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Final Programmatic Environmental Impact Report for the Humboldt Bay Regional *Spartina* Eradication Plan

Volume 1

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21 March 2013

Project No. 3192-02

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Executive Summary

This Final Programmatic Environmental Impact Report (PEIR) assesses the potential environmental effects of implementing the Proposed Project described in the Humboldt Bay Regional *Spartina* Eradication Plan (the Plan) (H. T. Harvey & Associates 2012) and project alternatives. The Proposed Project is located in the Mad River estuary, Humboldt Bay and the Eel River estuary in Humboldt County, California. Within this area (the Management Area) there are 1,699 acres of *Spartina densiflora* (*Spartina*) mapped (Grazul and Rowland 2011). *Spartina* is most common in salt and brackish marshes, but also occurs in mudflats and on sand spits. In the Management Area, *Spartina* is a non-native, invasive species that displaces native vegetation, reduces plant biodiversity, alters ecosystems and may alter sedimentation rates.

The Proposed Project has the following goal and objectives:

Goal: Tidal marsh communities in the Management Area will be enhanced through the eradication of invasive *Spartina* and restoration of native vegetation.

- **Objective 1:** By 2013, a regional program will be in place to coordinate efforts to eradicate the invasive cordgrass species *Spartina* from all lands within the Management Area in collaboration with the larger West Coast invasive *Spartina* eradication program.
- **Objective 2:** By 2018, tidal marshes in the Management Area will be dominated by native tidal marsh plant species.
- **Objective 3:** Tidal marshes in the Management Area will be protected against future *Spartina* invasions by prevention, early detection, and rapid response.

The goal and objectives would be obtained by implementing specific *Spartina* removal methods in a coordinated *Spartina* control program. The Proposed Project considers the following mechanical methods for *Spartina* removal: top mowing, grinding, tilling, excavation, disking, crushing, flaming, covering and flooding. The Proposed Project also considers the use of chemical methods; specifically, the application of imazapyr to control *Spartina*.

This PEIR considers 3 alternatives: the Proposed Project, Alternative 1 and Alternative 2. The Proposed Project considers the use of both mechanical and chemical *Spartina* control methods. Alternative 1 considers the exclusive use of mechanical methods (no chemical methods) and Alternative 2 is the No Project Alternative. Under Alternative 2, it is assumed that *Spartina* control will continue in the Management Area, but will not benefit from the coordination that will occur

under the Proposed Project and Alternative 1. The environmental effects of the Proposed Project and project alternatives are summarized in Table S-1.

Table S-1. Summary of the Potential Effects of the Proposed Project, Alternatives 1 and 2

Impact	Proposed Project: Use of Chemical and Mechanical *Spartina* Control Methods	Alternative 1: Use of Only Mechanical *Spartina* Control Methods	Alternative 2: No Project Alternative
Aesthetic and Visual Resources			
AV-1: Potentially Significant Effect on Scenic Vistas	LSM	LSM	LSM
AV-2: Potentially Significant Effect on Visual Continuity	LSM	LSM	LSM
AV-3: Potentially Significant Effect due to Vegetation Clearing	LSM	LSM	LSM
Air Quality			
AQ-1: Dust Emissions	LS	LS	LS
AQ-2: Smoke and Ash Emissions	LS	LS	LS
AQ-3: Herbicide Effects on Air Quality	LSM	NE	LSM
AQ-4: Ozone Precursor Emissions	LS	LS	LS
AQ-5: Carbon Monoxide Emissions	LS	LS	LS
Biological Resources			
BIO-1: Effects on Special Status Fish Species and their Critical Habitat and Essential Fish Habitat from Mechanical *Spartina* Removal Methods	LSM	LSM	LSM
BIO-2: Effects on Special Status Birds	LSM	LSM	LSM
BIO-3: Direct and Indirect Effects to Special Status Plant Species from Mechanical or Chemical *Spartina* Removal Methods	LSM	LSM	LSM
BIO-4: Effects to Animal Species from Chemical *Spartina* Removal Methods	LSM	NE	LSM
BIO-5: Temporary Loss of Habitat to Northern Harrier and Short-Eared Owl	LS	LS	LS

Impact	Proposed Project: Use of Chemical and Mechanical *Spartina* Control Methods	Alternative 1: Use of Only Mechanical *Spartina* Control Methods	Alternative 2: No Project Alternative
BIO-6: Potential Impacts of Mechanical and Chemical Methods to Eelgrass	LSM	LSM	LSM
BIO-7: Potential Effects on Marine Mammals	LSM	LSM	LSM
Bio-8: Direct Impacts to Nesting Northern Harrier and Short-Eared Owl	LSM	LSM	LSM
Cultural Resources			
CR-1: Mechanical Treatments having Potentially Significant Impacts on Archeological Resources	LSM	LSM	LSM
CR-2: Mechanical Treatments having Potentially Significant Impacts on Human Remains	LSM	LSM	LSM
Geology/Soils			
GS-1: Potentially Significant Loss of Soil from Mechanical Methods	LSM	LSM	LSM
Hazards/Hazardous Materials			
HHM-1: Safety Concerns for Workers	LSM	LSM	LSM
HHM-2: Accidental Spills	LSM	LSM	LSM
HHM-3: Toxicity of Imazapyr and Surfactants	LS	NE	LS
HHM-4: Existing Hazardous Waste Sites Near Potential *Spartina* Control Sites	LSM	LSM	LSM
Hydrology / Water Quality			
WQ-1: Degradation of Water Quality Due to Herbicide Application	LSM	LSM	LSM
WQ-2: Herbicide Spills	LSM	LSM	LSM
WQ-3: Fuel or Petroleum Spills	LSM	LSM	LSM
WQ-4: Pollutant/Contaminant Remobilization	LSM	LSM	LSM
WQ-5: Potentially Significant Loss of Soil from Mechanical Methods	LSM	LSM	LSM
WQ-6: Erosion/Sediment Control at Staging and Access Areas	LSM	LSM	LSM

Impact	Proposed Project: Use of Chemical and Mechanical *Spartina* Control Methods	Alternative 1: Use of Only Mechanical *Spartina* Control Methods	Alternative 2: No Project Alternative
WQ-7: Decreased Oxygen in Receiving Waters	LSM	LSM	LSM
WQ-8: Placement of Temporary Structures in a FEMA Flood Zone	LSM	LSM	LSM
WQ-9: Alteration of Drainage Patterns due to Placement of Temporary Dikes or Structures to Impound Waters	LSM	LSM	LSM
Land Use			
LU-1: Herbicide Overuse or Overspray	LSM	LSM	LSM
LU-2: Public Access	LSM	LSM	LSM
Noise			
N-1: Noise Impacts to Residential Areas	LSM	LSM	LSM

LSM = Less than Significant with Mitigation
LS = Less than Significant without Mitigation
S = Significant (no significant effects have been identified)
NE = No Effect

Evaluation of the Proposed Project and Alternatives

The Proposed Project is an environmental restoration project with short-term environmental impacts and long-term environmental benefits. More rapid *Spartina* eradication resulting from the Proposed Project will result in a shorter duration of impacts from *Spartina* removal and *Spartina* infestation and a sooner realization of the Proposed Project's benefits. There is current uncertainty regarding the effectiveness of the various *Spartina* control methods and their environmental effects, however the Proposed Project's adaptive management approach will allow for continual improvement, as control effectiveness and impacts become better understood. By including "all" potential methods as options that will be continually prioritized based on the best available information (as opposed to Alternative 1, which would not consider use of chemicals) and by allowing for improved coordination over Alternative 2 (the No Project Alternative), the Proposed Project will allow for the most effective removal of *Spartina* while also minimizing environmental impacts. The Proposed Project is therefore considered the preferred and environmentally superior alternative.

List of Acronyms and Abbreviations

Abbreviation or Acronym	Definition
AAQS	Ambient Air Quality Standards
APCO	Air Pollution Control Officer
ATV	All-terrain vehicle
BAAQMD	Bay Area Air Quality Management District
BLM	Bureau of Land Management
BMP	Best management practices
CalCA	California Coastal Act
CalCC	California Coastal Commission
Caltrans	California Department of Transportation
CAP	Clean air plan
CARB	California Air Resources Board
CCA	Critical Coastal Area
CCC	Criteria Continuous Concentration
CDF	California Department of Forestry
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
CHHSL	California Human Health Screening Levels
CMC	Criteria Maximum Concentration
CNAHC	California Native American Heritage Commission
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
Conservancy	California State Coastal Conservancy
County General Plan	Humboldt County General Plan
CPU	Conditionally Permitted Uses

Abbreviation or Acronym	Definition
CSAQB	California State Air Quality Board
CSLC	California State Lands Commission
CTS	California Toxics Rule
CWA	Clean Water Act
DO	Dissolved oxygen
EPA	Environmental Protection Agency
ERL	Effects range-low
ERM	Effects range-medium
ESA	Endangered Species Act
ESCP	Erosion/sediment control plan
ESHA	Environmentally Sensitive Habitat Areas
FEMA	Federal Emergency Management Agency
FHA	Flood hazard area
GHG	Greenhouse gas
GOPR	Governor's Office of Planning and Research
Harbor District	Humboldt Bay Harbor, Recreation and Conservation District
HBNWR	Humboldt Bay National Wildlife Refuge
HBRMA	Humboldt Bay Regional Management Area
HCP	Habitat conservation plan
HOODS	Humboldt Open Ocean Dredged Site
LOE	Lines of evidence
MCL	Maximum Contaminant Levels
MCSD	McKinleyville Community Services District
MSDS	Material Safety Data Sheet
MUN	Municipal supply
NCAB	North Coast Air Basin
NCAP	Northwest Coalition for Alternatives to Pesticides
NCCP	Natural Community Conservation Plans

Abbreviation or Acronym	Definition
NCIRWMP	North Coast Integrated Regional Water Management Plan
NCRWQCB	North Coast Regional Water Quality Control Board
NCUAQMD	North Coast Unified Air Quality Management District
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
NOS	National Ocean Survey
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PCBs	Polychlorinated biphenyls
PCP	Pentachlorophenol
PEIR	Programmatic Environmental Impact Report
PPE	Personal protective equipment
RHA	Rivers and Harbors Act
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEISP	San Francisco Estuary Invasive *Spartina* Project
HMSPCCP	Hazardous Materials Spill Prevention Control and Countermeasure Plan
SPWQCA	State Porter-Cologne Water Quality Control Act
SRERP	Salt River Ecosystem Restoration Project
SWRCB	State Water Resources Control Board
TDS	Total dissolved solids
The Plan	Humboldt Bay Regional *Spartina* Eradication Plan
TMDL	Total Maximum Daily Load
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WWTF	Wastewater Treatment Facility

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Section 1.0 Introduction

The California State Coastal Conservancy (Conservancy) prepared this Final Programmatic Environmental Impact Report (PEIR) in compliance with the California Environmental Quality Act (CEQA) to disclose potential environmental effects that could occur from adopting and implementing the Humboldt Bay Regional *Spartina* Eradication Plan (the Plan) (H. T. Harvey & Associates 2012). This Final PEIR incorporates changes that resulted from public comments on the Draft PEIR (see Volume 2). Additionally, in this Final PEIR, there are clarifications and additions made to Draft PEIR Mitigation Bio-3 (Mitigation Bio-4 in the Final PEIR) and some of the PEIR's background ecological information. Implementation of the Plan constitutes this PEIR's Proposed Project. Specifically, this PEIR evaluates the environmental effects of controlling and eradicating non-native *Spartina densiflora* (dense-flowered cordgrass or *Spartina*) in Humboldt Bay, the Eel River estuary, and the Mad River estuary. The general goals of the Proposed Project are to control *Spartina* and restore the Humboldt Bay Regional Management Area's (Management Area) tidal marshlands, which provide habitat for a diverse community of plants and wildlife, including special status species. Control of *Spartina* and re-establishment of native vegetation would enhance approximately 1,700 acres of tidal wetlands.

Spartina in Humboldt Bay and adjacent estuaries also threatens to colonize other West Coast estuaries via ocean dispersal of its seeds; long range seed dispersal has been demonstrated by a drift card study performed by Portland State University (PSU Undated). During this study, drift cards from Humboldt Bay in 2004 and 2005 were found within a month of their release in numerous locations along the Oregon coast and in southwest Washington.

Numerous treatment and control methods could be proposed in varying combinations, to create an almost unlimited number of *Spartina* control treatments. We split control methods into 2 broad categories, mechanical and chemical. Mechanical control treatments include top mowing, grinding, tilling, excavation, disking, crushing, flaming, covering and flooding. Chemical control treatments include application of the herbicide imazapyr by varying means. The Proposed Project evaluated in this PEIR allows for both mechanical and chemical control methods. Alternative 1 would allow only mechanical methods. Alternative 2 is the No Project Alternative, which fulfills the requirement for a "no Project' alternative. In this case, "no Project" means that existing eradication efforts would likely continue, but they would not be well coordinated with each other.

The Conservancy is the lead agency under CEQA. The Proposed Project would be implemented in close coordination with the Humboldt Bay Harbor, Recreation and Conservation District (Harbor District); the California Department of Fish and Wildlife (CDFW); the U.S. Fish and Wildlife Service (USFWS); the cities of Arcata and Eureka; the County of Humboldt and other local agencies; the

Wiyot Tribe; and landowners whose properties support populations of *Spartina*. The Conservancy circulated the Notice of Preparation (NOP) on January 7, 2011; the NOP and its comments defined the range of issues to be addressed in this PEIR. The NOP's circulation date defines the existing conditions considered.

1.1 Purpose of the Proposed Project

Specific Proposed Project objectives are listed in the Project Description, but the general purposes of the Proposed Project are to:

- Restore the native communities of tidal marshlands in the Humboldt Bay region, and
- Minimize the threat of *Spartina* dispersal to estuaries outside of the Management Area.

In September 2006, the Governors of California, Oregon, and Washington announced the "West Coast Governors' Agreement on Ocean Health" (WCGAOH 2011). Among many other goals, the Agreement seeks to support "effective ecosystem-based management." In July 2008, the Governors released the final Action Plan (OGWOC 2008). The Action Plan's Priority Area 2 calls for protection of healthy ocean and coastal habitats by "eradicat[ing] non-native cordgrasses (genus *Spartina*)." The Action Plan stresses that actions should be "West Coast-wide" and that the timeframe for full eradication of *Spartina* is by 2018. Work in West Coast estuaries (including San Francisco Bay, California, and Willapa Bay, Washington) has shown that a prerequisite to successful eradication of invasive *Spartina* is a coordinated, regional approach.

Spartina is known to displace native vegetation, which reduces the biodiversity of the salt marsh; further, no native *Spartina* species are found in the Humboldt Bay region. In 1998 and 1999, the USFWS mapped and observed *Spartina* and 2 rare high salt marsh plants; Humboldt Bay owl's clover (*Castilleja ambigua* var. *humboldtiensis*) and Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*). USFWS noted that "dense-flowered *Spartina* continues to be a major threat to biological diversity" and that "identifying and applying control measures for this invasive plant is of the highest priority" (Pickart 2001). In the *Status of Perennial Estuarine Wetlands in the State of California*, the authors state that improving biological conditions in the North Coast region requires controlling invasive *Spartina*, because its increasing dominance will decrease the structural complexity and species richness of estuarine wetlands (Sutula et al. 2008).

While it is generally accepted by scientists and regulators that *Spartina* is invasive and creates adverse environmental conditions, the specific ecosystem impacts of *Spartina* are the subject of ongoing research. While *Spartina* is most common in Humboldt Bay in salt and brackish marshes, its presence has also been increasingly noted on mudflats and on sand spits, such as the Elk River Spit, and it may

have the potential to spread in these environments. Studies have shown that *Spartina* in Humboldt Bay reduces net ecosystem primary productivity (Lagarde 2012). Also, Mitchell (2012) demonstrated that a shift in invertebrate communities followed removal of *Spartina*, resulting in increased species richness. As a tall, dense graminoid invading a native, more open mat-like plant community, *Spartina* may alter light penetration, causing shifts from autotropohic to heterotrophic food webs. It may also alter sedimentation rates in Humboldt Bay and neighboring estuaries. One indirect impact is its effect on marsh restoration; the dominance of invasive *Spartina* in Humboldt Bay has slowed marsh restoration efforts due to the likelihood that restored marshes will become dominated by *Spartina*, compromising their habitat value.

1.2 Use of this PEIR

The Conservancy is preparing this PEIR to disclose and address potential impacts of the Proposed Project. The primary usefulness of a PEIR is to reduce redundant environmental documentation that can occur when similar projects are proposed in similar areas, and that may have similar effects and mitigations. This PEIR describes *Spartina* infested areas in the region, and presents numerous methods by which it can be controlled or eradicated. When eradication is planned for a specific site, the environmental documentation for that eradication work may "tier off" of this PEIR. If the specific site's eradication work is similar in scope and effects to work that is 1) described in this PEIR, and 2) likely to pose less than significant effects as evaluated in this PEIR, then no additional environmental documentation would be required for CEQA compliance. However, if the specific site's eradication methods pose a different effect than considered in this PEIR, a tiered EIR or Mitigated Negative Declaration may be appropriate.

The Conservancy is the lead agency under CEQA. In accordance with CEQA, the lead agency has the responsibility for the scope, content, and legal adequacy of the document. This Final PEIR addresses the comments received on the Draft PEIR. The Final PEIR 1) provides a full discussion of the Proposed Project's potentially significant environmental impacts, and 2) will inform decision makers and the public of reasonable alternatives that will mitigate, avoid, or minimize adverse impacts.

The final step in the PEIR review process is certifying the PEIR, and adopting a Mitigation Monitoring and Reporting Plan. A certified PEIR indicates that the environmental document has been completed in compliance with CEQA, that the decision-making body of the lead agency reviewed and considered the Final PEIR prior to approving the project, and that the Final PEIR reflects the lead agency's independent judgment and analysis.

The following actions and approvals may be required for *Spartina* control activities:

- U. S. Army Corps of Engineers' (USACE) Rivers and Harbor Act Section 10 permit, and Federal Clean Water Act (CWA) Section 404 permit;
- Federal and State Endangered Species Act (ESA) consultations;
- Conservancy Plan approval;
- California Coastal Commission (CalCC), Consolidated Coastal Development Permit;
- California Department of Transportation (Caltrans) encroachment permit(s);
- CDFG Code Section 1601 Streambed Alteration Agreements(s);
- North Coast Regional Water Quality Control Board (NCRWQCB), Federal CWA Section 401 Certification and/or Discharge Permit(s);
- NCRWQCB Aquatic Pesticide Application permit from the Division of Water Quality;
- North Coast Unified Air Quality Management District (NCUAQMD) Permit(s);
- Humboldt Bay Harbor, Recreation and Conservation District permit(s);
- North Coast Railroad Authority encroachment permit(s);
- State and local agency approvals; and
- Tribal government permissions and/or agreements.

Responsible, cooperating, and trustee agencies reviewed and refined this list of required actions and approvals in their comments on the NOP. Under the National Environmental Policy Act, the likely lead federal agency would be the USACE or USFWS. Technical assistance and review of the Plan was provided by professors from Washington State University Extension and Portland State University.

1.3 Document Organization

This document is organized such that the Proposed Project is described 1st and then Alternative 1 and Alternative 2 (the No Project Alternative). Following the alternative descriptions, the Proposed Project and alternatives' potential impacts on the following resources are evaluated:

- Aesthetic/visual resources
- Air quality
- Biological resources
- Cultural resources
- Geology/soils
- Hazards and hazardous materials
- Hydrology and water quality
- Land use
- Noise

These resources were selected based on information within the Initial Study and reviewers' comments on the NOP.

In evaluating the potential impacts on the above resources, the following general format and outline is used to assess potential impacts to each resource:

1. Existing environmental setting of resource under evaluation
2. Summary of present and possible future conditions
3. Definition of significance and baseline conditions
4. Evaluation of impacts from the Proposed Project
5. Evaluation of impacts from Alternative 1
6. Evaluation of impacts from Alternative 2 (the No Project Alternative)

Under each evaluation of impacts section, mitigation measures are proposed as appropriate. Finally, potential cumulative impacts due to the Proposed Project and global climate change are evaluated.

Section 2.0 Project Description

This Project Description describes *Spartina* eradication actions for the Management Area, which includes Humboldt Bay, the Eel River estuary, and the Mad River estuary. The Plan provides a more complete description of the Proposed Project. Specifically, the Plan provides more information regarding the following items:

- Designation of a regional coordinating agency that will help ensure comprehensive and coordinated implementation of the Plan,
- Criteria for prioritizing sites for *Spartina* control,
- A general timeline for *Spartina* control,
- Development of site specific *Spartina* control plans,
- *Spartina* treatment stages (i.e., primary treatment, resprout treatment, seedling treatment, maintenance treatment, revegetation and seed suppression).
- *Spartina* and salt marsh monitoring,
- *Spartina* control related outreach activities, and
- Other background information, including further information regarding *Spartina* control and salt marsh ecology.

The project description below relates primarily to the Proposed Project's goals, location, and specific *Spartina* control methods. The control methods are presented here because they are the most relevant aspect of the Plan for evaluation of potential environmental effects. Other components of the Plan are incorporated by reference.

2.1 Proposed Project Goals and Objectives

The Proposed Project has the following goal and objectives:

Goal: Tidal marsh communities in the Management Area will be enhanced through the eradication of invasive *Spartina* and restoration of native vegetation.

- **Objective 1:** By 2013, a regional program will be in place to coordinate efforts to eradicate the invasive cordgrass species *Spartina* from all lands within the Management Area in collaboration with the larger West Coast invasive *Spartina* eradication program.
- **Objective 2:** By 2018, tidal marshes in the Management Area will be dominated by native tidal marsh plant species.

- **Objective 3:** Tidal marshes in the Management Area will be protected against future *Spartina* invasions by prevention, early detection, and rapid response.

2.2 Project Location

The Proposed Project is located in the Mad River estuary, Humboldt Bay and the Eel River estuary in Humboldt County, California. Within the Management Area, 1,699 acres of mapped *Spartina* occur over a range of cover classes (Table 2-1, Figures 2-1 through 2-4). This *Spartina* distribution information was generated by Grazul and Rowland (2011), but modified to account for areas where *Spartina* had been treated since the mapping occurred.

