significant Impact

## Environmental Impacts of the EDCP (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
	Indirect Impacts to Fish: Habitat	Avoidable Significant Impact	Reward use could result in a short-term, localized reduction in DO to concentrations that could adversely impact the habitat of the special status fish species listed above. Loss of native vegetation due to EDCP project activities would be a less than significant impact, since treatments would focus on sites with a high relative abundance of <i>Egeria</i> .	Same as for General Water Quality - Dissolved Oxygen above.	Less than Significant Impact
	Indirect Impacts to Fish: Prey Base	Unavoidable Significant Impact	Reward use and mechanical harvesting could cause a temporary decrease in the abundance of aquatic invertebrates, which could adversely impact special status fish species such as chinook salmon, delta smelt and splittail that consume these invertebrates.	Same as for Biological Resources– Invertebrates above.	Unavoidable Significant Impact
<b>Wildlife</b>					
	Reptiles and Amphibians	Unavoidable Significant Impact	Reward and Sonar use could adversely impact reptiles and amphibians that utilize channels and channel banks in the Delta, including special status species such as the giant garter snake, western pond turtle, and red-legged frog. Mechanical harvesting operations and staging of equipment could kill or maim individuals in channels or on channel banks.	Prior to mechanical harvesting, channel banks and uplands adjacent to treatment sites would be surveyed by a qualified biologist to assess whether sensitive species are present. Areas which show presence of sensitive species (e.g., nests or burrows) or which exhibit ideal habitat conditions for a particular sensitive species would be flagged. No mechanical harvesting equipment would be allowed within 50 feet of these flagged areas. There is no mitigation for impacts to reptiles and amphibians resulting from Reward and Sonar.	Unavoidable Significant Impact
	Birds	Unavoidable Significant Impacts	Reward or Sonar use could adversely impact birds that nest or forage on channel banks, since the herbicide could kill channel bank vegetation. Mechanical harvesting could adversely impact birds that nest or forage along channel banks due to staging of mechanical harvesting equipment. Special status species that could be impacted include the California black rail and great blue heron.	Same as for Biological Resources– Plants (Wetland, Intertidal and Riparian Plant Communities, and Wildlife - Reptiles and Amphibians).	Unavoidable Significant Impacts
	Mammals	Less Than Significant Impact	Exposure of mammals to EDCP activities is expected to be minimal. The only special status mammal species that utilize sloughs and channels of the Delta are the Small-footed myotis bat and Yuma myotis bat, which forage over the water. However, they are not expected to be impacted because EDCP activities would not affect their insect prey.	No mitigation necessary.	Less Than Significant Impact

## Environmental Impacts of the EDCP (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
3	<b>Agricultural Resources</b>				
	Agricultural Operations, Irrigation	Avoidable Significant Impact	Reward and Sonar use could adversely impact crops if herbicide-treated water were used for irrigation. Mechanical harvesting could disrupt irrigation if plant fragments clogged irrigation intakes.	Prior to beginning EDCP treatments (herbicide or mechanical) that are to occur near agricultural intakes, the appropriate County Agricultural Commissioner's Office would be consulted. Local landowners could then be informed of the particular periods of time during which irrigation should not occur and when it is safe to begin irrigation. Post-treatment monitoring would include measurement of herbicide residues in the water column and a site check for <i>Egeria</i> fragments in intake pipes.	Less Than Significant Impact
4	<b>Utilities and Service Systems</b>				
	Public Water Supply Operations	Avoidable Significant Impact	An increase in debris load due to decaying plant material, or plant fragments could adversely impact public water supply operations by clogging intake screens or pumps.	The DBW would establish a one-mile buffer zone around water treatment intakes. No herbicide application or mechanical harvesting would occur within that buffer zone without consultation and agreement from the appropriate water agencies.	Less Than Significant Impact
5	<b>Hazardous and Hazardous Materials</b>				
	Human Health	Avoidable Significant Impact	Reward use could adversely impact drinking water supplies as described above under Drinking Water Quality-Chemical Constituents. Impacts to human health could also result from exposure to concentrated formulations of reward and Sonar.	Impacts to drinking water supplies would be avoided through mitigation measures described above under Drinking Water Quality-Chemical Constituents. Prior to treatments, marina and dock owners would be notified regarding timing of treatments. During herbicide treatments, sites would be marked with buoys. Additionally, DBW staff would patrol treatment areas on a support boat, informing recreators that treatments are occurring. Handling of concentrated chemicals would follow the protocol identified in "Herbicide Handling Procedures and Spill Contingency Plan" (Appendix S).	Less Than Significant Impact
	Catastrophic Spills	Avoidable Significant Impact	A catastrophic spill of Reward or Sonar could result in adverse impacts to aquatic, wetland and intertidal habitat and associated flora and fauna, including special status species. Adverse impacts to human health could occur also due to exposure to concentrated herbicide formulations. The degree of harm would depend on the amount of chemical spilled, environmental conditions (flow, tidal action), and emergency response time.	Avoidance and mitigation measures are contained in "Herbicide Handling Procedures and Spill Contingency Plan" (Appendix S).	Less Than Significant Impact