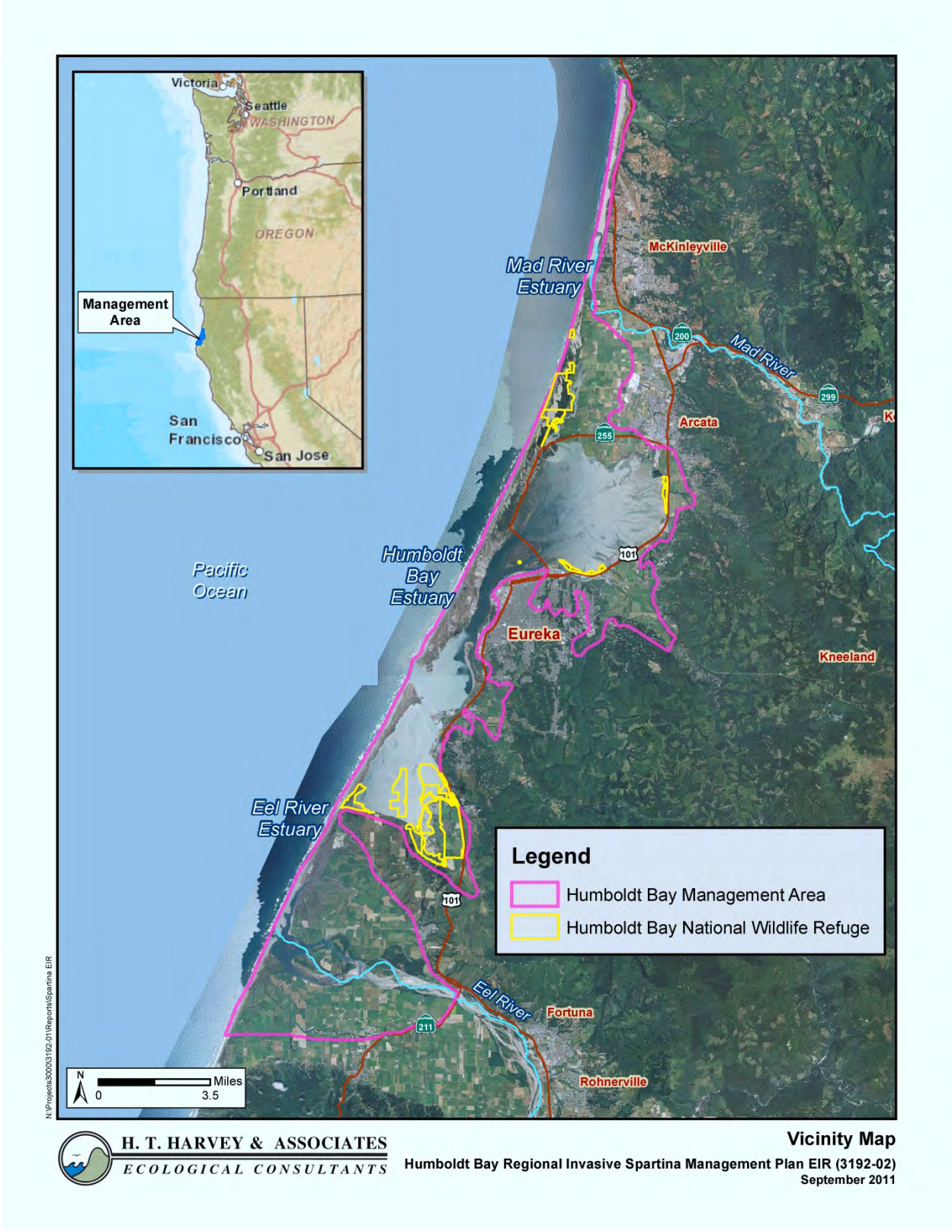

Figure 2-1. Vicinity Map Indicating the Management Area of the PEIR

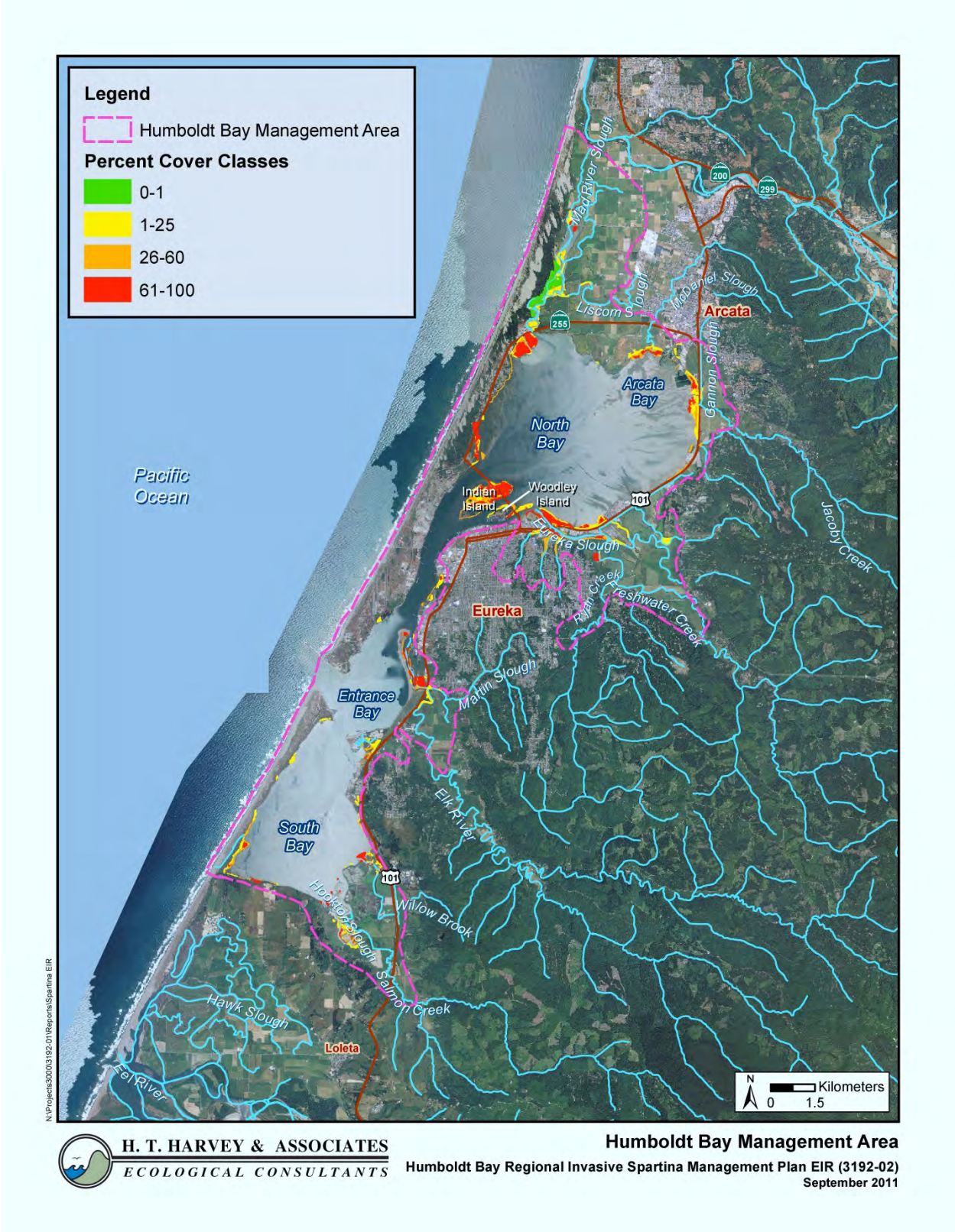

Figure 2-2. *Spartina* Distribution in the Humboldt Bay Management Area, which is the Central Portion of the Management Area

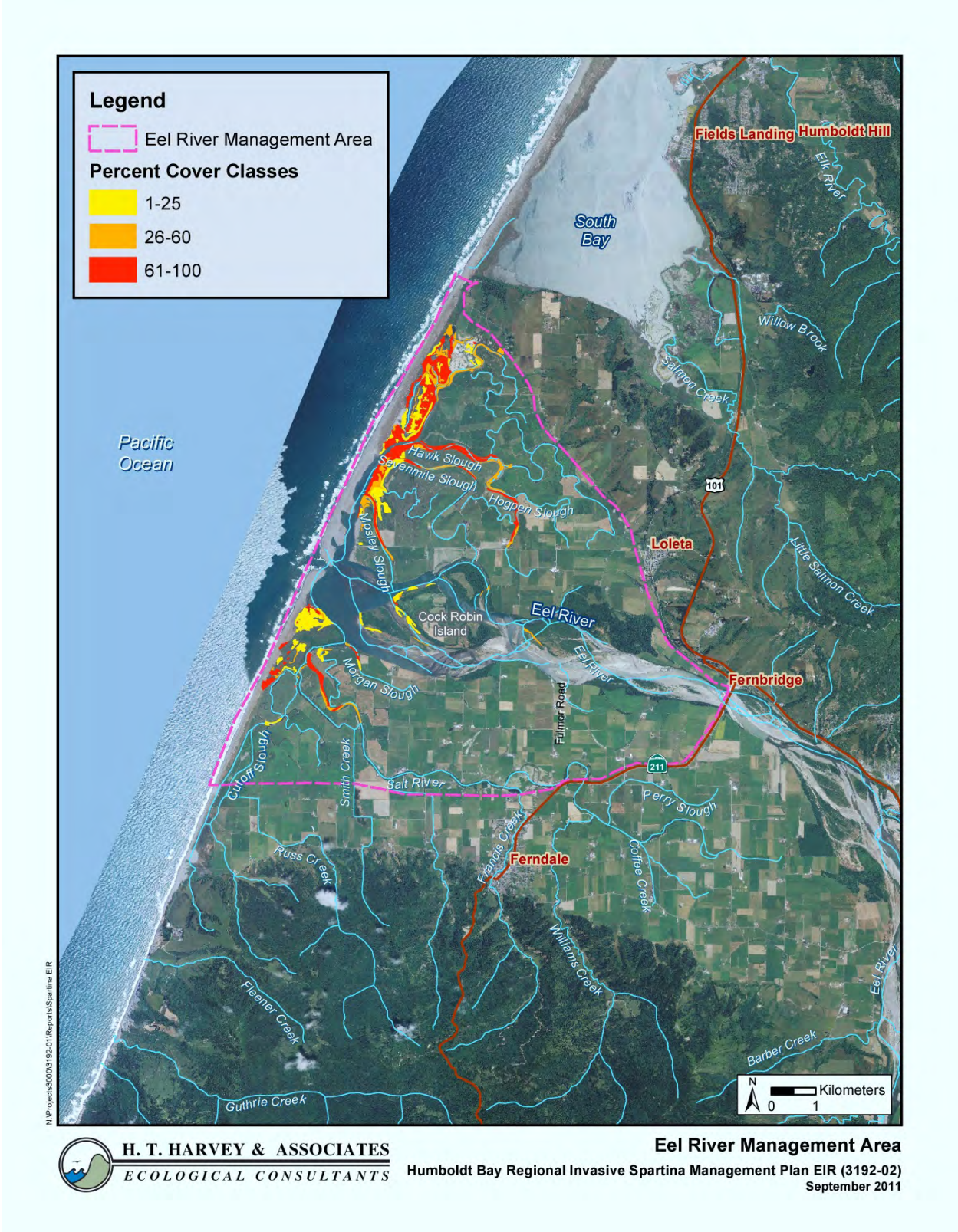

Figure 2-3. *Spartina* Distribution in the Eel River Management Area, which is the Southern Portion of the Management Area

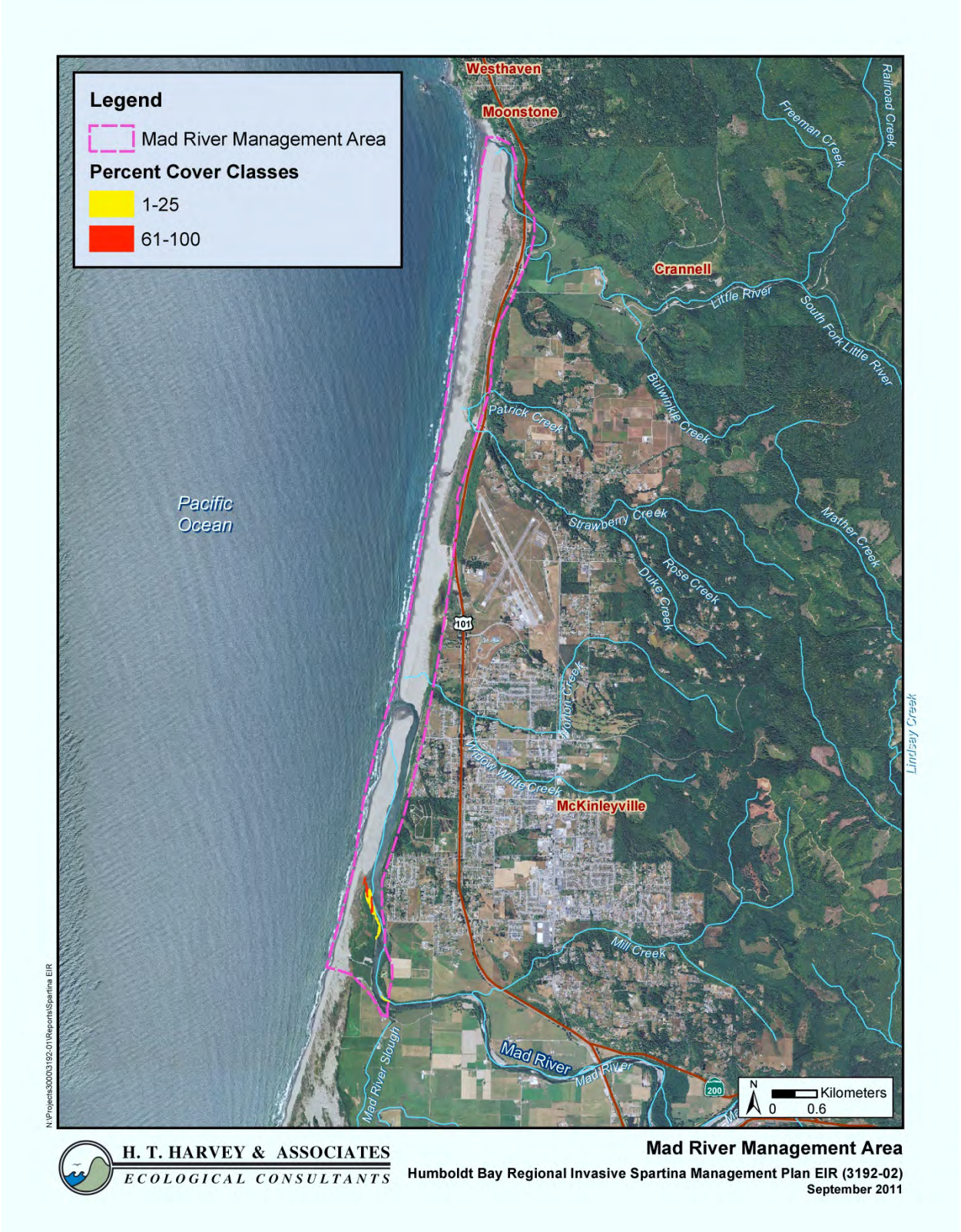

Figure 2-4. *Spartina* Distribution in the Mad River Management Area, which is the Northern Portion of the Management Area

Table 2-1. Distribution of *Spartina* in the Management Area, Reported by *Spartina* Cover Classes

Area	Percent Cover	Acres
Humboldt Bay	<1	72
	1-25	306
	26-60	290
	61-100	342
	Unknown	23
	Subtotal	**1,033**
Eel River	1-25	206
	26-60	172
	61-100	279
	Unknown	3
	Subtotal	**660**
Mad River	1-25	5
	61-100	2
	Subtotal	**7**
Total		**1,699**

2.3 Mechanical Control Methods

A number of mechanical control techniques are presented here for potential use for treating *Spartina* in the Management Area, based on methods currently in use, or that offer potential for further development (Table 2-2). This 'toolbox' approach allows resource managers to select the best method or combination of methods and equipment best suited for site-specific conditions.

Table 2-2. Summary of Mechanical Eradication Methods Potentially Used in the HBRMA

Method	Description of Method	Setting/Uses	Timing	Tools and Equipment	Efficacy	Advantages	Disadvantages
Top Mow	Cutting aboveground stems, leaves, and flowering stalks; may include raking off wrack or fine chopping to create a mulch that can be left in place	Useful as a seed suppression measure; also used as a means of clearing aboveground material in preparation for other treatments; repeated top mows can be used to kill plants where ground disturbance is not acceptable	For seed suppression, work window is May-Aug; in preparation for other treatments, can be used as appropriate all year; to kill plants, repetition of top mow needs to be frequent enough to inhibit recovery of the plant and deplete belowground reserves	Corded weedeaters, handheld gas powered brushcutters; amphibious equipment (for dense infestations); rakes for clearing wrack in some cases (if equipment used for top mow is capable of finely chopping aboveground material, the resulting mulch can be left in place, eliminating the need to remove wrack)	For seed suppression, 90% seed reduction if applied in May-June, near 100% in July-Aug if flowering stems are mowed to the base; repeated top mows can reduce plant vigor and eventually lead to mortality	Top mowing does not cause ground disturbance and may be preferential where ground disturbance is a concern; when using handheld weedeaters or brushcutters, top mowing requires less equipment maintenance and repair than the grind treatment and also less training of labor crews	Labor-intensive when using handheld brushcutters; large initial investment for amphibious equipment; precautions need to be taken to prevent potential gasoline and oil spill into habitats; mowing can generate large amounts of wrack; used alone, top mowing requires frequent repeated applications to kill mature plants
Grind Method	Grinding rhizomes below soil surface 3-6 in (7-15 cm) using metal-bladed brushcutters held at an angle to strike the rhizome (method includes finely chopping aboveground material with brushcutter prior to belowground treatment)	Can be used as primary treatment (best for low to moderate infestations) and as follow-up treatment of resprouts, seedlings, and young plants that re-establish	Can be used all year, though summer is most conducive for primary treatment; resprouts any time of year; seedlings in spring through summer; selective grind treatment of young plants easiest to see in fall-winter	Handheld metal-bladed brushcutters have been used effectively in the Management Area; on larger scale, similar effect could be achieved by tilling with use of amphibious equipment for large, dense infestations	Can kill mature plants with follow-up of 0-2 treatment of resprouts; also effective for treating seedlings and selective removal of juveniles	Grind method is well-developed in the Management Area for use on *Spartina*; handheld brushcutters are easy to transport; suitable for a wide range of field conditions; can be selective, minimizing impacts to non-target plants; native plant recovery following treatment is good; helps reduce seedbank, especially deep grind	Labor-intensive; operators need training for proper technique; precautions need to be taken to prevent potential gasoline and oil spill into habitats; using brushcutters for belowground treatment requires frequent equipment maintenance and repair; soil disturbance can be potential source of temporary sediment increase in slough channels
Tilling	Macerating rhizomes below soil surface, similar action to grind method, but using handheld rototiller or amphibious equipment (best to 1st clear aboveground material using other methods)	Suitable for primary treatment in areas where ground disturbance is acceptable; need to prepare areas with other methods like top mow; need to do follow-up treamtents with other methods like grind	Can be used year round except in areas where mud is too saturated or where *Spartina* rhizomes aren't sufficiently dense to create traction	Trials in progress in Management Area using handheld rototillers, best in low-moderate infestations; trials in progress using amphibious equipment with rototiller attachment for large, dense infestations	Kills mature plants by macerating the rhizomes; trials show that this treatment is feasible with handheld rototillers and amphibious equipment for primary treatment, but extent of resprouting not yet determined	Tilling is less labor-intensive and potentially more cost-effective than grind method for primary treatment; handheld tillers are portable; research ongoing to assess application with large equipment	Disrupts the top layer of soil; need other methods to 1st remove aboveground biomass; need to take precautions to avoid potential transport of rhizome fragments on equipment; handheld rototiller results in more resprouts than grind treatment; application with large equipment still under investigation
Excavation	Complete removal of plant including rhizomes; excavated material either transported off-site for disposal, or can be stockpiled and covered on site for composting, or chopped on-site using brushcutters	Hand digging preferred over grind method in standing water conditions, on rocky substrates, and for community volunteer events; excavation with equipment suitable where accessible and for projects involving earthwork	Any time of year, best to avoid seed-bearing months (Sept - Oct) to minimize seed dispersal; selective digging of young plants in winter and spring when they are more readily visible	Shovels, digging bars, bags, wheelbarrows, handcarts, sleds, trucks to transport materials off-site; backhoes in areas with levees or roads near marsh, or amphibious excavating equipment	Successfully kills mature plants when rhizomes are thoroughly removed; useful for removing juvenile and small plants	Excavation results in fewer resprouts than grind treatment; hand shoveling is relatively safe and requires minimal training; excavation by heavy equipment often cost-effective where applicable	May leave deep holes or trenches in marsh; disposal of excavated material is problematic; hand digging is extremely labor intensive over large areas

Method	Description of Method	Setting/Uses	Timing	Tools and Equipment	Efficacy	Advantages	Disadvantages
Disking	Cutting/shredding the plant including the root system	At this time, no clear settings where disking would be advantageous for *Spartina*	Any time of year that the ground can be worked, with some areas possibly too saturated in winter	Amphibious equipment fitted with disk attachment	In 2012 experimental trials using amphibious equipment with disk attachment, did not substantially macerate rhizomes and did little to detach even the stems from the ground	At this time, no clear advantages of disking evident for treating *Spartina*	In 2012 experimental trials, disking appeared to have low potential as an effective method
Crushing	Crushing aboveground plant material, leaving a thatch that may smother plants and inhibit resprouts and seedlings	May be suitable for primary treatment of large dense stands if effective	Could be applied any time of year; optimal timing for efficacy undetermined	Tracked amphibious vehicles outfitted with various crushing devices, including rollers; standard heavy equipment where accessible	Undetermined for *Spartina*, but some indications that the method is worth investigation	Crushing is relatively inexpensive and rapid; no ground diturbance	If effective, would only be suitable for treating large dense stands to avoid impacts to native plants
Flaming	Heat/flame passed over the plant until it wilts, ruptures cell walls and kills the plant	May be used to kill seedlings	Apply soon after seedling emergence in the spring	Handheld propane torch; tractor-mounted flaming devices	Effective on seedlings, but not on mature plants	Flaming causes less soil disruption than brushcutters; can be used selectively	Not effective when plants are older than about 6 wks; can initially suppress native plant recovery
Covering	Covering aboveground material (plants may be cut 1st)smothers plants, restricts photosynthesis, and exhausts energy reserves; covering can also used for on-site stockpiles to kill plants following excavation	Best used on a small scale; may be used as primary treatment for small or remote infestations; behind diked areas with limited tidal action	Any time; cover should be in place until plants are dead (6 months for stockpiles, 2 growing seasons to kill standing plants)	Clear polyethylene plastic in areas of dry ground, black plastic, geotextiles fabric, landscaping fabric, spikes or stakes used as anchors	Stockpiled plants dead after 6 months; in SF Bay, 2 growing seasons recommended when used as primary treatment	Covering does not disrupt soil processes; allows for on-site stockpiling of excavated material; materials are relatively inexpensive over small areas	Logistically difficult to use over large areas; difficult to anchor over long-term; can be visually objectionable; sediment may accumulate on the covering
Flooding	Artificial inundation, manipulated via a tidegate or blocking a levee breach with an inflatable dam or other structure to impound water	Suitable only at limited sites where hydrology can be manipulated; potential uses for preventing seed recruitment, killing young and possibly mature plants	Depends on the method of hydrologic manipulation (eg, setup of dams in the fall would provide ponding of rainwater through winter-spring)	Tidegates, inflatable dams, geotextile tubes, or other structures to block levee breaches or other sources of inundation	Water depth of 3 in (8 cm) sufficient to inhibit seedling establishment; unknown efficacy on killing mature plants	Flooding does not cause ground disturbance; not labor-intensive under suitable conditions; could be worth further investigation	Hydrologic manipulation is not readily achieved at most infested sites; associated plant species would also be killed

2.3.1 Top Mowing

Top mowing involves cutting above-ground stems, leaves, and flowering stalks. Top mowing can be used as a seed suppression measure during the flowering season before seed set. Mowing can also be used in various combinations with other mechanical treatments (e.g., in preparation for tilling) or chemical treatments (e.g., as a follow up to remove aboveground material). Repeated top mowing can cause *Spartina* mortality, however the mowing must be repeated with sufficient frequency to limit aboveground re-growth and eventually deplete the plants' below-ground energy reserves.

For low to moderate infestations and sites with limited accessibility, mowing can be accomplished using handheld gas-powered equipment including corded weedwhackers and metal-bladed brushcutters. Operators are equipped with a safety harness and a face shield. For large dense stands, heavy equipment can be used for top mowing. Standard tracked equipment may be suitable in some locations where accessible and the substrate is firm enough. In most cases, an amphibious tracked vehicle will be required to access and maneuver marsh channels and soft substrates.

Mowing typically generates a large amount of wrack, which may damage nearby native vegetation or inhibit recovery of native species. In pilot project treatments in Mad River Slough, wrack was raked into piles and either burned or hauled off site for disposal (Pickart 2012). Raking and hauling are very labor intensive and burning is not always a feasible option. Alternatively, top mowing can be performed in a manner that finely chops aboveground material into a mulch that can be left in place to compost or be washed away by tides without generating large wrack mats.

2.3.2 Grind Method

The Humboldt Bay National Wildlife Refuge (Refuge) has developed a treatment referred to as the grind method that effectively kills *Spartina* by targeting the shallow, below ground rhizomes using a brushcutter outfitted with a metal tri-blade. After cutting aboveground stems and leaves into a fine mulch, the blade on the brushcutter is rotated and applied such that the plane of the blade is tilted as it comes in contact with rhizomes, and the rhizomes are ground into small fragments. This method results in a large amount of debris (mud, plant fragments) that is flung into the air, so it is important that operators maintain a minimum distance of 50 ft from one another for safety. The grind method requires frequent maintenance and repair of equipment due to wear and tear.

Follow up treatments, which are less intensive than the initial grind, are required to address resprouts that re-generate from rhizome fragments remaining in the soil. It is recommended that resprout treatments be conducted at 6-month intervals following primary treatment. Using this method, mature *Spartina* stands can be eliminated in 1-2 years (Pickart 2012). In dense *Spartina*, it can be

advantageous to systematically treat short linear sections, 1st top-mulching the row, then applying the grind such that the mud displaced is sidecast onto already treated areas. This technique increases rhizome visibility prior to grinding, and the sidecasting of mud over mulch can help minimize marsh elevation loss.

Experiments are currently underway to determine optimal grinding depth to maximize efficacy and increase efficiency (fewer visits to treat resprouts) while minimizing impacts due to disturbance and elevation loss. The 'light grind' is applied to a depth of approximately 3 in (7.6 cm), and the 'deep grind' has a target depth of 5 in (12.7 cm), or up to a maximum of 6 in (15.2 cm) (Pickart 2011). Preliminary results indicate that both light and deep grind treatments resulted in few resprouts. The deep grind test plots had fewer *Spartina* seedlings, presumably as a result of seed bank disruption. At 6 months post-treatment, a loss of up to 1.5 in (3.8 cm) in marsh elevation was evident in treated areas, but elevation fully recovered these elevation losses by 1.5 years post-treatment, at which time there were no significant differences in elevation between treated and control plots (Pickart, pers. comm. October 2012). This study was done near Jacoby Creek and does not necessarily represent what will occur in other portions of the Management Area.

As a primary treatment, the grind method can be performed at any time of the year, though it is advisable to avoid the time when plants are bearing mature seed (Sept-October) to minimize seed dispersal. Experimental primary treatment using the grind method performed in the summer resulted in more resprouts but fewer seedlings as compared to winter treatment. Resprouts can be treated effectively at any time of the year, but are generally easier to see in late fall through spring when native plants are dormant. Seedlings are typically treated in the spring. Selective grind treatment of juvenile plants is best accomplished in late fall through early spring when they are most visible, but may be necessary in summer to catch young plants missed the previous year before they set seed.

2.3.3 Tilling

Tilling kills the plant by macerating the rhizome, similar to the grind method. To prepare the ground for tilling, aboveground material must 1st be cleared using other methods such as a top mow and the top plant material cleared away or chopped as mulch. Mini-tillers are quicker than the grind method; however they do not penetrate as deep, resulting in a higher number of resprouts and it is yet to be determined what the seedling response will be following this treatment. The time and labor resources required for follow up treatments needs to be considered when determining whether this is the most appropriate method for primary treatment. It appears that the mini-tiller is most advantageous when *Spartina* cover is less than 50%.

2.3.4 Excavation

Excavation involves complete removal of the plant including all rhizomes. Excavation can be performed either by hand or using heavy equipment where accessible. Excavation by any means is not suitable for use in low marsh or in areas with very soft substrates, since in both cases the method can result in excessive lowering of the marsh substrate (Pickart 2011). The excavated material must be addressed in some manner after it is excavated. Plant material plus mud clinging to the rootball needs to either be hauled off-site for disposal or stockpiled on-site or nearby. If stockpiled on-site, securely covering the plants with black plastic has been effective in killing the plants within 6 months. Alternatively, brushcutters may be used to grind the excavated material on-site, leaving it to compost or be flushed out by tides.

Hand digging is performed with shovels, hand trowels for small plants, or with digging bars in rocky areas. Hand digging requires minimal training of workers and can be used successfully for small areas and isolated plants, but is very labor intensive and not cost-effective over a large scale. Hand digging is advantageous in certain circumstances including gravelly or rocky substrates, areas of standing water, and it is a safe method for community volunteers.

2.3.5 Disking

Disking is a treatment that involves cutting or shredding the plant, including the root system. In September 2012 Refuge trials using an amphibious vehicle at Eureka Slough, an agricultural disk attachment had difficulty penetrating the standing *Spartina* and tended to bounce off the surface. It required 2-3 passes to expose much soil, and is unlikely to be an effective treatment as it did little to detach even the stems from the ground, and it did not macerate the rhizomes to any substantial degree (Pickart, pers. comm., October 2012).

2.3.6 Crushing

Crushing involves applying pressure by various devices such as rollers to crush aboveground material. The method has been used with some success on other invasive *Spartina* species elsewhere, but hasn't been tried for *Spartina* in the Management Area except inadvertently on a very small scale. In September 2010, the Refuge used a tracked skid steer with a flailmower attachment to apply an experimental top mow at the Refuge's Jacoby Creek Marsh. The equipment got stuck in the mud after treating only a small area; however, the top mow produced a thick thatch layer that remained on the marsh for at least 5 months, similar to the effect that might be produced by a crushing treatment. It was notable that within that small treated area, the thick thatch layer resulted in no *Spartina* resprouts. Based on these results, crushing may be worth investigation as a treatment, perhaps using an amphibious vehicle outfitted with a crushing attachment.

2.3.7 Flaming

Flaming is a form of thermal weed control in which a flame is passed over a plant until it wilts, causing the fluid in the plant's cells to expand, rupturing cell walls and ultimately killing the plant. Grasses are generally considered resistant to flaming because their growing point can be below ground or protected by a leaf sheath. Flaming is not an effective method to kill mature *Spartina* plants; however, it can be used effectively to kill seedlings. A single flaming treatment at the Lanphere Marsh pilot project resulted in 80% mortality of *Spartina* seedlings. While overall native plant recovery was somewhat suppressed by the flaming treatment in the 1st growing season, the effect was negligible by the end of the 2nd growing season (Pickart 2012). Flaming can be performed with the use of a handheld propane torch that delivers a small, controlled flame. Tractor-mounted flaming devices are also possible for larger scale *Spartina* infestations.

2.3.8 Covering

Covering can either be used as a means of heating plants to lethal temperatures (solarization) or as a means of smothering the plants to restrict photosynthesis and growth, and exhaust the plant's energy reserves. Covering is not feasible as a primary treatment for *Spartina* due to the logistical problems of securing covers over large areas of marsh. However, covering may provide an option for treating small, remote *Spartina* populations in situations where other methods are not suitable. Covering is recommended for on-site stockpiles of excavated material when it is not possible to otherwise dispose of this material.

2.3.9 Flooding

Flooding has not been tested as a primary treatment, but the method could be worth investigation at locations where conditions are suitable. If hydrology can be easily manipulated, as via a tidegate or by blocking a levee breach with an inflatable dam, it may be possible to drown the plants by flooding the site. Studies have shown that flooding *Spartina* plants for 2 months results in significant mortality of aboveground tissue, though belowground biomass may remain alive (Mateos Naranjo et al. 2007); flooding would likely have to be maintained for 3-4 months to be effective. *Spartina* does not typically occur in marshes or portions of marshes with insufficient drainage or prolonged inundation. This measure would be best applied in high density stands of *Spartina* where few other plants occur, as other plant species and animals could also be killed by the treatment. Additionally, at suitable locations, flooding may be useful as a means of inhibiting *Spartina* seedling emergence. In light of the experimental nature of this treatment and its limited applicability, flooding would initially be used experimentally on a small scale (< 5 acres) and would not be used in areas greater than 20 acres. Flooding would not be prolonged for longer than 4 months, and flooded areas would be monitored weekly to ensure that hydrologic changes due to temporary flooding are not having unforeseen

impacts in adjacent areas, such as through scouring of tidal channels. All impoundments will include a simple mechanism for releasing the impounded water if necessary to prevent any permanent changes to the tidal channels.

2.4 Chemical Control Methods

Chemical treatment involves the application of herbicides, typically sprayed on plant leaves during the active growing season. The chemicals are translocated by the plants to the root system and can kill or weaken the plant, or may be used for seed suppression. The 2 herbicides most widely used in estuaries on the West Coast for invasive *Spartina* control are glyphosate and imazapyr, the use of imazapyr is considered under the Proposed Project. Imazapyr may be most effective when used in conjunction with mechanical methods (see Table 2-3 below).

Herbicide application must be performed by a Certified Applicator or under the supervision of a Certified Applicator. Herbicides may be applied using backpack sprayers or wick applicators while walking through the marsh or can be applied from spray equipment mounted on boats, trucks, or amphibious tracked vehicles. In other locations, aerial application of herbicides (broadcast using helicopters) has provided a cost-effective means of covering large infested areas; however aerial application is not considered under the Proposed Project.

Due to requests by the public, mechanical methods will be preferred over the use of imazapyr. To select imazapyr application as a treatment method at a specific site, the Regional Coordinator must find that:

- Compared to mechanical methods, imazapyr substantially reduces treatment costs, and
- Compared to mechanical methods, imazapyr has a greater likelihood of successfully controlling *Spartina*.

Additionally, the area of annual treatment with imazapyr will be limited as follows:

- Mad River Estuary: 7 acres (all of the mapped *Spartina*)
- Humboldt Bay: 200 acres (approximately 1/5 of the mapped *Spartina*)
- Eel River Estuary: 200 acres (approximately 1/3 of the mapped *Spartina*)

Additionally, no site shall be treated with imazapyr more than 3 times during any 5 year period.

Table 2-3. Chemical and Chemical/Mechanical Combination Treatment Method Summary

Method	Description of Method	Setting	Timing	Tools and Equipment	Efficacy	Advantages	Disadvantages
Chemical	Application of imazapyr	May be appropriate for some areas where ground disturbance is unacceptable; could be used to treat large dense stands of *Spartina* with very few interspersed native plants; use should be minimized in areas with minimal tidal flushing	Efficacy directly relates to drying time: apply directly to plant during a low or receding tide for optimal dry time; imazapyr is best applied during active growing season (spring-summer) before seed set (Sept-Oct)	Backpack spray equipment, spray trucks, ATVs or tracked vehicles, amphibious equipment, airboats	Effective for seed suppression and in greatly reducing plant vigor of mature plants; low efficacy on top mowed plants and seedlings but stops development of young plants; unknown but not expected to affect seed viability in seed bank	Minimal ground disturbance; relatively rapid and less expensive than more labor intensive methods; successful for seed suppression	*Spartina* has exhibited herbicide resistance; methods not extensively tested on *Spartina* (use in the Management Area currently under investigation); local community may not support use of herbicides
Combined Chemical and Mechanical	Chemical and mechanical methods can be combined in numerous ways, such as top mowing after chemical application to remove aboveground material	Settings and timings of combination methods must consider the specific circumstances of each method and the *Spartina* conditions. See Table # and row above.		Backpack spray equipment, spray trucks, ATVs or tracked vehicles, airboats, hand-held gas powered brushcutters; amphibious vehicles, rakes, shovels, digging bars, bags, wheelbarrows, handcarts, sleds, trucks to transport plant material	Top mowing can provide a uniform canopy for spraying; mowing following chemical application can help clear away aboveground material and may be sufficient to kill weakened plants	Chemical treatment followed by top mow may kill plants with minimal ground disturbance; relatively quick method of seed suppression for reproductive stands that threaten areas treated by mechanical methods	Combination methods may negate the cost savings of chemical methods; need further investigation; local community may not support use of herbicides

2.5 Combination of Mechanical and Control Methods

An integrated management program incorporating a variety of methods used in combination offers flexibility and the ability to respond effectively to a variety of site conditions and logistical considerations. Mechanical and chemical control methods can be combined in various ways to optimize efficacy, minimize impacts, and achieve desired results. Settings and timings of combination methods must consider the specific circumstances of each site and *Spartina* conditions.

Chemical and mechanical methods in combination have been successfully used in Washington, Oregon and San Francisco Bay, California as part of an integrated management strategy. The combined use of imazapyr with mechanical control has been particularly effective in San Francisco Bay. Specifically, chemical and mechanical methods were combined successfully at Creekside Park in San Francisco Bay. Imazapyr treatment was used for seed suppression, making it easier to contain the species spread (Kerr, pers. comm., March 2011).

Section 3.0 Project Alternatives

Two alternatives were considered for the Proposed Project.

3.1 Alternative 1. *Spartina* Control Using Mechanical Methods Only

Alternative 1 is identical to the Proposed Project with the exception of limiting treatment to mechanical methods. No chemical treatment would occur. Project goals, locations, monitoring, and adaptive management activities would be identical under Alternative 1 and the Proposed Project.

3.2 Alternative 2. No Project

Alternative 2 is the No Project Alternative, which is the scenario of not implementing the Plan. Public agencies have been conducting eradication, and may continue their efforts. Without the Plan, their efforts are less coordinated, and the agencies are less able to take advantage of "lessons learned" on the efficacy, costs, and feasibility of the various treatment methods.

Specific differences between the Proposed Project and the No Project Alternative are that under the No Project Alternative:

- No adaptive management plan or implementation of it would occur.
- No *Spartina* eradication database or maps would be created or supported.
- No *Spartina* treatment priorities among sites would be established.
- Monitoring would be more opportunistic and less coordinated, resulting in data that are less comparable.
- Efficacy, costs, and feasibility of treatment methods would be shared to a lesser extent; agencies and land owners would need to determine this information individually.
- Eradication success would be more difficult to monitor and determine, if agencies and landowners do not coordinate their data gathering, with the risk that remaining stands of *Spartina* would, in the long-term, re-populate other, previously treated areas.
- Without a commitment to regional eradication, funders may believe that individual projects lack long term viability and will be less likely to fund them.

Section 4.0 Environmental Setting and Effects of the Alternatives

4.1 Overview Environmental Setting

The environmental setting described in this section reflects physical conditions as they occurred at the time the NOP was published (January 7, 2011). Physical conditions are described in the Plan by location (Humboldt Bay, the Eel River estuary, and the Mad River estuary); the descriptions are generally reproduced here. Other relevant information is provided as the effects analysis sections of this PEIR.

4.2 Humboldt Bay

As California's 2nd largest natural bay and the largest estuary on the Pacific coast between San Francisco Bay and Oregon's Coos Bay, Humboldt Bay is a complex ecosystem and valuable resource for California and the nation because of its natural resources, its aesthetic appeal and recreational opportunities, its ecological services, economic benefits, and its vital transportation links. Visitors and Humboldt County residents value Humboldt Bay for its natural and anthropogenic attributes. Humboldt Bay biota is diverse and ecologically significant at scales ranging from local fisheries, including oyster production to hemispheric ecological patterns such as shorebird and waterfowl migration. The Humboldt Bay area hosts over 400 plant species, 300 invertebrate species, 100 fish species, and 260 bird species, including those that rely on the bay as they travel the Pacific Flyway. Humboldt Bay is important in the life cycles of commercially and recreationally important fish species including shellfish, crustaceans and finfish. Humboldt Bay has a successful oyster culture industry, producing about 70% of the oysters grown in California. Portions of the diked former tidelands around Humboldt Bay, particularly in the Arcata Bottoms, are utilized for agriculture, primarily livestock grazing for dairy and beef production. The largest urban concentrations are in Arcata (population approximately 16,651), Eureka (population approximately 25,866), and Loleta/Table Bluff (population approximately 750).

During the late-19th and early 20th centuries, diking and filling reduced Humboldt Bay salt marshes from an estimated 9,000 acres to only 900 acres today. Humboldt Bay habitat has been further disturbed by discharges of agricultural and urban runoff, industrial and recreational activities, excessive sedimentation from the bay's watershed and other sources, colonization by invasive *Spartina*, and other stressors (HBHRCD 2007, Sutula et al. 2008).

4.3 Eel River Estuary

The estuarine channel of the Eel River flows into the Pacific Ocean approximately 14 mi south of the City of Eureka in Humboldt County. The Eel River estuary includes approximately 24 mi^2 of delta lands, wetlands, and estuarine channels that receive runoff from 3,700 mi^2 of the mountainous Eel River watershed. The Eel River estuary is a significant estuary of the California Coast, and its mosaic of tidal flats, sloughs, marshes, and seasonal wetlands supports hundreds of thousands of resident and migratory waterfowl. Approximately 875 acres of salt marsh currently exist in the estuary (Schlosser et al. 2010); approximately 5,200 acres of salt marsh existed in 1855 but have been lost due to diking, filling, and other human activities. The Eel River was designated a Critical Coastal Area (CCA) in 1995, as a water body impaired by excessive sediment and temperature that flows into an estuary. Urban and rural communities located in the Eel River estuary are the City of Ferndale, and the unincorporated community of Loleta. Land uses in the estuary and watershed include gravel mining, dairy and other agriculture, timber harvest, and recreation.

4.4 Mad River Estuary

The Mad River estuary is located northwest of the City of Arcata, and west of the unincorporated community of McKinleyville. Like the Eel River, the Mad River was designated as a CCA in 1995, as a water body impaired by excessive sediment, temperature, and turbidity that flows into an estuary. The Mad River estuary is smaller than the Humboldt Bay and Eel River estuaries, and supports a smaller acreage of tidal marsh. It is an extremely dynamic ecosystem, as evidenced by significant migration of its mouth north and south since the 1940s. Between 1942 and 1992, the Mad River mouth moved from a location approximately across from School Road in McKinleyville, to just below the Clam Beach Vista Point across from the McKinleyville airport. The river inlet remained in the vicinity of the vista point until 1998, when storm discharge breached a new inlet approximately 1.5 mi to the south, in the vicinity of the 1969 location. The river inlet has gradually migrated northward since 1998, reaching the vicinity of Murray Road in 2008 (Stillwater Sciences et al. 2010). The abandoned channel became a lagoon/estuary with a mixture of freshwater and brackish marshes, fed by Widow White Creek and subject to high tides entering the new mouth of the river.

The estuary provides nursery habitat for juvenile coho and Chinook salmon and steelhead (Stillwater Sciences et al. 2010). It also supports populations of western snowy plover. Invasive *Spartina* is present in this estuary, in marshes, and in and adjacent to riparian scrub habitat.

4.5 Overview of Effects Analyses

Potential impacts are assessed based on the following resources, as defined by the Initial Study and as requested by reviewers of the NOP:

- Aesthetic resources
- Air quality
- Biological resources
- Cultural resources
- Geology/soils
- Hazards/hazardous materials
- Hydrology/water quality
- Land use
- Noise

Assessments of the potential impacts identifies:

- Direct and indirect effects, considering short- and long-term effects
- Significant environmental effects of the Proposed Project and its alternatives
- Significant environmental effects that cannot be avoided by the Proposed Project and its alternatives
- Significant irreversible environmental changes that would be caused by the Proposed Project and its alternatives
- Mitigation measures proposed to minimize the significant effects, and findings of whether significance is reduced to less than significant

4.6 Aesthetic and Visual Resources

This section describes present and possible future conditions of visual resources in the Management Area. The significance of effects on visual resources is defined by CEQA "Appendix G" criteria, based on standards found in the California Coastal Act (CalCA), and on policies within the Humboldt County General Plan (County of Humboldt 2005) and its supporting documents.

4.6.1 Summary of Present and Possible Future Conditions

Present visual resources conditions are described in numerous documents including:

- The Humboldt County General Plan, Chapter 10, Section 10.7 Scenic Resources (HCPBD 2012)

- Local Coastal Plan Issue Identification Report, September 2003 (HCPBD 2003).
- Natural Resources and Hazards Report, Chapter 8 Scenic Resources (DBURP 2002)
- The County General Plan, Volume II, Humboldt Bay Area Plan of the Humboldt County Local Coastal Program (County of Humboldt 2005)
- The County General Plan, Volume II, Eel River Area Plan of the Humboldt County Local Coastal Program, April 1982, revised May 1995, printed April 2005 (HCPD 1982)

As stated in the Natural Resources and Hazards Report (DBURP 2002), scenic resources include "coastline views, mountains, hills, ridgelines, inland water features, forests, agricultural features, idyllic rural communities", and combinations of these features. These resources are contained within properties such as Humboldt County parks, state parks, open space and wildlife refuge areas, private farmlands and ranches, and private and federal forest. Specific to the *Spartina* eradication program, scenic resources of interest are coastline views, inland water features, agricultural features, and rural communities.