Where possible, the DBW would implement mitigation measures to avoid or minimize the impacts resulting from the EDCP. Proposed mitigation measures are described in Exhibit E-2. These proposed mitigation measures may be revised and/or additional measures incorporated following consultation with various State and federal agencies, such as the Central Valley Regional Water Quality Control Board (CVRWQCB), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS) and the California Department of Fish and Game (CDFG).

In addition to the EDCP, the DBW is proposing to conduct a two-year research trial using the aquatic herbicide, Komeen. Komeen contains eight (8) percent elemental copper in a chelated form. Komeen efficacy on *Egeria* would be greater than any other method proposed for the EDCP (approximately 80-90 percent for five years). Komeen is fast-acting and generally can work in flowing water conditions. However, the long-term environmental impacts of Komeen use in the Delta are uncertain. To better understand these impacts, the DBW proposes to conduct trials at three sites in the Delta of 50-acres each. Applications would be made twice per year for a total of 300 acres per year, and 600 acres over the two-year trial period.

The impacts analysis for the Two-Year Komeen Research Trials is found in Chapter 4. It is organized around the general resource categories found in the Environmental Checklist. **Exhibit E-3**, beginning on page E-15, provides a summary of this analysis.

Should results of the research on Komeen reveal that it meets the project objectives, the DBW may consider adding Komeen to the EDCP. However, the DBW would have to submit supplemental environmental documentation in accordance with CEQA requirements before adding Komeen as a control method.

Unavoidable and avoidable significant impacts from the Two-Year Komeen Trials are as follows:

*Unavoidable significant impacts to:*

- ❑ Water Quality, due to: 1) chemical constituents in water; 2) toxicity; and 3) the potential for Komeen to accumulate in sediments.
- ❑ Biological Resources based on the potential to: 1) kill intertidal plants; 2) temporarily decrease aquatic invertebrate abundance; 3) adversely impact fish; 4) temporarily decrease fish prey base abundance; 5) adversely impact reptiles, and amphibians utilizing Delta channels and banks; and 6) adversely impact birds utilizing Delta channels and banks.

*Avoidable significant impacts to:*

- ❑ Water Quality, based on potential for treated water to enter water supplies, and the potential for THM formulations.
- ❑ Biological Resources, based on the potential to impact the Valley elderberry longhorn beetle.
- ❑ Agricultural Resources, based on the potential for treated water to be used for irrigation.
- ❑ Utilities and Service Systems, based on the potential for debris to clog water supply operations.
- ❑ Human Health and Hazardous Materials due to the potential for:  
1) contamination of drinking water supplies; 2) exposure to concentrated formulations of Komeen; 3) bioaccumulation; and 4) catastrophic spills.

Where possible, the DBW would implement mitigation measures to avoid or minimize the impacts resulting from the Two-Year Komeen Research Trials. Proposed mitigation measures are described in Exhibit E-3. These proposed mitigation measures may be revised and/or additional measures incorporated following consultation with various State and federal agencies, such as the CVRWQCB, USFWS, NMFS, and CDFG.

The DBW will use pre- and post-treatment monitoring to measure the impacts of the EDCP on Delta waters. Monitoring methods are summarized in Exhibit 1-8 for the EDCP, and Exhibit 1-9 for the Two-Year Komeen Trials. Monitoring methods are organized into biological, chemical, and physical indicators.

**Chapter 5** summarizes the unavoidable significant impacts and irreversible environmental changes of the proposed project. Cumulative impacts of the proposed project are described in **Chapter 6**. The proposed project was evaluated in conjunction with the following seven related projects:

- ❑ CALFED Bay-Delta Program
- ❑ South Delta Improvements Program
- ❑ South Delta Temporary Barriers Project
- ❑ Delta Wetlands Project
- ❑ Water Hyacinth Control Program
- ❑ Montezuma Wetlands Project
- ❑ Suisun Marsh Preservation Agreement Amendment Three.