The Humboldt Bay shoreline is irregular with numerous small tributaries and sloughs creating marsh areas that transition to open water, depending on tides and storm flow. It is topographically flat, supporting both native and non-native vegetation. The many streams and sloughs that empty into Humboldt Bay provide a land/water interface that is generally visually appealing. The built environment that is visible from potential *Spartina* eradication areas includes industrial developments, billboards, residential housing, wharfs/marinas, bridges, mariculture, highways, farmland, and ranch land. Public access to any potential eradication areas is possible by small water craft, and roads service much of the area as well. HBNWR is open space that already has supported *Spartina* eradication efforts; other open space with public access include the Arcata Marsh, Woodley Island, Elk River Spit, South Spit, North Spit and Indian Island, which has less public access but is highly visible from the Highway 255 bridge. Recreational activities that occur within Humboldt Bay include fishing, boating, kayaking, birding, and hiking.

The Eel River estuary is characterized by an extensive delta and creeks and sloughs that empty into it. It is also topographically flat, supporting native and non-native vegetation. The built environment is much less prevalent than on the Humboldt Bay shoreline, but anthropogenic influences are evident in the Eel River estuary's extensive agricultural land use. Although there are some County roads, public access is limited by private property boundaries; sloughs may be accessible by kayak or other small water craft from public access points at the Pedrazzini Boat Ramp and Crab County Park. Open space is preserved by the area's agricultural land use. Riverside Ranch, a parcel that is along the Salt River, is planned to become a wildlife refuge that will be owned by the State of California, and

managed by CDFW. Recreational activities that occur within the Eel River estuary include fishing, boating, kayaking, and birding.

The Mad River estuary is a long, north-south oriented area bounded by sand spits to the west and the bluff to the east, extending from the river mouth north to Clam Beach. The area is a public park characterized by a small estuary, with a river mouth that migrates rapidly and frequently. Beach vegetation is sparse, and both native and non-native vegetation are present in the estuary. Access to the area is primarily via hiking, although limited vehicle access is allowed on the north end. The built environment is evident in houses that can be seen from the beach, hiking trails along parts of the beach, and 2 river mouth stabilization projects (1 at the current mouth location, and the other south of the mouth of Strawberry Creek). The Eureka-Arcata airport is near the Mad River Estuary; planes and helicopters can be frequently seen by people in the Management Area. Recreational activities that occur in the area include surfing, hiking, and horse riding.

Possible future conditions of visual resources are largely dependent on the scenic resources goals and policies of the Humboldt County General Plan, which has been informed and supported by the Local Coastal Plans of the Humboldt Bay Area and Eel River, and the Natural Resources and Hazards Report (DBURP 2002). The Humboldt County General Plan recognizes scenic area types that are characteristic and exemplary of Humboldt County. Relevant to the Proposed Project are these types:

- Open space and agricultural lands
- Scenic roads (several state highways are eligible for official designation, including Highway 101 for its entire route in Humboldt County)
- Wild and scenic rivers
- Coastal scenic and coastal view areas
- Community separators

Policies and goals that will affect and determine future visual resource conditions of these scenic area types include (HCPBD 2012):

SR-G1. Scenic Resource Protection. Protect high-value forest, agriculture, river, and coastal scenic areas that contribute to the enjoyment of Humboldt County's beauty and abundant natural resources.

SR-G2. Community Separators. Visible and aesthetic open space areas between urban development areas that separate and preserve unique identities of the county's cities and communities.

SR-P1. Development in Identified Scenic Viewsheds. In identified scenic areas, new development shall be consistent with and subordinate to natural contours including slopes, visible hilltops and

treelines, and bluffs and rock outcroppings. Visible disturbance shall be minimized to the extent feasible.

SR-P2. Heritage Landscapes. Protect the scenic quality of mapped heritage landscape areas with appropriate land use designations and design review standards to ensure that new development preserves or enhances the heritage landscape values of the site.

SR-P3. Scenic Roadway Protection. Protect the scenic quality of designated scenic roadways for the enjoyment of natural and scenic resources, landmarks, or points of historic and cultural interest.

SR-P4. Community Separators. Protect the scenic quality of "community separators" from degradation by maintaining adequate open space between communities and cities.

SP-P5. Development within Community Separators. Retain a rural character and promote low intensities of development in community separators. Avoid annexation or inclusion in spheres of influence for sewer and water services. Provide opportunities for consideration of additional development in community separators in exchange for permanent open space preservation.

Future conditions will be affected by 2 types of effects from the Proposed Project, 1) short-term and temporary effects, and 2) long-term and permanent effects. All of the above County General Plan goals and policies will be supported by the Proposed Project. Additionally, the proposed project is consistent with the goals and policies described in the City of Arcata General Plan (City of Arcata 2008), City of Eureka General Plan (City of Eureka 1997), existing County of Humboldt General Plan (County of Humboldt 2005), Humboldt Bay Management Plan (HBHRCD 2007) and the California Coastal Act. Long-term and permanent visual effects from the Proposed Project will be the conversion of vegetation from *Spartina* to other native plants, which will likely have a lower and sparser form, but with more diversity in colors and plant types. While *Spartina* can be bushier, native vegetation, such as pickleweed and saltgrass, has less brown, standing dead material during the growing season when most visitors are viewing the marsh. Casual observers may associate fuller vegetation with healthier and "prettier" coastal conditions. Therefore, the enjoyment of Humboldt County's beauty and abundant natural resources may be decreased for some observers, but increased for others who appreciate the diversity of the native plants.

Short-term and temporary visual effects from the Proposed Project will include changes in visual character due to:

- The presence of eradication crews and equipment, and

- Changes in vegetative cover, such as short-term conversion to bare ground, or short-term color changes from green to yellow or brown.

4.6.2 Definition of Significance and Baseline Conditions

Baseline conditions are those conditions existing at the time the NOP was circulated.

Significance criteria for effects on visual resources are defined in the "CEQA checklist", based on standards found in the CalCA, and on policies within the County General Plan and its supporting documents. According to CEQA, visual resources effects are considered significant if the project:

- Has a substantial adverse effect on a scenic vista,
- Substantially damages scenic resources, including trees, rock outcroppings, and historical buildings within a state scenic highway,
- Substantially degrades the existing visual character or quality of the site or surroundings, or
- Creates a new source of substantial light or glare.

In the County General Plan and its supporting documents, additional criteria to determine significance are proposed. According to the County General Plan, visual resources effects are considered significant if the project:

- Disturbs physical scale and visual continuity,
- Does not protect natural landforms and features,
- Is within a Coastal scenic area, is "visible from Highway 101" and causes change that is not "subordinate to the character of the designated area...",
- Results in vegetation clearing that is not minimized,
- Results in development of these resources: Arcata Bottoms, Bottomlands between Eureka and Arcata, South Spit, Bottomlands around South Bay, Ryan and Freshwater Slough, Eel River and associated riparian vegetation, Eel River estuary bottomlands.

4.6.3 Effects Analyses of the Proposed Project

Potentially significant Proposed Project effects and related mitigation measures are described below.

IMPACT AV-1: Potentially Significant Effect on Scenic Vistas. Mechanical and chemical treatments can have short term substantial and adverse effects on scenic vistas by creating brown, bare, or covered areas. Intensity depends on the extent of the treated area but changes in scenic vistas will be temporary. Substantial regrowth of native vegetation is expected to occur within one to 2 years of

treatment. With implementation of the following mitigation measure, this impact would be mitigated to less than significant.

MITIGATION AV-1: Post Educational Signs. Educational signs shall be posted in areas where public use is high. The signs will explain *Spartina*'s ecological impacts and describe the project. Increased public understanding of the project will improve the public's reaction to the temporary adverse change to the scenic marsh vista.

MITIGATION AV-2: Limit covering. In any given area that is visible from a public vantage point, including roads, highways and other areas of relatively high public use, covering shall be limited to 0.5 acres.

IMPACT AV-2: Potentially Significant Effect on Visual Continuity. Physical and chemical treatments can temporarily but substantially and adversely affect visual continuity depending on the extent of treated area. Substantial regrowth of native vegetation is expected to occur within one year of treatment. With implementation of the following mitigation measure, this impact would be mitigated to less than significant.

MITIGATION AV-1 (see above)

IMPACT AV-3: Potentially Significant Effect due to Vegetation Clearing. Physical and chemical treatments can result in vegetation clearing, depending on the treatment method used. Substantial regrowth of native vegetation is expected to occur within one year of treatment. With implementation of the following mitigation measure, this impact would be mitigated to less than significant.

MITIGATION AV-1 (see above)

4.6.4 Effects Analyses of Alternative 1, Mechanical Treatment Only

Aesthetic and visual effects of Alternative 1 will be similar in nature but could be less in area at a single time, than those of the Proposed Project. The area that could be treated using chemical methods may be larger than what could be treated mechanically, given the same amount of financial resources. For example, given the same funding, a larger area could be chemically treated than mechanically treated with brushcutters, so the visual impacts of the chemical treatment (allowed under the Proposed Project) would be greater than under Alternative 1. The characteristics of chemically and mechanically treated areas are generally similar; both result in a changed landscape from vegetative cover to either brown vegetation or bare ground.

Alternative 1's effects are the same as those of the Proposed Project; potentially significant effects may occur but they can be mitigated to less than significant by Mitigation AV-1.

4.6.5 Effects Analyses of Alternative 2, No Project

Aesthetic and visual effects of Alternative 2 will be similar in nature but could be longer lasting than those of the Proposed Project. One of the primary advantages of implementing the Plan is to coordinate efforts, thereby increasing treatment and control efficiency, and decreasing the risk of continued spread and reinfestation of *Spartina*. Without coordination, *Spartina* could spread farther and treated areas could be reinfested, making the need for follow up and additional treatments more likely. Additional treatments would increase the time and area of visually impacted scenic resources.

Therefore, under Alternative 2, aesthetic and visual effects could be greater than those of the Proposed Project. Mitigation AV-1 would still minimize impacts to less than significant because the impacts would still be temporary, however, Mitigation AV-1 would likely need to be implemented over a longer period of time.

4.7 Air Quality

This section describes existing air quality in the North Coast Air Basin (NCAB), processes affecting air quality, and the regulatory framework under which air pollutant emissions are controlled. Potential effects of treatment methods on local and regional air quality and odors are evaluated herein and mitigation measures are identified where necessary to address potentially significant impacts.

4.7.1 Summary of Present and Possible Future Conditions

The physical and regulatory air quality for the affected area (i.e., the Humboldt Bay coastal region) is described below, based on air quality data at the closest air monitoring stations. Applicable air quality regulations, significance thresholds and planning efforts are described for the Humboldt Bay area as well.

4.7.2 Regional Air Quality

The NCAB consists of Del Norte, Trinity, Humboldt, Mendocino, and the northern half of Sonoma County, and is under the regulatory jurisdiction of NCUAQMD. NCUAQMD contains 7,767 mi^2, or approximately 5% of the total area of California. It is bordered on the west by the Pacific Ocean and extends from the Oregon border south approximately 140 mi to the Mendocino County line, and varies between 30 to 100 mi in width inland.

4.7.3 Topography

The topography of NCUAQMD is mountainous. There is some fairly level terrain found along the coast and in isolated mountain valleys but in general the entire District is covered in mountains that are generically known as the Coast Range. Elevation varies from sea level to over 9,000 ft. The mountain ranges generally run north to south, divided by deep canyons cut by the rivers in this area. Most of the rivers in the area flow into the Pacific Ocean within the boundaries of NCUAQMD, while often having their origins in areas outside NCUAQMD (NCUAQMD 1997).

4.7.4 Meteorology

The weather in NCUAQMD is dependent on distance from the ocean and elevation. The coastal areas have cool summers with frequent fog and mild rainy winters. This changes just inland of the coast to hot, dry summers and cold, snowy winters. Inland areas experience cooler summers and more snow in the winter with increasing elevation. Coastal areas have the ocean to moderate temperatures year-round. Some portions of NCUAQMD have some of the highest rainfall totals found in the United States, over 60 in some years in coastal areas with more rainfall occurring inland, which all occurs during the winter rainy season (NCUAQMD 1997).

Dominant winds also exhibit a seasonal pattern on the North Coast, particularly in coastal areas. During the summer, frequently strong, north to north westerly winds are common, while in the winter storms from the south Pacific increase the percentage of days winds are from southerly quadrants. In the river canyons that empty into the Pacific, a diurnal pattern is often present in wind direction. In the morning hours, cool air from higher elevations flows down the valleys, while later in the day, as the lower elevation air heats up, this pattern is reversed, and the air flow heads up the canyon. These air flows can be very strong. Offshore and onshore air flows are also common along the coast and are associated with regional pressure systems. Often, onshore air flows brings foggy cool weather to the coast, while offshore flows blow fog away from the coast and brings sunny mild days (NCUAQMD 1997).

Temperature inversions are a common occurrence in NCUAQMD. Vertical air movement is important in spreading pollutants through a thicker layer of air. Horizontal movement is important in spreading pollutants over a wider area. Upward dispersion of pollutants is hindered wherever the atmosphere is stable; that is, where warm air overlies cooler air below. This situation is known as a temperature inversion. There are 2 types of temperature inversions that are common on the North Coast, the radiation inversion and the subsidence inversion. The coastal regions of NCUAQMD are also at times affected by an inversion known as a modified subsidence inversion. A radiation inversion is caused by cooling of the air layer near the surface of the ground and may extend upward several hundred feet. This inversion type is found almost daily, year-round, during the night and early

morning hours and little, if any, vertical mixing takes place in the inversion layer. The inversion is destroyed when heat from the sun the following day heats the lower layers of air, and mixing once again commences through the inversion layer. Although this inversion is almost a daily occurrence, it is more prominent from late fall through early spring when heating from the sun is weaker and hours of sunshine are less. While the radiation inversion is almost always destroyed by mid-morning in the summer months, it may persist until near noon in the winter months, and at times is not destroyed during the whole day or for several days. This type of inversion is more of a problem in the inland valleys, especially during the winter months, although it also occurs in the coastal areas. A subsidence inversion is caused by downward moving air aloft, which is common in the area of high pressure along and off the coast of California. As the air descends, it warms at a rate of 5.5 degrees Fahrenheit per 1,000 ft. Thus, it arrives at a lower height warmer than the air just below. This limits vertical mixing of the air. This type of inversion can frequently affect large areas and is common during the summer months. The modified subsidence inversion is the normal subsidence inversion intensified by cooling of the lower layers from the cool ocean water found off our coast. Thus, not only are the upper layers warmed, but the lower layers are cooled giving a very strong, shallow inversion. This inversion is present mainly from late spring through early fall and generally affects only the coastal areas of NCUAQMD (NCUAQMD 1997).

4.7.5 Air Quality Attainment Status

NCAB is currently in attainment (or is unclassified) of state and federal Ambient Air Quality Standards (AAQS), with the exception of the state standard for particulate matter less than 10 micrometers in diameter (PM10). (In terms of comparative size, a human hair is approximately 50 microns across, while fine beach sand is approximately 100 microns across.) Attainment means that the values the government set for clean healthy air are not exceeded in an area. Nonattainment classification means that the air quality for that pollutant does not meet the state and/or federal AAQS for healthy air. Humboldt County has been designated by the California State Air Quality Board (CSAQB) as being in "non-attainment" for PM10 air emissions. Despite the non-attainment designation for PM10, air quality is generally regarded as good. Nearly all areas of the state are classified as non-attainment for PM10. The greatest sources of PM10 are human-caused area-wide sources such as residential wood burning and unpaved roads; construction (site grading) activities contribute a small fraction of PM10 emissions. An AAQS for particulate matter less than 2.5 microns in diameter (PM2.5) has been designated for NCAB, but attainment status has not been designated.

The 2 pollutants of greatest concern in Humboldt County are ozone and particulate matter. The county's sunny climate, pollution-trapping mountains and valleys, along with the growing population, all contribute to the problem. Ozone is an invisible pollutant formed by chemical reactions involving nitrogen oxides, reactive hydrocarbons and sunlight. It is a powerful respiratory irritant that can cause

coughing, shortness of breath, headaches, fatigue and lung damage, especially among children, the elderly, the ill, and people who exercise outdoors. Particulate matter is fine mineral, metal, soot, smoke and dust particles suspended in the air. PM2.5 has more severe potential health impacts than PM10. Particles of this size and smaller can permanently lodge in the deepest, most sensitive areas of the lungs, and cause respiratory and other health problems. The California Air Resources Board (CARB) recently concluded that PM2.5 is far more hazardous than previously estimated.

NCUAQMD monitors criteria pollutants at 3 stations in Eureka. The stations are known as the Eureka Downtown Station, Jacobs Avenue Station, and Humboldt Hill Station. NCUAQMD established the new Jacobs Avenue monitoring station to complement the Eureka Downtown Station. The new station measures criteria pollutants including ozone (O3), particulate matter (PM10), nitrogen dioxide (NO2), ammonium (NH3), sulfur dioxide (SO2), carbon monoxide (CO), continuous PM and air toxics. Information is collected 24 h a day, 7 days a week. The new station went online in the summer of 2011. Tables 4-1 through 4-4 provide trend summaries for ozone, PM10, PM2.5, CO and NO2. NH3 and SO2 summaries are not available.

Table 4-1. State and National Standards for Selected Criteria Pollutants, and Measured Air Pollutant Concentrations in the NCAB: Trend Summary for Ozone

	Days > Standard				1-Hour Observations			8-Hour Averages				Year Coverage	
	State		National			State	Nat'l	State		National			
Year	1Hr	8Hr	1Hr	2008 8Hr	Max	D.V.[1]	D.V.[2]	Max	D.V.[1]	Max	2008 D.V.[2]	Min	Max
2010	**1**	0	0	0	**0.097**	0.08	*0.088*	0.051	0.06	0.05	0.053	95	97
2009	0	0	0	0	0.094	0.08	*0.08*	0.064	0.064	0.063	0.056	94	98
2008	0	**1**	0	0	0.09	0.08	*0.08*	**0.072**	0.069	0.072	0.058	56	99

Years: Annual ozone statistics are available for this basin from 1978 through 2010
Notes: All concentrations expressed in parts per million
The national 1-hour ozone standard was revoked in June 2005 and is no longer in effect. Statistics related to the revoked standard are shown in italics
State and National exceedances shown as bold text
[1] D.V. = State Designation Value
[2] D.V. = National Design Value
Source: CARB Undated

The only standard currently listed as nonattainment on the North Coast is the state standard for PM10. Air quality standards are set for particulate this size because particles under 10 microns can get past the human lung's natural filtration systems. The North Coast, along with most of the rest of California, does not meet the ambient levels the state sets for PM10; the federal PM10 standard is 3 times the level set by California. There are many particulate matter sources, and NCUAQMD

implements control measures for those that are considered significant. The North Coast trend summary for PM10 is provided in Table 4-2.

Table 4-2. State and National Standards for Selected Criteria Pollutants, and Measured Air Pollutant Concentrations in the NCAB: Trend Summary for PM10

	Est Days > Standard		Annual Average		3-Year Average		High 24-Hr		
Year	Nat'l	State	Nat'l	State	Nat'l	State	Nat'l	State	Year Coverage
2010	*	6	22.1	19	19	22	64.5	67.3	100
2009	*	6.1	23.3	18.8	25	22	230.7	59.5	100
2008	*	23.6	40.2	21.5	20	22	301.9	285.8	100

Years: Annual PM10 statistics are available for this basin from 1987 through 2010
Notes: All concentrations expressed in micrograms per cubic meter
*There was insufficient (or no) data available to determine the value
Source: CARB Undated

Similar to PM10, monitoring of PM 2.5 also occurs at 3 stations within the Humboldt Bay area. An AAQS has recently been adopted for PM2.5, but NCAB attainment status has not been designated. Table 4-3 below provides a trend summary for PM2.5.

Table 4-3. State and National Standards for Selected Criteria Pollutants, and Measured Air Pollutant Concentrations in the NCAB: Trend Summary for PM2.5

	Est. Days > Nat'l	Annual Average		Nat'l Annual Std	State Annual	Nat'l '06 Std	Nat'l '06 24-Hr Std	High 24-Hr Average		Year Coverage	
Year	'06 Std	Nat'l	State	D.V.[1]	D.V.[2]	98th Percentile	D.V.[1]	Nat'l	State	Min	Max
2010	0	7.7	5.6	6.8	8	21.2	24	22.0	47.5	96	100
2009	0	7.0	7.0	7.3	8	24.2	25	35.0	30.3	29	100
2008	0	7.9	7.9	7.5	8	31	25	31.6	31.6	100	10

Years: Annual PM2.5 statistics are available for this basin from 1999 through 2010
Notes: All concentrations expressed in micrograms per cubic meter
1: D.V. = National Design Value
2: D.V. = State Designation Value
*There was insufficient (or o) data available to determine the value
Source: CARB Undated

Although there are high 24 h values for PM2.5 emissions, the estimated number of days that PM2.5 emissions exceeded the national average is zero. NCUAQMD anticipates that the county will be designated as in attainment for the annual average, but non-attainment for 24 h, PM2.5 standard. CO and NO_2 emissions are also monitored for Humboldt Bay. A trend summary for CO and NO_2 is provided below in Table 4-4. Humboldt County is designated as having CO and NO_2 attainment status.

Table 4-4. State and National Standards for Selected Criteria Pollutants, and Measured Air Pollutant Concentrations in the Humboldt Bay Area: Trend Summary for Carbon Monoxide and Nitrogen Dioxide

Pollutant (Unit of Measure)	Average Time	State Standard	National Standard	Mean - 2011
Carbon Monoxide (CO) (ppm)	1 h	20 ppm	35 ppm	0.6
	8 h	9.0 ppm	9 ppm	0.99
Nitrogen Dioxide (NO_2) (ppm)	1 h	180 ppb	-	12.6
	Annual	30 ppb	0.053 ppm	3

ppm = parts per million
- = insufficient (or no) data available to determine the value
Source: CARB, Undated for NCAB (Eureka Downtown, Eureka Jacobs, and Humboldt Hill Station results listed for station with larger number of exceedance days)

For discussion of existing conditions and the proposed herbicides for chemical treatment see Section 4.11, Hazards and Hazardous Materials.

4.7.5.1 Regulatory Framework

CARB has primary responsibility for regulating emissions from stationary, mobile, and area sources. CARB and the U.S. Environmental Protection Agency (EPA) currently focus on the following air pollutants as indicators of ambient air quality: Ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM10 and PM2.5), and lead (Pb). Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documentation is available, they are commonly referred to as "criteria air pollutants."

The CARB requires regions that do not meet the California AAQS for ozone to submit clean air plans (CAP) that describe plans to attain the standard. The Bay Area Air Quality Management District (BAAQMD) has prepared the Bay Area CAP to address the California Clean Air Act. This plan includes a comprehensive strategy to reduce emissions from stationary, area, and mobile sources to achieve a region-wide reduction of ozone precursor pollutants. Air quality plans are developed on a triennial basis, with the latest plan developed in 2000 (i.e., 2000 CAP). The primary objective of the 2000 CAP is to reduce ozone precursor pollutants through the implementation of all feasible control measures. NCUAQMD does not currently have an Ozone CAP, but does have an annual Air Monitoring Network Plan. The Attainment Plan for PM10 was developed in 1995.

4.7.6 Sensitive Receptors

Sensitive receptors include schools, residential areas, hospitals, and senior centers. In general, some receptors are considered more sensitive than others to air pollutants. The reasons for greater than

average sensitivity include pre-existing health problems, or duration of exposure to air pollutants. Land uses such as schools, hospitals, and convalescent homes are considered to be sensitive to poor air quality. This is because infants and children, the elderly, and people with health conditions, especially respiratory ailments, are more susceptible to respiratory infections and other air-quality-related health problems than the general public. Residential areas are also considered to be sensitive to air pollution, because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present.

4.7.7 Definition of Significance and Baseline Conditions

This analysis considers to what degree the Proposed Project will (a) directly interfere with the attainment of long-term air quality objectives identified by NCUAQMD; (b) contribute pollutants that would violate an existing air quality standard, or contribute to a non-attainment of air quality objectives in the NCAB; (c) produce pollutants that would contribute as part of a cumulative effect to non-attainment for any priority pollutant; (d) produce pollutant loading near identified sensitive receptors that would cause locally significant air quality impacts; or (e) release odors that would affect a number of receptors.

NCUAQMD is committed to achieving and maintaining healthful air quality throughout its tri-county jurisdiction as a regional government agency. This is accomplished through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. As part of NCUAQMD clean air strategy, they do the following:

- Adopt rules that limit pollution, issue permits to ensure compliance, and inspect pollution sources;
- Minimize the effects of agricultural burning through the use of smoke management plans;
- Inventory and assess the health risks of toxic air emissions;
- Monitor the North Coast's air quality by operating air monitoring stations throughout NCUAQMD;
- Administer Motor Vehicle Emission Reduction Programs;
- Minimize the air quality impact of new businesses and land development projects before they are constructed;
- Investigate public complaints and respond to requests for information;
- Partner with other government agencies to promote air quality projects; and
- Provide individuals and businesses with training on federal, state, and local air pollution control topics.

The following evaluation will consider impacts to air quality from PM10 air emissions as a result of the Proposed Project. Due to the type of Proposed Project activities, specific federal, state and NCUAQMD rules and policies that pertain to agricultural burning and the application of herbicides have been identified below within the discussion subsection of Section 4.7.9, Effects Analyses. The San Francisco BAAQMD CEQA guidelines have been consulted for this analysis as directed by NCUAQMD.

4.7.8 Overview of Effects Analyses

Potential impacts to air quality caused by the proposed *Spartina* control measures are qualitatively described for the Proposed Project. Alternatives 1 and 2 are analyzed to a lesser extent since the Proposed Project is expected to utilize more treatment techniques at an aggressive rate of up to 566 acres annually. Proposed Project related emissions are anticipated to be *de minimus* in nature, and would be well below any established thresholds. Guidelines state that emissions modeling would not need to be conducted for projects that meet the screening guidelines. The screening guidelines are specific to different land use types and size. The Proposed Project is not construction or operational in nature, does not fall within any of the land use types listed within the screening criteria, and potential associated Proposed Project impacts would be much less than impacts associated with the listed land uses in regard to air quality. There are also specific screening guidelines for carbon monoxide, which are identified below within the carbon monoxide impact and mitigation measure discussion.

The screening criteria identified are not equivalent to CEQA thresholds of significance. BAAQMD developed screening criteria to provide lead agencies and project applicants with a conservative indication of whether a project could result in potentially significant air quality impacts. If all of the screening criteria are met by a proposed project, then the lead agency or applicant would not need to perform a detailed air quality assessment of their project's air pollutant emissions. These screening levels are generally representative of new development on greenfield sites without any form of mitigation measures taken into consideration. In addition, the screening criteria do not account for project design features, attributes, or local development requirements that could additionally result in lower emissions and reduction in potential impacts. For projects that are mixed use, infill, and/or proximate to transit service and local services, emissions would be less than the greenfield type project that these screening criteria are based on (BAAQMD 2011).

The primary air quality issues associated with the treatment of non-native *Spartina* are the potential for dust emissions from ground treatment methods such as gas-powered brushcutters, mowers, grinders, tractors (used for disking, tilling, crushing), bobcats (used for excavating and digging), smoke emissions associated with burning *Spartina* wrack or flaming of seedlings, and potential for chemical

drift from spray application of herbicide or surfactants. The analysis is conducted in accordance with procedures recommended by NCUAQMD. NCUAQMD has been consulted regarding the appropriate significance thresholds for eradication/control measures given the temporary nature of potential impacts. Finely mulching the *Spartina* wrack is preferred over burning and is expected to be used much more frequently than burning, especially when a residential area is near the site, or if the site is near oyster beds. Current mechanical control methods and equipment do not generate large pieces of wrack. Raking and hauling of wrack is cost prohibitive. If wrack is hauled offsite, it must be composted prior to disposal at a green waste refuse facility. Composting odor, since this method is not proposed as part of the Proposed Project, is *not* a potential impact. If *Spartina* wrack is to be burned, piles will range from about 3 to 5 ft tall, and 4 to 5 ft wide.

Potential air quality impacts are assessed by describing the potential "worst-case" scenario. The scenario that could most affect local air quality would be widespread pile burning of *Spartina* wrack. Emissions from pile burns are described below since NCUAQMD has rules that address these types of emissions.

NCUAQMD is responsible for monitoring and enforcing local and state air quality standards. Air quality standards are set for emissions that may include, but are not limited to: fugitive dust, particulate matter, and visible emission. Pursuant to Air Quality Regulation 1, Chapter IV, Rule 400 – *General Limitations*, a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Fugitive dust means any solid *particulate matter* that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person. Examples of sources include open fields, dirt/unpaved roads, and uncovered stock piles. With regard to particulate matter, all of Humboldt County has been designated by CSAQB as being in "non-attainment" for PM10 air emissions. PM10 air emissions include fugitive dust and chemical emissions. Examples of PM10 emissions include smoke from agricultural burning and fireplaces, motor vehicle/equipment emissions (particularly diesels but also petrol-fuelled vehicles), and construction activities (grading and equipment emissions). Natural sources of PM10 include windblown dust, smoke from wildfires, airborne salts, other particulate matter naturally generated by ocean surf, and pollen. Visible emissions are fairly self-explanatory. They include emissions that are visible to the naked eye, such as smoke from a fire. Because, in part, of the large number of wood stoves in Humboldt County and because of the generally heavy surf and high winds common to this area, Humboldt County has exceeded the state standard for PM10 air emissions. Therefore, any use or activity that generates unnecessary airborne

particulate matter may be of concern to NCUAQMD. The use of mechanical control may result in the release of small particulate matter from the engines of hand-held brushcutters and mechanical tracked equipment. The amount of small particulate matter that will be released is expected to be small relative to regional emissions. Particulate matter generated within the Management Area is part of the total particulate load in the NCAB. Because the Basin is "nonattainment" for PM10, this generation would be, by definition, a contribution to this significant cumulative effect. Proposed Project activities could contribute to the cumulative effect of exceeding the state PM10 standard. The CEQA Guidelines provide explicit guidance for a circumstance in which a proposed action may result in a contribution to a cumulative effect on a regional basis, in Guidelines Section 15064(i)(3), where there is an ongoing regulatory concern but for which the relevant regulatory body has adopted an appropriate control plan:

> "A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency."

The 1995 PM10 Attainment Plan adopted by NCUAQMD provides specific requirements for addressing the particulate nonattainment in the NCAB, and the plan was adopted pursuant to a formal public review process. Therefore, compliance with NCUAQMD's plan would constitute the necessary mitigation (see below) to allow the lead agency to conclude that Proposed Project activities would result in less-than-significant air quality effects.

The Proposed Project has the potential to generate wrack by mechanical control methods, but wrack will typically be ground to small size and mulched into the site, rather than being burned or allowed to be carried away by the tides. Current methods and equipment do not generate large pieces of wrack. However, it is possible that under some circumstances, it may be desirable to burn piles of *Spartina* wrack generated by mechanical control, or to burn dead *Spartina* remaining after chemical control. If *Spartina* wrack is to be burned, piles would typically range from about 3 to 5 ft tall, and 4 to 5 ft wide. Air quality impacts from burning are evaluated below. Also refer to Impact AQ-2 and Mitigation Measure AQ-2. Burning of *Spartina* wrack and operation of equipment generating PM10 emissions will be conducted in accordance with Air Quality Regulation 1, Chapter IV, of NCUAQMD. Regulation 1 governs particulate generation from burning and from construction

equipment. Mitigation measures will include ensuring that mechanical control equipment is properly tuned, and limiting idling time of large equipment to 5 min. The following rules in this Regulation apply:

1.1.11 Agricultural Burning: Open outdoor fires used in agricultural operations, in the growing of crops or raising of fowl or animals, or open outdoor fires used in forest management, *range improvement or the improvement of land for wildlife and game habitat*, or disease or pest prevention.

1.85 Designated Agency, Applied to Open Burning: Any agency designated by CARB as having authority to issue agricultural burning permits, including prescribed burning permits as *NCUAQMD*, U.S. Department of Agricultural Forest Service (USFS), and *CDF* are so designated within their jurisdiction of NCUAQMD. *The project area is not within USFS or CDF jurisdiction. The project area may be within the jurisdiction of a local fire agency and/or department, and will be determined on a site specific basis.*

1.86 Designated Marginal Burn Day: A day when limited amounts of agricultural burning, including prescribed burning, for individual projects in specific areas for limited times is not prohibited by the state board and burning is authorized by the AQMD.

1.87 Designated No-Burn Day: Any day, or portion thereof on which agricultural burning, including prescribed burning is prohibited by CARB or by the Air Pollution Control Officer (APCO) of NCUAQMD.

1.88 Designated Permissive Burn Day: Any day, or portion thereof, meeting the requirements of Rule 201 of these Rules and Regulations. For the purposes of determining daily burn status, the APCO shall utilize identified designated smoke management areas, shall consider local meteorological and air quality related factors, and shall be guided by CARB's daily determinations.

1.89 Designated Smoke Management Areas: Any of 3 approved burn day Smoke management areas within NCUAQMD, including:

Zone 1 - Coastal Smoke Management Area: Includes all lands within the 5 statute air miles inland from the Pacific Ocean coastline, and all lands less than 2,000 ft mean sea level within the jurisdiction of NCUAQMD north of Cape Mendocino and identified by the APCO. The Proposed Project Area is within this zone.

Treatment efforts are not expected to expose sensitive receptors to significant pollutant levels. Herbicide would only be applied in locations and conditions when exposure of sensitive receptors, such as schools, residential areas, hospitals, and senior centers, would be highly unlikely to occur. However, the potential for sensitive receptor exposure from herbicide application and burning of wrack and the specific conditions under which application and burning could occur and locations at which it could occur are evaluated below for the Proposed Project. Also refer to Impact AQ-3 and Mitigation Measure AQ-3. More detailed discussion of worker and public health effects of herbicide exposure due to spray application can be found in Section 4.11, Hazards and Hazardous Materials. With regard to objectionable odors, the Proposed Project does not propose any treatment methods that will result in odors that could reasonably be considered objectionable by the general public.

4.7.9 Effects Analysis of the Proposed Project

Potentially significant Proposed Project effects and related mitigation measures are described below. The effects and mitigation measures are generally applicable to all the significance criteria. As described below, all effects are considered less than significant after mitigation.

All methods would involve relatively small emissions of criteria air pollutants through either direct or indirect sources. Direct sources may include emissions from equipment such as gas-powered brushcutters, mowers, grinders, tractors (used for disking, tilling, crushing), and bobcats (used for excavating and digging). Emissions from indirect sources would include vehicles, all-terrain vehicles (ATVs), and boats used for transporting materials and workers and worker vehicle trips to the work sites.

IMPACT AQ-1: Dust Emissions. Dust contains PM10, for which BAAQMD has established best management practices (BMP) to obtain less than significance impacts to air quality. Treatment of infested sites using manual or mechanical and ground-based chemical methods will require accessing the sites on foot or by vehicles. This is expected to cause disturbance to soils during access to the treatment sites. However, the majority of the work would be done in wet or moist soil or mud, thereby minimizing the likelihood of dust generation. The primary source of airborne dust generated by the Proposed Project would be travel on unpaved access roads to the treatment sites. Dust generation is expected to be localized, and not result in emissions that affect off-site receptors, or exceed BAAQMD significance thresholds. Therefore, the impact would be less than significant. Although potential impacts are expected to be less than significant, Mitigation AQ-1 will be implemented at treatment sites as a precautionary measure and BMP.

MITIGATION AQ-1: Dust Control. Apply dust control measures where treatment methods may produce visible dust clouds and where sensitive receptors (i.e., houses, schools, hospitals) are located within 500 ft of the treatment site. The following dust control measures shall be included:

- Suspend activities when winds are too great to prevent visible dust clouds from affecting sensitive receptors; and
- Limit traffic speeds on any dirt access roads to 15 mi per hour.

Implementation of this mitigation measure is in accord with attainment of long-term air quality objectives identified by NCUAQMD and BAAQMD. Additionally, implementation of this measure will abate contributions of PM10 pollutants in the NCAB that is classified as being non-attainment, which would mitigate contributions as part of a cumulative effect to non-attainment of this priority pollutant.

IMPACT AQ-2: Smoke and Ash Emissions. Treatment methods and activities using burning are a potential source of PM10 emissions involving smoke and ash from prescribed burns. Burning of wrack may be proposed on a project-specific basis and is not necessarily part of all project activities. Size of wrack piles, location, distance from sensitive receptors, frequency and timing of burning, and method of ignition are project-specific variables that would be necessary to determine. This information would be supplied to District APCO as part of project-specific consultation and permitting. The emissions would vary depending on the amount and type of activity, target plant and soil conditions, and meteorological conditions. This impact would be less than significant. However, burning is subject to NCUAQMD Regulation1– Open Burning, and approval of NCUAQMD and a local fire agency to minimize the impact to both local and regional air quality. Under this regulation, prescribed burns are allowable under Section 1.1.11 and 1.88/Rule 201 on permissive burn days. Notification to NCUAQMD and a local fire agency is required well in advance of the burning activities. Prescribed burns conducted in accordance with this regulation would result in less than significant impacts to air quality. Although expected to be less than a significant impact, Mitigation AQ-2 will be implemented as a precautionary measure. Temporary incidences of odors from prescribed burns may be detected and would be less than significant due to the short term temporary nature of the emissions and compliance with NCUAQMD rules and regulations.

MITIGATION AQ-2: Smoke and Ash Emissions. The Management Area is within NCUAQMD Smoke Management Zones 1 and 2. Therefore, for prescribed burns, notification of and coordination with NCUAQMD and a local fire agency shall happen well in advance, prior to initiating the burn. Depending upon the quantity of material to be burned, the District APCO may request that a burn authorization number be obtained prior to ignition. On a project specific basis, a burn permit may be required with NCUAQMD to address potential issues with smoke and as a component of a smoke

management plan, if deemed necessary. Additional notification to the local fire agency and/or department may also be required as deemed appropriate by the APCO. The following shall be conducted as a part of this mitigation measure:

- Initiate consultation with the District APCO by calling (707) 443-3093 (or the current phone number) to determine if the following would be required for the site specific project:
    - Burn authorization number,
    - Burn permit, and/or
    - Smoke management plan, as well as
    - Consultation with additional agencies such as the local fire agency and/or department.
- If the treatment is occurring within the jurisdiction of a local fire agency and/or department, initiate consultation well in advance, prior to the initiating the burn.

Implementation of this mitigation measure is in accord with attainment of long-term air quality objectives identified by NCUAQMD. Additionally, implementation of this measure will abate contributions of visual PM10 pollutants in the NCAB, pollutant loading near identified sensitive receptors that would cause locally significant air quality impacts, and the release of odors that would affect a number of receptors.

IMPACT AQ-3: Herbicide Effects on Air Quality. Refer to Section 4.11, Hazards and Hazardous Materials, for discussion of herbicide application effects on worker and public health and the environment. Spray application of herbicides and surfactants could result in chemical drift to populated areas. The potential for chemical drift is highly dependent on the proximity to populated areas, wind flow, equipment used, applicator nozzle size, and height application is conducted above ground. Drift from ground application can extend up to approximately 250 ft, with herbicide concentrations diminishing as the drift gets farther from the source. For perspective, herbicide drift from aerial application has been measured up to 2,600 ft (approximately half a mile) from the source (NCAP 2002). Chemical drift to areas within 250 ft of a treatment site could be a potentially significant impact if sensitive receptors are within the potential impact area. The treatment sites are generally in open space, greater than 250 ft from urban areas. Therefore, ground–based application of herbicide is not expected to result in air quality impacts since the application would occur only within the targeted areas, and because the proposed surfactants have low volatility. While there are no established BAAQMD significance thresholds for herbicides that would be sprayed during implementation of the Control Program, spray application of herbicides has the potential to cause chemical drift that could expose the public to the herbicide downwind from application areas. Populated areas may detect slight odors and proximity to the treatment site, droplet size, and wind conditions are the primary factors that affect drift of herbicide, and detection or exposure of the

public. Although there is no evidence that imazapyr could cause human health risks when used for its intended use and applied appropriately according to the Supplemental California Manufacturer Label (see Section 4.11, Hazards and Hazardous Materials), impacts such as skin or eye irritation or respiratory problems (similar to those that result from smog) could occur if drift affected populated areas. For these reasons, this impact could be potentially significant. However, the herbicide sprayers would be used for a short period of time and in a manner consistent with its intended use. Therefore; with implementation of the mitigation measures discussed below, these emissions would have a less than significant impact on air quality.

MITIGATION HHM-4: Avoid Health Effects to the Public and Environment from Herbicide Application. (Section 4.11).

IMPACT AQ-4: Ozone Precursor Emissions. Treatment methods involving internal combustion engines are a potential source of ozone emissions. BAAQMD has established significance thresholds for emissions of ozone precursor pollutants (reactive organic gases and nitrogen oxides) of 54 pounds per day for each pollutant. BAAQMD CEQA Guidelines indicate that projects with potential to exceed the established thresholds are: 1) traffic associated with subdivision developments of 320 homes, 2) shopping centers of 44,000 ft^2, or 3) office parks of 210,000 ft^2. The potential traffic associated with the Proposed Project would be temporary and well below the guidelines specified by BAAQMD. One home being constructed on one acre (includes staging area) would require more workers than required to eradicate *Spartina* on one acre, and thus potential Proposed Project associated traffic would not meet significance criteria. Therefore, the combination of direct and indirect vehicular or equipment-related emissions associated with implementation of the Proposed Project would result in emissions less than BAAQMD thresholds for ozone precursor pollutants. Vehicle and equipment emissions with regard to ozone would be less than significant. Thus, the Proposed Project would not be contributing significant ozone emissions. Furthermore, NCAB is not classified as being in non-attainment of ozone emissions standards, and ozone is therefore not a priority pollutant of concern in the Basin. Therefore, no mitigation is recommended for this less than significant impact.

IMPACT AQ-5: Carbon Monoxide Emissions. Treatment methods involving internal combustion engines are a potential source of CO emissions. BAAQMD CEQA Guidelines indicate that exceedance of the CO air quality standard are not anticipated from projects that generate less than 10,478 (8 h average) or 23,284 (1 h average) pounds per day of CO, do not cause congestion at intersections, and would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour. Traffic generated by implementation of any of the treatment methods would not lead to exceedances of CO air quality standard. Therefore, the impact is considered to be less than significant and no mitigation is required for this impact.

4.7.10 Effects Analyses of Alternative 1, Mechanical Treatment Only

Alternatives would likely be implemented over a smaller area than the Proposed Project. The Proposed Project would include all available control techniques at an assumed regional eradication rate of 566 acres or less and, therefore, has the greatest potential for air quality impacts.

4.7.10.1 Impacts

Alternative 1 is identical to the Proposed Project, with the exception that chemical methods would not be used, and manual or mechanical treatment methods would be applied more frequently for treatment methods. Impacts associated with this alternative would be similar to the Proposed Project, except impacts associated with herbicide and surfactant application would be eliminated and replaced by increased dust and smoke from repeated mechanical treatment. Therefore, potential air quality impacts would be similar to, but generally less than, those described for the Proposed Project.

4.7.10.2 Mitigation Measures

Mitigation measures AQ-1 and AQ-2, above, would apply to Alternative 1. Implementation of these Mitigation Measures would reduce residual impacts of Alternative 1 to less than significant.

4.7.11 Effects Analyses of Alternative 2, No Project

Alternatives would likely be implemented over a smaller area than the Proposed Project. The Proposed Project would include all available control techniques at an assumed regional eradication rate of 566 acres or less and, therefore, has the greatest potential for air quality impacts.

4.7.11.1 Impacts

The Proposed Project would not be implemented and treatment efforts would not be regionally coordinated. The extent of localized treatment, the methods to be used, and BMPs are not specified and in many cases are unknown. It is known that the Refuge and City of Arcata are conducting *Spartina* removal. Private land owners may also be conducting *Spartina* removal. However, it is likely that the localized treatment would be less widespread than with Alternative 1. Therefore, potential air quality impacts would be generally less than those described for Alternative 1.

4.8 Biological Resources

4.8.1 Present Biological Conditions

Present biological conditions in the Humboldt Bay region are characterized by describing its:

- Potentially affected ecological communities: tidal marsh, mudflat, riparian and aquatic ecological communities.
- Special status species as defined below.
- Local, regional, state and federal plans protecting biological resources.
- Wetlands as defined by Section 404 of the CWA.

Humboldt Bay is approximately 14 mi (22.5 km) long and its width varies from 0.5 mi (0.8 km) in Entrance Bay to 4.3 mi (6.9 km) across the widest part of the North Bay. At high tide, the Humboldt Bay occupies an area of 24.1 mi^2 (62.4 km^2), which is reduced to 10.8 mi^2 (27.97 km^2) at low tide (Proctor et al. 1980). At low tide, extensive intertidal mudflats are exposed, comprising about 2/3 of the Humboldt Bay area (Gast and Skeesick 1964, Proctor et al. 1980). The entrance and shipping channel depths are maintained at 38 to 48 ft (11.6 to 14.6 m) by periodic dredging (HBHRCD 2007).

The area of the Eel River delta is about 50 mi^2 (130 km^2), of which 4 mi^2 (10 km^2) are open sloughs, side channels, and mudflats (USFWS 2009). Tidal influence extends upstream approximately 7 mi (11.3 km) inland. The Eel River estuary experiences a much larger freshwater influence than Humboldt Bay, has a smaller tidal prism, and has greater seasonal variability.