## Environmental Impacts of the Two-Year Komeen Trials (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
1	<b>Hydrology and Water Quality</b>				
	General Water Quality				
	Chemical Constituents	Unavoidable Significant Impact	Komeen use would result in a violation of the Basin Plan standard for copper concentration.	No mitigation available.	Unavoidable Significant Impact
	Toxicity	Unavoidable Significant Impact	Komeen use conflicts with the Basin Plan standards regarding toxicity, which states that Delta waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.	No mitigation available.	Unavoidable Significant Impact
	Dissolved Oxygen (DO)	Less Than Significant Impact	Komeen use would not likely result in decreases in dissolved oxygen.	Although no mitigation is necessary, standard pre-treatment monitoring would include measuring of DO concentration at treatment sites. If DO concentrations were less than 5 ppm, treatment would be postponed until levels increased above this limit. The DBW would treat no more than 20 acres at a given trial site per day. During late summer and early fall (when DO in the hypolimnion is typically lowest) the DBW would treat no more than 20 acres at a given site over a 14-day period.	Less Than Significant Impact
	Sediments	Unavoidable Potentially Significant Impact	Chelated copper, the active ingredient in Komeen, does not biodegrade and thus could accumulate in the sediments. The extent to which chelated copper might accumulate and the degree of harm it could pose to the aquatic environment is not currently known.	Although the Komeen research trials propose extensive monitoring to determine whether accumulation is occurring, there is no mitigation to avoid this potential impact.	Unavoidable Potentially Significant Impact
	Turbidity	No Impact	Komeen use would not impact turbidity levels.	No mitigation necessary.	No Impact
	Floating Material	No Impact	Komeen use would not increase floating material in the water column.	No mitigation necessary.	No Impact
	<b>Drinking Water</b>				
	Chemical Constituents	Avoidable Significant Impact	Komeen treatments that occur near water treatment facility intakes could adversely impact drinking water supplies if an influx of herbicide-treated water contaminated drinking water supplies.	The DBW would establish a one mile buffer zone around water treatment facility intakes within which <i>no</i> herbicide application would occur without consultation with the water agency. In addition to regular monitoring activities (measurements of DO, herbicide residues, turbidity, etc.) the DBW would coordinate monitoring of BOD, TOC, DOC, and UVA-254 with the DHS.	Less Than Significant Impact
	THM Formulation	Avoidable Significant Impact	Komeen treatments that occur near water treatment facility intakes could increase the potential for THM formation due to the increase in dissolved organic compounds released from decaying plant material.	Same as for Drinking Water Quality - Chemical Constituents above.	Less Than Significant Impact

## Environmental Impacts of the Two-Year Komeen Trials (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
	Turbidity	No Impact	Komeen use would not impact turbidity levels.	No mitigation necessary.	No Impact
<b>2</b>	<b>Biological Resources</b>				
	Plants				
	Native Aquatic Plants and Algae	Less Than Significant Impact	Loss of native aquatic plants would be minimal due to the fact that treatment is focused on sites with a high relative abundance (approximately 85 percent) of <i>Egeria</i> . Further, removal of <i>Egeria</i> would create new habitat for native aquatic plants. Algae would not be impacted by Komeen treatments.	No mitigation necessary.	Less Than Significant Impact
	Intertidal Wetland Plant Communities	Unavoidable Significant Impact	Intertidal wetland plants could be adversely impacted or killed due to inundation by Komeen treated water. Special status plants that could be impacted include Mason's lilaeopsis, Delta mudwort, Rose mallow, Delta tule pea, and Northern California black walnut. Wetland plants include tules and cattails.	Prior to Komeen application, channel banks would be surveyed by a qualified biologist to determine whether sensitive plant species are present. If the site exhibits a high percentage of sensitive plants, the site may not be treated. To the degree possible, herbicide applications would occur during low tide to decrease the likelihood that sensitive plants would be inundated by herbicide-treated water. Herbicide application would be focused in the mid-channel region to decrease the possibility that concentrated herbicides would come in contact with sensitive plants growing along channel banks. Following herbicide treatment, channel banks would be surveyed to determine whether a loss of sensitive plants has occurred. If substantial loss is evident, changes may be made to treatment protocol.	Unavoidable Significant Impact
	Terrestrial Plants	No impact	Project operations would not affect plants that occur upland of channel banks.	No mitigation necessary.	No impact
	Invertebrates				
	Aquatic Invertebrates	Unavoidable Significant Impact	Komeen use could cause a temporary decrease in the abundance of aquatic invertebrates, since it is moderately toxic to these organisms. The decrease in invertebrate abundance likely would be temporary. It is expected that planktonic invertebrates would be reintroduced to treatment areas inadvertently through water flow. Further, benthic and plant-dwelling organisms would likely recolonize treatment areas relatively rapidly once regrowth of plants began.	No more than 20 acres would be treated with Komeen at any given site on a given day. Upstream portions would be treated first, and downstream portions would be treated several weeks later. This period of time would likely be sufficient to allow for recolonization of invertebrates.	Unavoidable Significant Impact
	Insects	Avoidable Significant Impact	Komeen use could adversely impact the Valley elderberry longhorn beetle if herbicides inundated valley elderberry shrubs growing on channel banks.	Pre-treatment, surveys would be conducted to determine whether sensitive species are present. Herbicide treatments would not occur along channels where elderberry shrubs could be adversely impacted.	Less Than Significant Impact

## Environmental Impacts of the Two-Year Komeen Trials (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
Fish					
	Fish: Direct Impacts	Unavoidable Potentially Significant Impact	Exposure of fish to Komeen, or its residues, could result in direct adverse impacts to fish. Although Komeen is not expected to be lethal to most fish species, it is moderately toxic to some. Further, Komeen residues could become toxic to certain fish under certain environmental conditions. Finally, Komeen has the potential to bioaccumulate in fish tissues. Special status species that could be impacted include all four runs of chinook salmon, steelhead, Delta smelt, splittail, green sturgeon, longfin smelt, Pacific river lamprey, and river lamprey.	All requirements identified by the regulatory agencies, such as the USFWS, NMFS and CDFG would be adhered to. These could involve, for example, suspension of herbicide trials for specific periods of time to avoid disrupting fish migration or spawning, or avoiding certain habitat conditions. Prior to Komeen application, IEP Real Time Monitoring data would be obtained and evaluated (if available and relevant to the project site) to determine whether any sensitive fish species had been identified in the treatment area. If required, a pretreatment fish survey, following the protocol for pop-net use established by McGowan (1998), would be conducted by a qualified biologist one to two days prior to commencement of each trial. If the number of sensitive fish identified through the IEP data, or pop-net surveys, were above a certain threshold level, the trial would be postponed until additional surveys indicated that fewer sensitive fish were present in the area.	Unavoidable Potentially Significant Impact
	Indirect Impacts to Fish: Habitat	Less Than Significant Impact	Use of Komeen would not likely result in a reduction in DO to concentrations that could adversely impact critical habitat of special status fish species listed above. Loss of native vegetation due to Komeen trials would also be a less than significant impact, since treatments would focus on sites with a high relative abundance of <i>Egeria</i> .	Although no mitigation is necessary for this less than significant impact, standard pre-treatment protocol would include monitoring of dissolved oxygen as described under Drinking Water - Dissolved Oxygen above. No Komeen Trials would occur if DO were found to be less than 5 ppm.	Less Than Significant Impact
	Indirect Impacts to Fish: Prey Base	Unavoidable Significant Impact	Komeen use could cause a temporary decrease in the abundance of invertebrates, which could adversely impact special status fish species such as chinook salmon, delta smelt, and splittail, that consume these invertebrates.	Same as for Biological Resources—Invertebrates above	Unavoidable Significant Impact
Wildlife					
	Reptiles and Amphibians	Unavoidable Significant Impact	Komeen use could adversely impact reptiles and amphibians that utilize channels and channel banks in the Delta, including special status species such as the giant garter snake, western pond turtle, and red-legged frog.	Prior to treatment, channel banks and uplands adjacent to treatment sites would be surveyed by a qualified biologist to assess whether sensitive species are present. If evidence suggests a relatively large number of sensitive species are present along channel banks, a new location for the Komeen trials would be selected.	Unavoidable Significant Impact