The Mad River is located north of Humboldt Bay. The mouth of the river is continuously migrating, and is currently located approximately 14 mi (22 km) north of the mouth of Humboldt Bay. The Mad River is a freshwater-dominated system, with tidal influence extending approximately 5 mi (8 km) upstream towards the Highway 101 Bridge. The estuary sub-basin drains 17 mi^2 (44 km^2), while the watershed drains 497 mi^2 (1287 km^2).

Numerous sensitive, special status and candidate species are potentially within the Humboldt Bay region, however only a portion of these species are likely within the *Spartina* infested areas. A California Natural Diversity Database (CNDDB) search identified 36 plant and 21 animal species that have been identified within the region. However, many of these species are unlikely to occur in the Management Area, either because they have been extirpated, or occupy habitats not in the Management Area such as coastal dunes or coniferous forest. Based on a literature review (CNPS 2012, HBHRCD 2007) and expert review, 3 ecological communities, 7 special status plant species and 9 special status animal species are determined to be potentially affected by the Proposed Project (Table 4-5 and 4-6). Descriptions of these communities and species are provided below.

4.8.2 Ecological Communities

Spartina occurs and will be controlled primarily within salt marshes and to a much lesser extent within mudflats. One known population of *Spartina* in the Management Area occurs in riparian habitat in the Mad River Estuary. Plant and animal species within salt marshes will potentially be affected by

the Proposed Project. In mudflats, aquatic habitats and riparian habitats, plants are unlikely to be affected, but animals may be affected by noise.

4.8.2.1 Tidal Marsh Community

The tidal marsh community in Humboldt Bay and the Eel and Mad river estuaries is comprised of herbaceous vegetation that is periodically flooded by tidal waters. Tidal marsh communities in the Management Area are thoroughly described in the Plan. In general, tidal marshes are either dominated by *Spartina* or native plant species, or a combination of *Spartina* and native plant species. Conversion of *Spartina* dominated to native-plant dominated tidal marsh as a result of the Proposed Project is considered a beneficial effect on the tidal marsh community.

4.8.2.2 MudFlat Community

Mudflats are exposed during lower tides and are submerged during higher tides. Channels cut across the mudflats. In some areas, eelgrass forms dense beds, and, in other areas, eelgrass is sparsely distributed or absent. Species of algae also occur on mudflats including red alga (*Polysiphonia*), rockweed (*Fucus* spp.) and sea lettuce (*Ulva* spp.). During high tides, fish, including special status fish species described in this PEIR, can occur on mudflats and some may utilize them as foraging habitat. Various invertebrate species including the commercially and recreationally important Dungeness crab (*Metacarcinus magister*) can occur on mudflats during high tides and low tides. The Proposed Project may potentially affect individuals of these species, but the mudflat community as a whole will not be affected.

4.8.2.3 Aquatic Community

The aquatic community in Humboldt Bay and the Eel and Mad river estuaries is comprised of plant and animal species that are always inundated by water. Due to the numerous aquatic species that occur in the bay and estuaries, "functionally related" species groups have been defined (HBHRCD 2006). Special status fish in this community include tidewater goby (*Eucyclogobius newberryi)*, coastal cutthroat trout (*Oncorhynchus clarkii clarkia)*, coho salmon (*O. kisutch),* steelhead (*O. mykiss)*, Chinook salmon (*O. tshawytscha)*, longfin smelt (*Spirinchus thaleichthys)*, green sturgeon (*Acipenser medirostris*) and eulachon (*Thaleichthys pacificus)*. The Proposed Project may potentially affect individuals of these species, but the aquatic community as a whole will not be affected.

4.8.2.4 Riparian Community

Riparian communities are comprised of plants and animals that grow and live along the banks or edges of rivers or creeks. Typically the community includes a dense understory of shrubs and vines with an overstory of trees. Willows (*Salix* spp.) are a common riparian tree species. Riparian areas in the

Planning Area are critical to many species of birds and other animals, such as bank swallow (*Riparia riparia*). The vegetation provides cover and nesting habitat for birds and creates corridors for animal movement. Similar to the aquatic community, the Proposed Project may potentially affect individuals of riparian animal species, but the riparian community as a whole will not be affected.

4.8.3 Special Status Species Potentially Affected

This PEIR focuses on plant and animal species that:

- Are likely to occur within or adjacent to *Spartina* in the Management Area and may be affected by the Proposed Project, and
- Are listed under the ESA or California ESA, or
- Are listed as a Species of Special Concern by the State of California, or
- Are a plant species ranked by the California Native Plant Society (CNPS) as Rank 2 or rarer.

These species are referred to as "special status species".

4.8.4 Special Status Plant Species Potentially Affected

Based on the above criteria, a literature review, and input from species experts, the plant species determined to be potentially affected by the Proposed Project are identified in Table 4-5.

Table 4-5. Special Status Plant Species Potentially Affected by the Proposed Project

Plant Common Name	Scientific Name	Status
Humboldt Bay owl's clover	*Castilleja ambigua* ssp. *humboldtiensis*	CNPS Rank 1B. 2, rare, threatened or endangered in California and elsewhere
Point Reyes bird's beak	*Chloropyron maritimum* ssp. *palustre*	CNPS Rank 1B.2, rare, threatened or endangered in California and elsewhere
Dwarf alkali grass	*Puccinellia pumila*	CNPS Rank 2.2, rare, threatened, or endangered in California, but more common elsewhere .
Western sand-spurrey	*Spergularia canadensis* var. *occidentalis*	CNPS Rank 2.1 rare, threatened, or endangered in CA but more common elsewhere
Lyngbye's sedge	*Carex lyngbyei*	CNPS Rank 2.2, rare, threatened, or endangered in California, but more common elsewhere)
Humboldt Bay wallflower	*Erysimum menziesii* ssp. *eurekense*	Federally and state listed as endangered
Beach layia	*Layia carnosa*	Federally and state listed as endangered

4.8.4.1 Humboldt Bay Owl's Clover, Point Reyes Bird's Beak

Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) and Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*) are discussed together because they are related taxa that co-occur in similar habitat and have similar growth characteristics. Both are given a Rank of 1B.2 by the CNPS, indicating they are fairly endangered in California and elsewhere (CNPS 2012). Neither are listed by the state or Federal Endangered Species Act. They occur in intertidal coastal and brackish marshes in the Humboldt Bay/Eel River region, specifically within high-elevation salt marshes and brackish marshes (Eicher 1987). Both taxa are small annuals and are facultative hemi-parasites; they parasitize other plant species by root connections called haustoria, but also derive some of their energy through photosynthesis. The life histories of these 2 rare annuals have been studied in high elevation salt marsh on islands of the intertidal coastal marsh at Mad River Slough and on the mainland of Mad River Slough in north Humboldt Bay (Bivin et al. 1991).

Pickart (2001) mapped Humboldt Bay owl's clover in May-June 1998 and Point Reyes bird's beak in June 1999 in salt marshes throughout Humboldt Bay. USFWS maintains an ongoing monitoring program for these species on Refuge lands. Both species have exhibited high annual fluctuations in population numbers in over a decade of monitoring in Mad River Slough (Pickart 2001, 2012, Pickart and Miller 1988). Both species are locally abundant, but are rare across their range because of a drastic habitat decline. At the USFWS Refuge's Lanphere and Ma-le'l Dunes Units, removal of *Spartina* from these species' habitat resulted in an explosive population increase of Humboldt Bay owl's clover and Point Reyes bird's beak (Pickart 2012).

A number of conditions contribute to these plants' rare status. Salt marsh habitat has been reduced by an estimated 90% in the study area due to the diking and conversion of marshes for agriculture (Schlosser et al. 2010). Encroachment by *Spartina* in high elevation salt marshes, where both plants occur, represents an ongoing threat (Pickart 2001). Also, because both plants are annuals, they typically have high annual variations in their population sizes.

In a 2-year study at Humboldt Bay on Humboldt Bay owl's clover, no significant impacts associated with application of the grind brushcutter *Spartina* treatment method were detected in terms of plant abundance, vigor, or reproductive output (Eicher and Pickart 2011). Five years after *Spartina* treatment, native species diversity at the Lanphere-Ma-le'l Marsh is high, especially near freshwater springs that occur near the upper margin of the marsh. Native species that colonized the marsh through natural recruitment include Humboldt Bay owl's clover and Point Reyes bird's beak (Pickart 2012). Humboldt Bay owl's clover has been counted and mapped at the site periodically since 1988. Pre-*Spartina*-treatment population size fluctuated between 1,000 to 3,800 individuals, while post-treatment numbers reached 6,213 the 1st year following restoration and have increased every year

since, with an estimated 99,485 in 2011. A nearby control site peaked in 2008, but has declined every year since. Point Reyes bird's beak was observed to have a similar post-treatment positive effect, although the population was not quantitatively monitored due to its more cryptic nature (Pickart 2012).

4.8.4.2 Dwarf Alkali Grass

Dwarf alkali grass (*Puccinellia pumila*) is a perennial salt marsh grass of limited distribution in California. It has a CNPS Rank of 2.2, which indicates it is fairly endangered in California, but more common elsewhere. It is known from only 2 historical occurrences in California, one in the Eel River Wildlife Area, Humboldt County (a 1938 collection) and the other in Fort Bragg, Mendocino County (an 1899 collection); and it is more common in Oregon, Washington, and northeastern North America (Baldwin et al. 2012, CNPS 2012, CNDDB 2013).

4.8.4.3 Western Sand Spurrey

Western sand spurrey (*Spergularia canadensis* var. *occidentalis*) is a diminutive annual herb found in high elevation coastal salt marsh. It has a CNPS Rank of 2.1, which indicates it is seriously endangered in California, but more common elsewhere (CNPS 2012). In California, it is known only by its occurrences in/near Humboldt Bay. CNDDB (2013) records include occurrences within 4 quadrangles (Fields Landing, Cannibal Island, Eureka, and Arcata South), with some of the location information reported as vague, and CNPS (2012) noted that the species may be present in additional areas where conditions are favorable. Western sand spurrey blooms between June and August (CNPS 2012).

4.8.4.4 Lyngbye's Sedge

Lyngbye's sedge (*Carex lyngbyei*) is a perennial species typically associated with brackish conditions, and is common in brackish marshes locally (Leppig and Pickart 2009). The *Carex lyngbyei* Herbaceous Alliance is characterized by a continuous canopy of herbs < 6.0 ft (2.0 m) tall, with Lyngbye's sedge as a dominant or co-dominant species in the herbaceous layer. This alliance occurs in brackish marshes in the Management Area.

Lyngbye's sedge is listed by the CNPS as California Rare Plant Rank 2.2, which means it is fairly endangered in California, but more common elsewhere. In California, the species extends as far south as Bolinas Lagoon, just north of San Francisco Bay, California (CNPS 2012). In Humboldt Bay and Eel River estuary intertidal coastal marshes, Lyngbye's sedge is typically found bordering sloughs near river mouths and where there are other freshwater inputs.

In addition to colonizing salt marshes, *Spartina* is also invading brackish marshes in the Management Area, particularly in areas near open or leaking tide gates (Pickart 2001). These brackish communities can include plant species such as Lyngbye's sedge. Riverside Ranch, a conservation area located at the mouth of the Salt River in the Eel River Delta, is one location where *Spartina* and Lyngbye's sedge co-occur.

4.8.4.5 Humboldt Bay Wallflower

The Humboldt Bay wallflower (*Erysimum menziesii* ssp. *eurekense*) is a short-lived perennial herb, producing dense clusters of bright yellow flowers in winter and early spring (USFWS 2011a). Its geographic range estimated by USFWS in 2011 extended from the mouth of the Mad River, south to the North Spit of Humboldt Bay. It occurs in nearshore dunes and swales. Although it is federally and state listed as Endangered, risks to the Humboldt Bay wallflower appear to have decreased (USFWS 2011a). Known threats include non-native species competition and trampling. This species has never been documented occurring in areas with *Spartina*, although it could occur in dune areas adjacent to *Spartina*.

4.8.4.6 Beach Layia

Beach layia (*Layia carnosa*) is an annual herb that is federally and state listed as Endangered. Beach layia is restricted to Humboldt, Marin, and Monterey Counties (CNPS 2012), occurring in the dune plant community, especially open areas with sparse vegetation. Beach layia is found on both the North and South Spits of Humboldt Bay. This species has never been documented occurring in salt marsh areas with *Spartina*, although it could occur in dune areas adjacent to *Spartina*.

4.8.5 Animal Species Potentially Affected

Based on the criteria listed in Section 4.8.3, a literature review, and input from experts, the animal species determined to be potentially affected by the Proposed Project are identified in Table 4-6.

Table 4-6. Special Status Animal Species Potentially Affected by the Proposed Project

Common Name	Scientific Name	Status
Green sturgeon - southern DPS	*Acipenser medirostris*	Federally threatened, State Species of Special Concern
Tidewater goby	*Eucyclogobius newberryi*	Federally endangered
Coho salmon - southern OR/ northern CA ESU	*Onchorhynchus kisutch*	Federally threatened, State threatened
Northern California steelhead DPS	*Onchorhynchus mykiss*	Federally threatened

Common Name	Scientific Name	Status
California coastal Chinook salmon ESU	*Onchorhynchus tshawytscha*	Federally threatened
Southern eulachon DPS	*Thaleichthys pacificus*	Federally threatened
Longfin smelt	*Spirinchus thaleichthys*	State threatened
Western yellow - billed cuckoo	*Coccyzus americanus occidentalis*	Considered extirpated but at least one observed in Eel River estuary in July 2010
Bald eagle	*Haliaeetus leucocephalus*	Federally delisted, State endangered
Bank swallow	*Riparia riparia*	State threatened
Western snowy plover	*Charadrius alexandrines nivosus*	Federally threatened, State Species of Special Concern
Northern harrier	*Circus cyaneus*	State Species of Special Concern
Short eared owl	*Asio flammeus*	State Species of Special Concern

4.8.5.1 Green Sturgeon – Southern DPS

Green sturgeon (*Acipenser medirostris*) is a long-lived, slow-growing fish species, which is listed as threatened under the Federal ESA, and as a Species of Special Concern under the California ESA. Mature males range from 4.5-6.5 ft (1.4-2 m) fork length and do not mature until they are at least 15 years old, while mature females range from 5-7 ft (1.6-2.2 m) fork length and do not mature until they are at least 17 years old (NOAA Fisheries 2012). Maximum ages of adult green sturgeon are likely to range from 60-70 years. This species is found along the west coast of Mexico, the United States, and Canada.

The life history of green sturgeon is typical of anadromous fish. They likely spend most of their lives in nearshore oceanic waters, bays (such as Humboldt Bay), and estuaries. Spawning occurs in deep pools in "large, turbulent, freshwater river mainstems" (NOAA Fisheries 2012). Currently, spawning is believed to occur in the Klamath River basin, the Sacramento River, and the South Fork of the Trinity River. Spawning is very unlikely to occur in creeks flowing into Humboldt Bay, or in the Mad and Eel rivers. Green sturgeon adults appear occasionally within channels in the Eel River and Humboldt Bay.

4.8.5.2 Tidewater Goby

The tidewater goby (*Eucyclogobius newberryi*) is a small, elongate, grey-brown fish, rarely exceeding 50 mm (2 in) length, and is listed as endangered under the Federal ESA. It has been found in Humboldt Bay's off-channel habitats that are reached by very high tides, including areas behind tidegates (Chamberlain 2006). Tidewater gobies also occur in the Eel River estuary (Goldsmith, pers. comm., 2005). In both Humboldt Bay and the Eel River estuary, substantial potential habitat for tidewater

goby is likely privately owned and has not been surveyed. Other locations where tidewater gobies have been observed during the past decade include Tillas Slough (Del Norte County); Jacoby Creek, Gannon Slough and Mad River Slough in Humboldt Bay; and the Eel River delta (USFWS 2011c).

Tidewater goby is found at the bottom of shallow bodies of water. Vegetation within its habitat is sparse, though tidewater gobies may use the edges of dense vegetation. "Actual breeding sites, though, may be in mostly open, unvegetated sand or silt substrates, and not within dense vegetation" (USFWS 2011c).

Although year-round spawning is possible, it is unlikely and infrequent due to seasonal low temperatures and disruption of lagoons during winter high flows (USFWS 2011c). "Distinct peaks in spawning may occur in spring and late summer. Peak breeding activities commence in late April through early May, when male gobies dig a vertical nesting burrow 10 to 20 cm deep in substrate that usually contains a coarse sand component. Female tidewater gobies lay 300 to 500 eggs, which adhere to the walls of the burrow until hatching. Male gobies remain in or near the burrows for approximately 9 to 11 days to guard the eggs until they hatch. Once the eggs hatch, larval gobies are pelagic, and stay in the mid-water column near underwater vegetation until they become benthic" (USFWS 2011c).

4.8.5.3 Coho and Chinook Salmon, and Steelhead Trout (Salmonids)

Humboldt Bay, and the Eel and Mad River estuaries support 3 salmonid species that are listed as threatened under the Federal ESA: coho salmon (*Oncorhynchus kisutch*) Southern Oregon/Northern Coastal California (SO/NCC) evolutionary significant unit (ESU), the Northern California steelhead trout (*O. mykiss*) Distinct Population Segment, and the California coastal Chinook salmon ESU (*O. tshawytscha*). The coho salmon SO/NCC ESU is also listed as threatened under the state ESA.

This section generalizes the life histories of these salmonids. In general, we assume that at any point in time, at least one life stage of one of 3 species could be present in the Management Area. Therefore, eradication treatments will be unable to spatially or temporally avoid the presence of salmonids, but careful choice of treatment types can reduce the potential for impacts.

Salmonid life history is characterized by periods of pelagic conditions, adult upstream migration, spawning and egg development, fry and juvenile development, smolt outmigration, and estuary rearing. Channels within marsh habitats may be of particular importance to subyearling salmonids because of the high insect and invertebrate prey resources and potential refuge from predators (Bottom et al. 2005). Wallace (2006) found significant use of the tidal portions of Freshwater Creek, Elk River, and Salmon Creek (Humboldt Bay tributaries) by juvenile Chinook salmon, coho salmon and

steelhead trout. Pinnix et al. (2008) found that in Humboldt Bay, juvenile coho salmon also utilize deep channels, channel margins and floating eelgrass mats.

4.8.5.4 Southern Eulachon DPS

The Pacific eulachon (*Thaleichthys pacificus*) is a small anadromous fish from the eastern Pacific Ocean (NOAA Fisheries 2011). In March 2010, National Marine Fisheries Service (NMFS) listed the Southern DPS as threatened under the ESA; the DPS includes populations in Washington, Oregon, and California. Critical habitat was designated in October 2011; in California, critical habitat includes the Mad River (NMFS 2011).

Eulachon spend 3 to 5 years at sea before returning to freshwater to spawn, from late winter to mid-spring. Eggs are fertilized in the water column, where they then sink and adhere to the river bottom of coarse sand and gravel. Most adults die after spawning. Eggs hatch in 20 to 40 days, and larvae are carried downstream and "are dispersed by estuarine and ocean currents shortly after hatching" (NOAA Fisheries 2011).

Eulachon have been documented in Humboldt Bay and nearby coastal rivers such as Redwood Creek and the Mad River, although in the rivers, it is thought to be extirpated or nearly so. CNDDB records include no dates, specific locations or other survey information. In 1996, the Yurok tribe supported a eulachon sampling effort on the Klamath River of over 110 surveying hours, from early February to early May. No eulachon were observed. Considering the low abundance for over 20 years, CDFW considers the fish to be "nearly extirpated from California" (CDFG 2008).

4.8.5.5 Longfin Smelt

Longfin smelt (*Spirinchus thaleichthys*) are estuarine fish listed as threatened under the California ESA. Longfin smelt are known to occur in Humboldt Bay, but little is known regarding their distribution, abundance or life history there. It is a short-lived (generally 2 years) species. Adults spawn in low salinity or freshwater areas within the lower reaches of coastal rivers and the buoyant larvae are swept into more brackish waters where they rear.

4.8.5.6 Western Yellow-Billed Cuckoo

The western yellow-billed cuckoo is a rare bird and currently a candidate for listing under the ESA. In California, a catastrophic decline in abundance occurred with broad development in the mid-1800s (USFWS 2011d).

Western yellow-billed cuckoo breed in large blocks of riparian habitats, commonly with cottonwoods (*Populus fremontii*) and willow. They migrate from southern Canada to as far south as northern

Argentina. They forage in dense shrubs and trees. Nesting occurs in trees or shrubs, usually from 2 to 12 ft high, and nests consist of short twigs creating a platform (Ehrlich et al. 1988).

In July 2010, at least one western yellow billed cuckoo bird was observed on Cock Robin Island in the Eel River estuary. The species can occur in riparian habitats in the Eel River estuary that are near *Spartina* infested salt marsh that may be treated.

4.8.5.7 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was delisted from the ESA in August 2007 although it remains listed as Endangered under the California ESA. The bald eagle is a large bird that can have a wingspan of up to 8 ft (USFWS 2007a). They live near rivers, lakes, and marshes where they can find fish, although they will also eat waterfowl, turtles, rabbits, snakes, and other small creatures. Their habitat also includes estuaries, reservoirs, rivers, and some sea coasts. They require a food base, perching areas, and nesting sites. They are relatively long-lived in the wild, ranging from 15 to 25 years.

Hundreds of migratory bald eagles from nesting areas in northwestern states and provinces spend the winter in California, arriving during fall and early winter (CDFG undated). These wintering birds may remain until February or March, or even into April. In late winter, some adult bald eagles in California have already started nesting, while other eagles have not yet returned to their nesting territories more to the north or northeast. Some of the adults that winter in California have been tracked to their nesting territories in north-central Canada 2,000 mi away.

4.8.5.8 Bank Swallow

The bank swallow (*Riparia riparia*) is listed as threatened under the state ESA. It is found in riparian ecosystems; nesting colonies are in alluvial soils along rivers, streams, lakes and ocean coasts (Garrison 1998). The colonies are located in vertical banks or bluffs, and can number dozens to thousands of nesting birds. Bank swallows begin arriving at breeding grounds in California in late March, and the majority arrive by late April to early May. Juveniles begin dispersing from the colonies by late June to early July. The migration south occurs in the fall, and it is generally not found in California during the winter.

The presence of bank swallows in Humboldt County is questionable. The 7 local records for the species are dated between 1904 and 1956 (Laymon et al. 1987), and biologists now believe that these records may have been the rough-winged swallow, which is a similar bird. In 2008, a bank swallow colony of a dozen pairs was reported at Clam Beach (north of the Management Area); in 2003, another 2-3 birds were reported in the same area (Leskiw 2009).

The bank swallow captures flying or jumping insects on the wing, foraging over lakes, ponds, rivers, streams, meadows, fields, pastures, and bogs (Garrison 1998). Foraging occurs from dawn to dusk.

4.8.5.9 Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) is a small shorebird weighing up to 2 ounces, and between 6 and 6-1/2 in long. Its average life span is about 3 years (USFWS 2007b). The Pacific Coast population was listed federally as Threatened in 1993, and as a Species of Special Concern by the state. A Recovery Plan was released in 2007, and in March 2011 revised critical habitat designations were proposed (USFWS 2011b). Within the Management Area, 3 critical habitat sub-units are proposed (Sub-unit CA-4B Mad River, Sub-unit CA-5A Humboldt Bay South Spit, Sub-unit CA-5C, Eel River South Spit/Beach) (Federal Register vol. 76, no. 55 March 22, 2011). Del Norte, Humboldt, and Mendocino counties are combined into USFWS Recovery Unit 2 (Colwell et al. Undated).

The western snowy plover breeds primarily on coastal beaches above the high tide line, "sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths..." (USFWS 2011b). Breeding occurs between March 1 and September 30; nests are in shallow scrapes or depressions in the sand, or in the gravel on bars in the Eel River Delta. Chicks leave the nest within hours after hatching, but fledging requires another month.

These birds forage for small invertebrates "in wet or dry beach sand, tide-cast kelp, vegetation along the coastal dune or ridge that is parallel to the shoreline, and near water seeps in salt pans" (Federal Register vol. 76, no. 55 March 22, 2011). Above the high tide line, they feed in dry sandy areas, saltpans, spoil sites, and along the edges of salt marshes and ponds (USFWS 2007c). They may migrate up or down the coast during winter, or they may remain at their nesting beaches. Whether they migrate or not can be variable by year. Birds may also winter where nesting does not occur.

4.8.5.10 Northern Harrier

The Northern Harrier (*Circus cyaneus*) is a California Bird Species of Special Concern. They breed locally within coastal lowlands, such as Lake Earl in Del Norte County; the Humboldt County breeding bird atlas found harriers along the coast from Clam Beach to the Humboldt Bay lowlands (Shuford and Gardall 2008). They breed and forage in numerous habitats including freshwater marshes, brackish and saltwater marshes, and weedy borders of rivers and streams. Northern harriers nest on the ground in patches of dense, tall vegetation.

4.8.5.11 Short Eared Owl

The short eared owl (*Asio flammeus*) is a California bird Species of Special Concern. Although Humboldt Bay is indicated as within its breeding range, the Humboldt breeding area is limited to the immediate environs of the Bay, and is not contiguous with other more extensive breeding areas in northeastern California. Possible sightings have occurred at the Mad River Slough and at Fay Slough in the late 1990s. Breeding occurrence and success depends on the abundance of prey. The primary threats to this species are shooting, and habitat degradation and loss. Loss of eggs to ground predators and grazing is also a problem on a local level.

4.8.6 Plans Protecting Biological Resources

In the vicinity of the Management Area, numerous riparian habitats and other sensitive natural communities have been identified by city governments, CDFW, and USFWS. These natural communities provide habitat for year-round and migrant species, recreation, environmental interpretation, and preservation of aesthetic resources. The City of Arcata's Marsh and Wildlife Sanctuary also provides wastewater treatment. Specific areas managed by local, state or federal entities protecting riparian habitats and other sensitive natural communities include:

- The Humboldt Bay National Wildlife Refuge Complex, owned and managed by the USFWS. http://www.fws.gov/humboldtbay/
- The Arcata Marsh and Wildlife Sanctuary, owned and managed by the City of Arcata. http://www.cityofarcata.org/departments/environmental-services/water wastewater/wildlife-sanctuary
- CDFW Wildlife Areas, at the following locations http://www.dfg.ca.gov/lands/wa/region1/index.html: South Spit WA, Eel River WA, Fay Slough WA, Mad River Slough WA, Elk River WA

Plans protecting biological resources in the vicinity of the Management Area are Local Coastal Plans, the Open Space Element of the County General Plan, habitat conservation plans (HCPs), and recovery plans for listed species that are likely to occur within the Management Area.

Local Coastal Plans and other relevant documents include:

- City of Arcata Certified Local Coastal Program, http://www.cityofarcata.org/departments/building-planning/regulations/certified-local-coastal-program
- Humboldt Bay Area Plan of the Humboldt County Local Coastal Program, April 1995, http://co.humboldt.ca.us/planning/local_coastal_plans/hbap/hbap.pdf

- Eel River Area Plan of the Humboldt County Local Coastal Program, May 1995, http://co.humboldt.ca.us/planning/local_coastal_plans/erap/erap.pdf
- Local Coastal Plan Issue Identification Report, September 2003, http://co.humboldt.ca.us/planning/local_coastal_plans/pdf/issueidentificationreport/issue.pdf
- Humboldt Bay National Wildlife Refuge Comprehensive Conservation Plan 2009, http://www.fws.gov/humboldtbay/ccp.html

The County's coastal plan policies call for providing maximum public access and recreational use of the coast; protecting wetlands, rare and endangered habitats, environmentally sensitive areas, tidepools, and stream channels; maintaining productive coastal agricultural lands; directing new development to already urbanized areas; protecting scenic beauty, and locating coastal energy facilities such that they have the least impact (County of Humboldt 2003).

The County General Plan is currently being updated (County of Humboldt 2012). The Biological Resources section of the Conservation and Open Space Elements describes the policies for preservation of natural resources, management of production of resources, outdoor recreation, and public health and safety. Particularly relevant to *Spartina* eradication activities are policies supporting preservation of fish, plants, and wildlife, including rivers and streams.

The cities of Arcata and Eureka have both adopted policies on pesticide use. The City of Arcata adopted a "Pesticide Reduction Plan" in November 2004. It describes allowable uses of pesticides within various sites of Arcata, such as multi-family dwellings, schools, other public property, and the ball field. The Plan does not ban the use of herbicides, specifically imazapyr, but specifies that chemical methods should be the method of last resort. The City of Eureka's "Integrated Pesticide, Herbicide and Fertilizer Management Plan" was adopted in April 2011. It has specific pesticide management guidelines for wetlands and open spaces. Similar to Arcata's plan, herbicides are considered a method of last resort. The City of Eureka uses imazapyr to control *Phragmites australis* in the PALCO Marsh in Eureka, because an analysis of control options determined that herbicide was the only effective approach for this species.

In the general vicinity of the Management Area, HCPs, Natural Community Conservation Plans (NCCPs), and candidate conservation agreement and assurances plans have been written, but none geographically overlap the Management Area. There is minor overlap in considered species. Specifically, 2 nearby HCPs describe the same or similar species as this PEIR:

- The 1999 Pacific Lumber Company HCP, which also evaluated potential effects on the western snowy plover and bald eagle. http://www.fws.gov/arcata/es/habConsPlanning.html

- The 2004 Humboldt Bay Municipal Water District HCP, which also evaluated potential effects on 4 salmonid species, Chinook and coho salmon, steelhead and coastal cutthroat trout. http://www.hbmwd.com/site_documents/hcp.pdf

4.8.7 CWA Section 404 Wetlands

Under Section 404 of the CWA, wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (USEPA 2011). The USACE defines 3 characteristics of wetlands: hydrology, hydrophytic plants, and hydric soils. An area must exhibit all 3 characteristics to be considered a "jurisdictional wetland." Some areas may perform the functions of wetlands, yet not be delineated as jurisdictional wetlands if they do not exhibit all 3 wetland characteristics. Based on the habitat requirements of *Spartina*, all infested areas are likely to be considered jurisdictional wetlands.

4.8.8 Coastal Act

Areas where *Spartina* control will occur are primarily within the California Coastal Commission's area of retained permitting jurisdiction and the project will require either a Coastal Development Permit or federal consistency determination under the Coastal Act. The Coastal Act contains policies to protect marine resources, coastal waters, estuaries, wetlands, water quality, and environmentally sensitive habitat areas.

4.8.9 Possible Future Biological Conditions

Possible future biological conditions depend on many variables; 2 important variables are 1) the degree of success of habitat restoration and species recovery, and 2) the extent and rapidity of sea level rise.

Habitat restoration within and in the vicinity of the Management Area is on-going, and numerous areas have been set aside as refuges, wildlife areas, sanctuaries, and parks. The future biological conditions of these protected areas depend largely on available staffing and funding to at least maintain, if not improve, habitat conditions. *Spartina* eradication is one restoration activity that would improve future biological conditions. Preservation and restoration of lands adjacent to the refuges and wildlife areas, and to creeks and streams that drain into the Management Area, will also improve future biological conditions. While competition for state and Federal funding of restoration and enhancement projects is keen, local governments and non-governmental organizations have been generally successful in obtaining grants. If that success continues, the future biological conditions of the Management Area could improve.

Some special status plant species seem to have responded positively to past and on-going *Spartina* eradication, such as the Humboldt Bay owl's clover and the Point Reyes bird's beak. The possible future conditions of special status plants will be determined by numerous variables including sea level rise and habitat restoration.

Recovery of listed fish and bird species within the Management Area is also variable and dependent on conditions outside of the Management Area. Some species are unlikely to become numerous in the Management Area because they probably never were (e.g., bank swallow). Other species may become more numerous because recovery actions have been successful (e.g., bald eagle). The future possible conditions of listed salmonids will be determined by many variables in the ocean, estuaries / bay and the watersheds.

Restoration, enhancement, and recovery actions will be implemented against the backdrop of global climate change and sea level rise. Some infrastructure is unlikely to be moved (for example, Highway 101) so marsh area will likely decrease in the Management Area due to sea level rise.

4.8.10 Definition of Significance and Baseline Conditions

Baseline conditions are those that have been documented at the time that the NOP was published. These conditions are described above as the present conditions of biological resources within and in the vicinity of the Management Area.

The potential effects on biological resources are identified as either: no impact, less than significant, or significant. Significance criteria are those listed in the CEQA checklist; a project's effects on biological resources are significant if it will:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFW or USFWS.
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS.
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
4. Have a substantial adverse effect on coastal wetlands as defined by the California Coastal Act.
5. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

6. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
7. Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP.

4.8.11 Effects Analyses of the Proposed Project

This section evaluates possible impacts that would directly affect biological resources. Related mitigation measures are specified that minimize impacts and are designed to avoid take of species as defined by the ESA and California ESA.

IMPACT BIO-1: Effects on Special Status Fish Species and their Critical Habitat and Essential Fish Habitat from Mechanical *Spartina* Removal Methods. Special status fish species described above may be present in channels adjacent to *Spartina* control efforts during any time of the year. If present, fish could be indirectly impacted by erosion caused by mechanical methods, resulting in increased turbidity. Increased turbidity could affect fish by interfering with gill function, reproduction or behavior (e.g., feeding or predator avoidance). Additionally, potential direct impacts could occur if fish are struck, injured, or killed by heavy equipment operating within a channel. Finally, the flooding control method could have direct impacts on fish by altering water quality and preventing fish movement. Without mitigation, impacts to special status fish could be potentially significant. However, with implementation of the following mitigation measures the impacts are reduced to less than significant. No impacts to critical habitat of special status fish species or the rearing functions of Essential Fish habitat are expected.

MITIGATION BIO-1: Minimize Effects of Mechanical Spartina Removal Methods to Special Status Fish Species. On a project specific basis, a habitat analysis shall be done to determine if special status fish species have the potential to occur. If they could occur, then surveys may be done to establish that these species are absent, using protocols approved by USFWS or NMFS. If such surveys are not conducted, then the species will be assumed present. If special status fish species are present, then *Spartina* control methods will be selected that minimize potential impacts. To minimize erosion effects, control methods that are most likely to cause erosion (i.e., grinding, tilling, disking and digging/excavating) will not occur within 15 ft of any aquatic habitat containing special status fish species, but this distance could be increased depending on site specific conditions, such as soil stability and bank slopes. Additionally, amphibious vehicles will not contact the channel substrate where special status fish species are present and the vehicles will be operated in such a manner that they avoid causing erosion into the channels. Furthermore, no flooding will be conducted in areas where special status fish species are present. Treatments that do not involve ground disturbance, such as top mowing, crushing, chemical treatment and covering will be the only methods used in close proximity

(e.g., within 15 ft) to special status fish species. This mitigation measure is intended to avoid take as defined by the ESA and California ESA.

IMPACT BIO-2: Effects on Special Status Birds. Breeding special status birds may be temporarily affected by noise caused by *Spartina* control equipment and vehicles. Disturbance due to noise will depend on many factors such as proximity to the noise, the levels of ambient noise, the nature of ambient noise, and the ability of birds to habituate to new noise. Control methods that create a potentially significant high level of noise are brushcutters, and methods that require airboats (e.g., amphibious vehicles). Without mitigation, noise impacts to birds could be potentially significant. In addition, northern harriers and short-eared owls may nest in the uplands adjacent to *Spartina* control areas, and their nests, which are located on the ground, could be directly impacted by *Spartina* control workers and equipment crossing these areas to reach *Spartina*. However, with implementation of the following mitigation measures impacts are less than significant.

MITIGATION BIO-2: Minimize Noise Effects. Breeding special status birds could be present based on habitat and time of year. The breeding season is generally October through mid-August. On a project specific basis, a habitat analysis shall be done to determine if special status bird species have the potential to occur. If the habitat would support special status birds, and if eradication is planned to occur when these birds may be breeding, then surveys will be done to establish that these species are absent, using protocols approved by USFWS. If such surveys are not conducted, then the species will be assumed present. Response of birds to noise varies by species as well as site specific factors including ambient noise levels, topography and vegetation. A limit of 60 dB reaching breeding songbirds has recently been advocated for the by the California Department of Fish and Wildlife (see ICF Jones and Stokes 2009). For the purpose of this PEIR, if breeding birds are known or assumed present within close proximity to *Spartina* control activities than actions will be taken to ensure that $\leq$60 dB reaches the breeding area. Actions may include the use of sound measuring devices to determine the range of noise production and limit *Spartina* control methods accordingly (i.e., use quieter methods near breeding special-status birds).

MITIGATION BIO-3: Avoid Northern Harrier and Short-Eared Owl Nests. The breeding season is March-August for northern harriers (Loughman and McLandress 1994) and March-July for short-eared owls (Gill 1977). If *Spartina* control activities are planned to occur during these periods (i.e., between March-August) then a qualified biologist will assess whether there is potential nesting habitat for northern harrier or short-eared owls. If there is potential habitat, it will be avoided or a qualified biologist will survey the potential habitat immediately prior to *Spartina* control work and if nests are found then a minimum 300 ft buffer zone will be delineated. The buffer zone will be avoided by *Spartina* control workers and equipment.

IMPACT BIO-3: Direct and Indirect Effects to Special Status Plant Species from Mechanical or Chemical *Spartina* Removal Methods. Impacts to special status plants from direct mechanical methods include accidental excavation, cutting, bruising, crushing, and mowing. Direct impacts from chemical methods include accidental contact with herbicides, resulting in disruption of plant metabolism and possible mortality. Indirect impacts from mechanical and chemical removal include compaction of soil, increasing erosion when soil is left exposed, exposing plants to greater light (if top mowing, for example) or to lesser light (if wrack and mulch cover special status plants). Indirect effects could also occur when direct mechanical or chemical methods result in harm but not mortality to special status plants. Injured plants must spend energy repairing structures, instead of growing, setting seeds or spreading propagules. Without mitigation, direct and indirect effects on special status plants could be potentially significant. Even with implementation of mitigation measures, some individual special status plants may be impacted. However, given the overall net benefit for special status plant species of removing invasive *Spartina*, with implementation of the following mitigation measure impacts are less than significant. Humboldt Bay wallflower and beach layia would not be affected by the Proposed Project, because they do not occupy the same habitats as *Spartina*.

MITIGATION BIO-4: Minimize Impacts to Special Status Plant Species. On a site specific basis, a habitat analysis shall be done to determine if special status plant species have the potential to occur. If they could occur, then surveys may be done to establish that these species are absent, using protocols approved by CDFW. If such surveys are not conducted, then the species will be assumed present. If special status plant species are present, then *Spartina* control methods will be selected that avoid or minimize potential impacts. Staked locations of special status plant populations or special status plant habitat shall be recorded, and field crews on foot or in vehicles shall be instructed to avoid and protect special status plant populations or plant habitat. Impact to the endangered dune plants beach layia and Humboldt Bay wallflower will be avoided by selecting access routes that do not contain these plants. For Humboldt Bay owl's clover and Point Reyes bird's beak, avoidance is determined not to be necessary because temporary effects during *Spartina* control are mitigated by the explosive increase in population that has been demonstrated after *Spartina* control (Pickart 2012). For other annual special status plants such as Western sand spurrey, avoidance shall occur by using only treatment methods that are highly selective; for example heavy equipment will not be operated where these plants or their habitat occur. For perennial plants such as Lyngbye's sedge, a qualified botanist shall stake out locations of special status plants and provide training to control crews to ensure that they minimize impacts to these plants. If special status plant populations or habitat occur near the high tide line, wrack and large deposits of mown *Spartina* shall be removed during the growing season. Special status plant populations shall be covered with fabric adjacent to areas sprayed with herbicide, or spray-drift barriers made of plastic or geo textile (aprons or tall silt fences) shall be installed. If accidental exposure to spray drift occurs, affected plants shall be thoroughly washed with silt-clay suspensions.

To avoid trampling of special status plant species, in areas where frequent access will occur, paths shall be marked and used that avoid special status plant species to the maximum extent possible.

IMPACT BIO-4: Effects to Animal Species from Chemical *Spartina* Removal Methods. The herbicide that could be used for *Spartina* treatment is imazapyr. Imazapyr's effects on animal species, including shellfish species (cultured and wild), are potentially significant, but can be mitigated to less than significant. The chemical backgrounds of proposed herbicides are described in the Hazardous Materials and Water Quality sections and these sections should be consulted regarding potential significant impacts to animal species. However, at the core of the issue is evidence that, although imazapyr is highly toxic to plants, it has very low toxicity to animals. The low toxicity of imazapyr to animals provides support for an assessment of "less than significant effect on animals." With mitigation measures, this assessment is further supported.

Herbicide application could directly impact fish and wildlife, although impacts would be minor because the toxicity of imazapyr to animals is low. Imazapyr has a low potential for bioaccumulation and biomagnification, meaning that adverse impacts to fish and wildlife is unlikely to occur through food web exposures (Kerr 2010). Imazapyr's potential to bioaccumulate is low because it is highly soluble in water, and has low solubility in lipids, meaning that it does not concentrate in animal fat or organ tissue (Kerr 2010, Pless 2005). Because imazapyr has a low potential for bioaccumulation, the primary concern for impacts to fish and wildlife from its use is acute exposure.

Acute exposure could occur when herbicides are present at relatively high concentrations during and immediately following application. Herbicide solutions have the potential to affect organisms that live in the water column, including algae, non-target plants, fish and aquatic invertebrates. While some other receptors such as mammals and birds may spend a considerable portion of their time in the water, they are generally more likely to be affected by other exposure routes, primarily dermal contact during application and incidental ingestion of contaminated sediment during foraging (Kerr 2010). The period during which acute exposure could occur is short, because imazapyr rapidly degrades via photolysis. The maximum proposed application rate of imazapyr for control of *Spartina* does not result in aquatic concentrations or terrestrial doses that exceed screening levels for toxicity to aquatic or terrestrial mammals, birds, invertebrates, or benthos, even under extremely conservative assumptions and risk scenarios (Patten 2003, Pless 2005). The more stringent screening levels for acute toxicity to endangered fish species are marginally exceeded by the highest measured and modeled imazapyr concentrations in the leading edge of an incoming tide (ibid). The conditions and assumptions for these concentrations are extremely conservative and would only be present momentarily and in a small volume of water. The concurrent presence of a special status species is highly unlikely.

Surfactants will be mixed with imazapyr so that the herbicides adhere to the plants. The surfactants would be either a soybean-based lecithin (Liberate®), or a methylated vegetable oil (Competitor®). No surfactants containing nonylphenol ethoxylate (NPOE) will be used because these surfactants, when mixed with glyphosate, were determined to be more toxic to aquatic species than the Rodeo itself (Diamond and Durkin 1997).

The colorant to be used would be Blazon® Spray Pattern Indicator "Blue" ("Blazon® Blue"), which has been used successfully in the San Francisco Estuary control program. Blazon® Blue is a water-soluble non-ionic polymeric colorant.

With the following mitigation measures, impacts from herbicides, surfactants and colorants are less than significant.

MITIGATION HHM-2: Accidents Associated with Release of Chemicals and Motor Fuel. (see Section 4.11.5).

MITIGATION WQ-1: Managed Herbicide Control. (see Section 4.12.19).

MITIGATION WQ-2: Minimize Herbicide Spill Risks. (see Section 4.12.19).

IMPACT BIO-5: Temporary Loss of Habitat to Northern Harrier and Short-Eared Owl. The northern harrier may experience temporary and limited loss of nesting and foraging habitat when *Spartina* infested areas are treated. Similarly, the short-eared owl may temporarily lose a limited amount of breeding habitat. Effects on these species will be short-term (up to 2 years but likely less). Based on the short-term nature of these impacts, effects are less than significant and no mitigation is required.

IMPACT BIO-6: Potential Impacts of Mechanical and Chemical Methods to Eelgrass. Eelgrass (*Zostera marina*) beds are considered essential fish habitat under the Magnuson-Stevens Act and environmentally sensitive habitat areas (ESHA) under the CalCA. Any impacts to eelgrass generally require mitigation in the form of transplanting the eelgrass and/or creating new eelgrass habitat. *Spartina* has not been observed in close proximity to eelgrass. However, it is possible that *Spartina* and eelgrass could occur together. When conducted in mudflats, all of the *Spartina* removal methods have the potential to directly impact eelgrass. For example, eelgrass plants could be killed by application of herbicide, impact from a brush cutter or flaming. With implementation of the following mitigation measure this impact is less than significant.

MITIGATION BIO-5: Avoid Impacts to Eelgrass. Workers removing *Spartina* in areas with the potential for eelgrass shall be trained to recognize eelgrass and the mudflats that are habitat for eelgrass.

Training shall be conducted by a qualified biologist. Only methods that avoid physical disturbance to eelgrass plants shall be used in close proximity to eelgrass, such as top mowing and excavation. With this mitigation measure, there will be no impact to eelgrass.

IMPACT BIO-7: Potential Effects on Marine Mammals. Marine mammals, particularly harbor seals (*Phoca vitulina*), are abundant in the Management Area and could potentially be affected by sound generated from *Spartina* control activities. The sound produced will be short term and generally low (see Section 4.14), but the impact could be significant. However, with implementation of the following mitigation measure the impact will be reduced to less than significant.

MITIGATION BIO-6: Reduce Noise near Marine Mammals. If marine mammals are present within 200 ft of *Spartina* control operations, then methods which cause relatively high levels of noise (i.e., brushcutters, the Marsh Master and airboats) shall not be used. Other methods which do not generate a relatively high level of noise can be used.