## Environmental Impacts of the Two-Year Komeen Trials (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
	Birds	Unavoidable Significant Impact	Komeen use could adversely impact birds, including special status species such as California black rail and tricolored blackbirds, that nest on channel banks, since the herbicide could kill channel bank vegetation. Further, piscivorous birds could be impacted since Komeen can bioaccumulate in fish tissues.	Same as for Wildlife-Reptiles and Amphibians. Mitigation measures described under Biological Resources– Fish would minimize the possibility that special status bird species would be exposed to Komeen. There is no mitigation to avoid bioaccumulation of Komeen in non-special status bird species.	Unavoidable Significant Impact
	Mammals	Less Than Significant Impacts	Exposure of mammals to Komeen during research trials is expected to be minimal. The only special status mammal species that utilize the sloughs and channels of the Delta are the small-footed myotis bat and Yuma myotis bat, which forage over the water. However, they are not expected to be impacted because Komeen research trials would not affect their insect prey.	No mitigation necessary.	Less Than Significant Impacts
<b>3</b>	<b>Agricultural Resources</b>				
	Agricultural Operations, Irrigation	Avoidable Significant Impact	Komeen use could adversely impact crops if herbicide-treated water were used for irrigation.	Prior to Komeen trials that are to occur near agricultural intakes, the appropriate County Agricultural Commissioner's Office would be consulted. Local landowners could then be informed of the particular periods of time during which irrigation should not occur and when it is safe to begin irrigation. Post-treatment monitoring would include measurement of herbicide residues in the water column.	Less Than Significant Impact
<b>4</b>	<b>Utilities and Service Systems</b>				
	Public Water Supply Operations	Avoidable Significant Impact	An increase in debris load due to decaying plant material following Komeen applications could adversely impact public water supply operations by clogging intake screens and or pumps.	The DBW would establish a one-mile buffer zone around water treatment intake facilities. No herbicide application would occur within that buffer zone without consultation with appropriate water agencies.	Less Than Significant Impact

## Environmental Impacts of the Two-Year Komeen Trials (Listed by General Resource Category)

No.	Resource Categories	Impact Significance Prior to Mitigation	Explanation of Impact	Proposed Mitigation Measures	Impact Significance Post Mitigation
5	<b>Hazardous and Hazardous Materials</b>				
	Human Health	Avoidable Significant Impact	Komeen use could adversely impact drinking water supplies as described above under Drinking Water Quality-Chemical Constituents. Consumption of fish or other aquatic organisms recently exposed to Komeen could be harmful to human health. Exposure to concentrated formulations of Komeen could adversely affect human health.	Impacts to drinking water supplies would be avoided through mitigation measures described above under Drinking Water Quality-Chemical Constituents. Prior to treatments, marina and dock owners would be notified regarding timing of the trials. During the trials, sites would be marked with buoys. Additionally, DBW staff would patrol trial sites on a support boat, informing recreators that herbicide application is occurring. Trial sites would be closed to fishing and clamming during and for 48-hours following the trials. Handling of concentrated chemicals would follow protocol identified in "Herbicide Handling Procedures and Spill Contingency Plan" (Appendix S).	Less Than Significant Impact
	Catastrophic Spills	Avoidable Significant Impact	A catastrophic spill of Komeen could result in adverse impacts to aquatic, wetland and intertidal habitat, and associated flora and fauna, including special status species. Adverse impacts to human health could also occur due to exposure to concentrated herbicide formulations. The degree of harm would depend on the amount of chemical spilled, environmental conditions (flow, tidal action), and emergency response time.	Avoidance and mitigation measures are contained in "Herbicide Handling Procedures and Spill Contingency Plan" (Appendix S).	Less Than Significant Impact

The proposed project is expected to have significant cumulative adverse impacts to water quality, shallow water habitat (by removing habitat for fish and aquatic invertebrates), wetlands, sensitive fish and plant species, aquatic invertebrates, and sediments.

**Chapter 7** discusses Growth Inducing Impacts (as defined by CEQA) that could be associated with the EDCP or Two-Year Komeen Research Trials. Growth Inducing Impacts would be less than significant.

**Chapter 8**, discusses the seven alternatives to the proposed project (i.e., the EDCP and Two-Year Komeen Trials) considered by the DBW. They are as follows:

- ❑ Alternative 1—No Project
- ❑ Alternative 2—EDCP with Reward and Sonar; and Two-Year Komeen Trials
- ❑ Alternative 3—EDCP with Reward, Sonar, and Mechanical Harvesting; and No Two-Year Komeen Trials
- ❑ Alternative 4—EDCP with Reward and Sonar; and No Two-Year Komeen Trials (Least Environmental Impact)
- ❑ Alternative 5—EDCP with Reward, Sonar, and Mechanical Harvesting; and No Two-Year Komeen Trials
- ❑ Alternative 6—EDCP with Reward, Sonar, and Komeen; and No Two-Year Komeen Trials
- ❑ Alternative 7—EDCP with Mechanical Harvesting; and No Two-Year Komeen Trials.

Though these alternatives may appear similar because they use combinations of both proposed EDCP control methods and Komeen, these combinations have different potential efficacy levels and environmental impacts. Many of these alternatives meet most of the project objectives; however most do not substantially lessen the significant environmental impacts of the proposed project.

There are a total of 19 appendices to this EIR. These appendices are included at the end of Volume I.