4.8.12 Effects Analyses of Alternative 1, Mechanical Treatment Only

Alternative 1 limits the eradication methods to mechanical treatments; no herbicide spraying would be allowed. Differences in impacts between the Proposed Project and Alternative 1 are:

- Alternative 1's effects on special status plants due to herbicide use would be eliminated, but mechanical effects would be increased. Non-target plants could still be affected by mowing, grinding, crushing, flaming, excavating/digging, covering or flooding although pre-eradication surveys and avoidance would decrease effects to less than significant.
- Alternative 1 may have a potentially significant adverse effect on the success of Management Area-wide eradication, compared to the Proposed Project. Without herbicide spraying, eradication may require a longer time period, assuming that funds are limited. A longer eradication period could increase the difficulty and risk of complete eradication, because the *Spartina* plants would have more chances to set seed and reproduce by rhizomes. Complete eradication may never occur if areas with seed banks and runners continue to re-infest treated areas. However, the effectiveness of herbicides for treating *Spartina* remains uncertain. This potentially significant adverse effect could be mitigated to less than significant if enough funding was available to perform primary and follow up mechanical methods.
- Alternative 1 may have a potentially significant adverse effect on fish and wetlands, due to increased turbidity and erosion risk, when compared to the Proposed Project. When eradication is limited to mechanical methods, for example when performing grinding and mowing via amphibious vehicles, erosion and turbidity risk is greater. This effect could be minimized but not avoided, especially if eradication occurs in an area already experiencing

erosion or sediment loss. If grinding could be performed in smaller areas, exposing less bare marsh at any one time, the potential effects could be mitigated to less than significant.

4.8.13 Effects Analyses of Alternative 2, No Project

The No Project Alternative is the scenario of not implementing the Plan, and continuing the current condition of eradication on a site by site basis, without regional coordination. The biological effects of not implementing the Plan include:

- A potentially significant adverse effect on native plants because eradication success would likely decrease. Without coordination, some areas will likely remain as *Spartina* seed and rhizome sources, decreasing eradication success.
- A potentially significant adverse effect on native plants because without a commitment to regional eradication, likelihood of funding individual projects will be greatly diminished, and current/ongoing control efforts may be discontinued.

4.9 Cultural Resources

This section describes potential effects of treatment methods on cultural and historical resources. Mitigation measures are identified where necessary to address potentially significant impacts.

4.9.1 Summary of Present and Possible Future Conditions

General information on the cultural resources in the vicinity of the Management Area is found in a number of sources, including:

- Planwest Partners and the Cultural Resources Facility, Center for Indian Community Development, Humboldt State University 2008. Humboldt Bay Historic and Cultural Resource Characterization and Roundtable. October 2008.
- Humboldt County Department of Community Development Services 2008. Humboldt County General Plan November 20, 2008. Chapter 10, Section 10.6 Cultural Resources.
- Humboldt Bay Harbor Recreation and Conservation District 2006. Humboldt Bay Management Plan Draft EIR. April 2006.
- Humboldt County Resource Conservation District 2010. Draft EIR: Salt River Ecosystem Restoration Project. April 2010.
- ESA 2008. Marina Center Mixed Use Development Project Draft Environmental Impact Report. November 2008.

4.9.1.1 Present Conditions of Cultural Resources

We describe present conditions of cultural resources as known at the time that the NOP was published. Prehistoric and archaeological resources are considered to be those related to tribal habitation of the area. Much of this prehistoric and archaeological resources description is based on information from the 2006 "Humboldt Bay Management Plan Draft EIR" (HBHRCD 2006).

The primary source for the historical resources information (resources dated from approximately the 1850s) is the 2008 "Humboldt Bay Historic and Cultural Resource Characterization and Roundtable." The description that follows is focused on potential submerged resources that could be encountered during *Spartina* removal, such as wharves, docks, or railways that formerly extended into Humboldt Bay.

Due to confidentiality concerns, most cultural resource locations are described in a general and approximate manner.

4.9.1.2 Cultural / Archeological Resources (from Pre-History to 1850s)

Archaeological resources were described in the Humboldt Bay Management Plan EIR (HBHRCD 2006), and the following description is from that source, unless cited otherwise.

The Wiyot people's ancestral territory covered the coastal plain from the Little River, south to the Bear River Mountains, and inland to the east until the 1st mountain ridgeline. The Yurok people were the Wiyot's neighbors to the north. The Wiyot may have entered this ancestral territory from northern and eastern areas approximately 1,050 to 1,100 years ago; however, other sources state that the Wiyot arrived approximately 2,000 years ago (PPI and CRFCICDHSU 2008). Carbon dating of archaeological material on Indian Island dates to approximately 900 AD. They formerly lived along Humboldt Bay shores and river mouths of the Eel, Elk, and Mad Rivers. Approximately 32 Wiyot settlements are estimated to have existed, with 70 archaeological sites on or near Humboldt Bay. The South Spit was a more lightly populated area, perhaps due to its unprotected, open dunes. Estimates of the Wiyot population before Euro-American contact vary, ranging from 1,000 to 3,300 individuals. Settlements were located on streams or the Bay, and most were located on tidewater (some sources state "every bay settlement was on tidewater" [Nomland and Kroeber 1936, as cited in PPI and CRFCICDHSU 2008]). Areas of archaeological sensitivity include the Bay margin, tributary sloughs, and adjacent uplands.

4.9.1.3 Historical Resources (from 1850s to 1960s)

Historical resources were described in the "Humboldt Bay Historic and Cultural Resource Characterization and Roundtable" (PPI and CRFCICDHSU 2008) and the following description is

from that source, unless cited otherwise. The outline of much of the "Roundtable" report is based on geographic area; an "historical circuit" of Humboldt Bay was presented to aid readers who are primarily interested in cultural resources within a specific area. This historical circuit approach will be taken in the following description of historical resources that could be affected by *Spartina* treatment projects (Table 4-7). Fourteen of the circuit's 21 activity clusters are within or in the vicinity of areas with *Spartina* coverage greater than 26%, where *Spartina* treatment will be most intensive and thus have the highest potential to affect historic resources.

Table 4-7. Areas of *Spartina* Coverage Greater than 26% that are in the Vicinity of Historical Resource Activity Clusters

Activity Cluster (PPI and CRFCICDHSU 2008)	Areas of *Spartina* Coverage >26% in Vicinity of Activity Cluster?
The jetties, lighthouse, lifesaving station, blimp base	No
Fairhaven	No
Quarantine station (between Fairhaven and Samoa)	No
Samoa	Yes
Carson's and Cole's landing (1.2 mi north of Samoa)	Yes
Manila (includes Sierra Pacific mill)	Yes
Arcata	Yes
Bayside	Yes
Brainard/Bracut	Yes
Murray Field area	Yes
Eureka (including Eureka, Martin's, Clark's sloughs)	Yes
Indian and Woodley Islands	Yes
Bucksport	Yes
Lower Elk River area	No
King Salmon area	Yes
Field's Landing	No
Beatrice (Salmon Creek) area	Yes
Hookton	Yes
Indianola	No
Southport Landing	Yes
South Spit	No

Although numerous developments occurred in the activity clusters since the 1850s, those that are potentially relevant to *Spartina* treatment are described below. These developments are described because they may have been located where *Spartina* treatment could occur, as follows:

- Carson's and Cole's landing (1.2 mi north of Samoa). A "bayside embarcadero" named Cole's Landing was constructed 1.2 mi north of Samoa. Later, a railroad roundhouse and a shingle mill were there. A dock may have been associated with the landing, according to a 1972 USGS quad sheet.
- Samoa. A wharf was noted in an 1872 sale, but structures in this area did not become numerous until the early 1900s. Additional wharves, docks, and mills were built (see Figure 4 of Planwest's 2008 "Roundtable" report for the confirmed Hammond mill site).
- Manila. Railroad lines and track were the main features of this area from 1890s to 1920s. The community of Manila is 1st mentioned in 1903, as is a school, but the area was primarily a ranch that changed ownership over the years. Other sources state that Manila was not a community until the early 1920s, and development did not begin to accelerate until the 1930s and 1940s. A sawmill, shingle mill, lath mill, spur track and a mill pond were located east of Peninsula Drive. When the mill closed, it became a dumping ground for old cars; after community effort, the abandoned cars were cleaned up and the mill site has become Manila Park. The Sierra Pacific mill on the Mad River Slough continues to operate.
- Arcata. The town of Arcata was connected with the ship channel by a 2-mile long plank road and rail track that passed over the marsh; the track led to a wharf and warehouses, and at its economic peak, a steam locomotive transported materials along the track. Levees define present-day marshes that were once mill ponds, and pilings from the old wharf still exist.
- Bayside. A mile-long wharf was built into Humboldt bay, which also supported a rail line. Additional tracks ran west-southwest into the bay, and their remnants are still visible next to the south-easternmost oxidation pond of Arcata's wastewater treatment plant. A 3rd logging railroad reached the bay from Jacoby Creek.
- Murray Field area. In 1919, the area is described as a grassy field, but it was remembered as land "carved out of the marsh" of a ranch (Dreyer 1990, as cited by PPI and CRFCICDHSU 2008). A 2nd Murray Field airstrip was a former marshland that was directly to the south of the then-existing Murray Field. In the mid-1930s, drainage was generally improved by filling gullies and ditches. Railroads served this area as well; rail service was provided from Freshwater to both Eureka and Humboldt Bay.
- Eureka (including Eureka, Martin's, Clark's sloughs). Prior to development, land to the west of present-day Broadway was estuarine, drained by Clark's Slough. Forest was present down to the bayside marsh. Lumber mills were built on the waterfront, and 2 trains also serviced the waterfront. Two confirmed mill sites in this area are the California Redwood Company

and the Dolbeer-Carson Lumber Mill. Of the lettered streets, most ended in a dock, wharf, sawmill, warehouse or shipyard. To the south of the lettered streets, other confirmed mill sites include the Coastal Pacific Lumber Company, Eureka Plywood Company, and the Hammonds Bayside Mill 2.

- Indian and Woodley islands. The Indian Island Massacre occurred in February 1860; shortly afterwards the northeast end of the island was diked. Sawmills, shingle mills, shipyard, and a railway were constructed over the years. The Excelsior mill is a confirmed mill site that was located on the southern portion of the island. A few structures remain on the island. Woodley Island was less developed than Indian Island in the past, but now supports a boat basin, a restaurant, a government agency weather service office, and a wildlife refuge.
- Bucksport. The Wiyot village of Kutsuwahlik was located on the east side of Humboldt bay; but by 1851, a half dozen settlers' houses had been constructed. A sawmill was operating by 1852. Numerous other structures such as houses, stores, and hotels were also constructed over the years. A wharf was likely present in the 1850s as well. The Kutsuwahlik village was burned and destroyed at the same time as the Indian Island Massacre (February 1860). Rail lines are reported in the 1880s and early 1900s, but at least some were dismantled by 1953. At the northern end of Bucksport, the Holmes-Eureka Mill operated, and by the 1920s, the operation included a deepwater dock, a long pond that was part of the bay, saw and planing mills, dry kilns, sheds, and stacked lumber. At the southern end of Bucksport, the Modena Mill operated and is now a confirmed mill site. A cofferdam built in the early 1930s diverted the Elk River mouth into the bay, such that the river mouth migrated northward.
- King Salmon area. The Wiyot village of Djorokegochkok occupied the area that is now considered King Salmon. The Indians were killed and the village burned almost immediately upon contact with Euro-Americans. Structures built by the white settlers did not survive long, and wave action has eroded land that structures once stood on. Much later, after World War II, the area was dredged and filled to create King Salmon.
- Beatrice (Salmon Creek) area. This estuary area of Salmon Creek and Hookton Slough were connected at various locations and times. This area has experienced much physical change throughout the years. Railways were laid in Humboldt Bay in this area to transport logs to mills. At the Salmon Creek mill, structures included barns, a blacksmith shop, a machine shop, a boarding house, a company store, and numerous small houses. A county road was east of Salmon Creek, approximately following the route of existing Hookton Road; marshlands were north and northwest of this road.
- Hookton. Sawyer's Landing was an area consisting of a ditch from Hookton Slough, south to higher ground. A wharf was also built. Approximately 1200 ft west of the landing (at present day Hookton and Clough roads) was a commercial district. Transport of goods from

Hookton was later taken over by railway. Now, a National Wildlife Refuge dock is at the location of the old wharf.

- Southport Landing. By 1870, Southport Wharf extended into Humboldt Bay from the southwest portion of the bay. Railways and roads served warehouses, and entrepreneurs competed for the route that goods could take to be transported out of the area. Southport Landing closed and in 1878 winds and high tides destroyed the rail line. It reopened briefly in 1892 when a new dock was built to relay construction materials to the Table Bluff lighthouse.

4.9.1.4 Future Conditions of Cultural Resources

In the future, archaeological and historical resources should remain either undisturbed, or if intentionally or unintentionally disturbed, effects should be mitigated, assuming that all laws and regulations protecting cultural resources are upheld and enforced. As development and/or restoration occur along Humboldt Bay in the future, additional sites of cultural significance could be identified. The future conditions of cultural resources will be protected and considered through coordination with the State Office of Historical Preservation's regional Information Center.

Of particular archaeological significance and sensitivity is Indian Island and the village of Tuluwat; these locations hold special significance and meaning to present-day Wiyot people. The Wiyot Tribe has purchased portions of Indian Island (1.5 acres in 2000, and 60 acres in 2004), and they have received grants from federal agencies for restoration and remediation of the area. Representatives of the Wiyot Tribe are now the Table Bluff Reservation Wiyot Tribe and the Blue Lake Rancheria, and some Wiyot descendants are of the Bear River Band of the Rohnerville Rancheria. The Table Bluff Reservation is 80+ acres on the southern bluffs of Humboldt Bay.

The California State Lands Commission (CSLC) commented that "any submerged archaeological site or submerged historic resource remaining in state waters for more than 50 years is presumed to be significant. The CSLC maintains a shipwrecks database of known and potential vessels located on the state's tide and submerged lands; however, the location of many shipwrecks remains unknown." The CSLC Shipwreck Database, records 132 shipwrecks in Humboldt County. A map of known marine disasters is available within the Humboldt Room collection of the Humboldt State University Library. These shipwreck sites would not be affected by the Proposed Project because they do not spatially overlap with salt marsh habitats in the Management Area (i.e., the shipwrecks are in the open ocean not in Humboldt Bay or the estuaries).

4.9.2 Definitions of Significance and Baseline Conditions

Baseline conditions are those that were documented at the time that the NOP was published. These conditions are described above as the present conditions of cultural resources within and in the vicinity of the Proposed Project.

The potential effects on cultural resources will be identified as either no impact, less than significant, less than significant with mitigation, and significant. Significance criteria will be those listed in the CEQA checklist; a project's effects on cultural resources are significant if it will:

1. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature
4. Disturb any human remains, including those interred outside of formal cemeteries

"Substantial adverse change" in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired (CNAHC Undated). Further, material impairment can happen when a project demolishes or materially adversely alters a historical resource's physical characteristics such that:

- It affects the resource's inclusion or eligibility for the California Register of Historical Resources
- It affects the resource's inclusion or eligibility for a local register of historical resources

Criteria for eligibility include resources that are (CSPOHP Undated):

- "Associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States (Criterion 1).
- Associated with the lives of persons important to local, California or national history (Criterion 2).
- Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values (Criterion 3).
- Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation (Criterion 4)."

The Proposed Project's potential effects on cultural resources were analyzed based on the policies and definitions above.

4.9.3 Effects Analyses of the Proposed Project

Potentially significant Proposed Project effects and related mitigation measures are described below.

IMPACT CR-1: Mechanical Treatments having Potentially Significant Impacts on Archeological Resources. Mechanical treatments that disturb the soils (grinding, tilling, disking and digging/excavating) could damage historical or archaeological resources that were unknown to be present. This impact will be mitigated to less than significant with implementation of the following mitigation measures.

MITIGATION CR-1: Worker Awareness. Workers shall be made aware of the potential of uncovering artifacts or human remains, and instructed to cease work should any artifacts or human remains be found, and to contact the California Native American Heritage Commission (CNAHC), National Crime Information Center and/or County Coroner as appropriate. When treatment is allowed to begin again, areas identified as potentially having artifacts will be treated with methods that do not disturb the soil, such as top mowing, crushing and chemical treatment.

MITIGATION CR-2: Site Specific Planning for Artifacts. Site specific planning will include a consultation with the Wiyot Tribe to determine the likelihood that artifacts are present. If there are indications that artifacts are likely to be found, soil disturbing methods shall be avoided.

IMPACT CR-2: Mechanical Treatments having Potentially Significant Impacts on Human Remains. It is not likely that human remains occur in areas where *Spartina* treatment will occur (i.e., salt marshes, mudflats and riparian habitat). However, mechanical treatments that disturb the subsurface (grinding, tilling, excavation) could damage human remains that were unknown to be present. This impact will be mitigated to less than significant with implementation of the following mitigation measures.

MITIGATION CR-1 (see above).

MITIGATION CR-3: Site Specific Planning for Human Remains. If, during site specific planning, indications are that human remains are likely to be found (e.g., based on literature or communications with representatives from a Tribe), soil disturbing methods shall not be used until the remains are located and properly removed. If the coroner determines that the remains may be Native American, the coroner will contact CNAHC. CNAHC staff will notify the most likely descendants of the

deceased. The descendants may, with permission of the land owner or representative, "inspect the site of the discovery of the Native American remains and may recommend to the owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods" (Public Resources Code Section 5097.98). The descendants must make their recommendations within 48 h of being contacted by CNAHC. The land owner will insure that the area within the immediate vicinity of the remains is not further disturbed or damaged until the land owner and the most likely descendants have "discussed and conferred" reasonable options.

4.9.4 Effects Analyses of Alternative 1, Mechanical Treatment Only

The potential effects on cultural resources from Alternative 1 are the same as from the Proposed Project, although chemical treatment, which is otherwise a potential option for minimizing ground disturbance, would not occur. Non-ground disturbing methods would be limited to top mowing, flaming, crushing or flooding. Under Alternative 1, since chemical treatment could not occur, in some circumstances top mowing or crushing may be the only treatment that would allow *Spartina* removal and also allow artifacts to remain undisturbed. However, the same mitigation measures described for the Proposed Project would also reduce impacts to less than significant for Alternative 1.

4.9.5 Effects Analyses of Alternative 2, No Project

Without the Plan, Proposed Project and this PEIR, eradication activities are likely to continue regardless. However, without the Plan, the planning of future eradication projects may not include measures to minimize and avoid potential effects on cultural resources. Therefore, without the Plan, eradication activities are more likely to potentially affect cultural resources. However, the effects can be mitigated to less than significant with mitigation measures, which have the same effect as the measures that mitigate the effects of the Proposed Project.

4.10 Geology/Soils

4.10.1 Summary of Present and Possible Future Conditions

This section describes potential effects of treatment methods on geologic and soil resources. Mitigation measures are identified where necessary to address potentially significant impacts.

4.10.1.1 Present Geologic and Soils Conditions

Present geologic conditions of the Humboldt Bay region are characterized by active seismic activity. Numerous faults could result in seismic shaking, including faults in the Gorda and North American plates, the Mendocino and San Andreas Fault systems, and the Cascadia Subduction Zone (HBHRCD

2006). To be considered "active," fault movement must have occurred within the last 11,000 years; all faults in the Humboldt Bay region are considered active. To reduce fault rupture hazards, the Alquist-Priolo Special Studies Zones were established to regulate development near faults that could create surface ruptures. Within the Humboldt Bay region, Alquist-Priolo zones are along the Mad River (the Falor-Korbel fault), and within Arcata (County of Humboldt 2012).

Soils of Humboldt Bay include the poorly drained Weott and Arlynda series that are derived from old salt marsh soils (Table 4-8). Weott soils are very poorly drained, subject to frequent ponding, and result in very high surface runoff.

Table 4-8. Properties of Weott and Arlynda Soil Series (USFWS and HBNWRC 2009)

Soil Property	Weott Soil Series	Arlynda Soil Series	
Depth	0 to 12 in	0 to 3 in	3 to 14 in
Salinity dS/m	0 to 2	0	0–2.0
pH	6.1 to7.3	5.1 to 6.0	6.1–7.3

The Humboldt Bay Management Plan and its EIR provided a detailed and complete evaluation of erosion and sedimentation (HBHRCD 2006, 2007); the following general information is from those reports unless stated otherwise. Sediment within Humboldt Bay is from 2 sources, the Humboldt Bay watershed and the near-shore Pacific Ocean; more comes from the Pacific (an estimated 600,000 m^3 per year) than from the watershed (an estimated 90,000 m^3 per year). Sediment from the Pacific Ocean originates from the Mad and Eel river basins, with most coming from the Eel river basin. Channels and basins in Humboldt Bay are dredged by the USACE, local jurisdictions and private marina owners. The dredged material is then ferried to the open ocean for disposal or deposited at upland disposal sites.

Within Humboldt Bay, sediment is transported and deposited in patterns that vary with sediment size, wind, wave, currents, and stabilizing vegetation. "Sediment in the tidal flats in Humboldt Bay can be significantly 'remobilized' by waves that are generated by strong winds blowing across tidewaters in these shallow areas having a long wind 'fetch'; the sediment is then redistributed..." (HBHRCD 2007).

4.10.1.2 Possible Future Geologic and Soils Conditions

Two possible future events could affect geologic and soils conditions, a large seismic event and sea level rise. Depending on the magnitude and location of the moving fault(s), geologic and soils conditions could change dramatically in the Humboldt Bay region. Changes due to a large seismic event would likely be abrupt; elevation changes of a few feet are possible, and ground rupture is also a possibility.

Changes due to sea level rise are likely to be more gradual, but could be farther-reaching than a large seismic event.

Models of sea level rise scenarios agree that sea levels will rise, but vary in their predicted rates and magnitudes of rise. Moderate predictions are that "the average elevation of the oceans surface may be expected to increase by somewhere between 0.18 m and 0.76 m [0.59 ft to 2.49 ft] during the next century..." (HBHRCD 2006). Specific to Humboldt Bay, sea level rise is likely to increase water surface elevations as measured by parameters including mean low water, mean tide level, and mean higher high water. Because sediment deposition and erosion is linked to tide levels, and assuming that Eel and Mad river sediment sources remain constant, "increased sea level will likely lead to an increase in the elevations of the tidal flats in the bay" (HBHRCD 2006). Whether sea level rise causes sediment deposition or erosion is likely to be site specific, and dependent on structures and landforms that are within the range of sea level rise.

4.10.2 Definition of Significance and Baseline Conditions

Definitions of significance are available from the CEQA checklist. Significance criteria are based on whether the Proposed Project would:

1. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.
    b. Strong seismic ground shaking
    c. Seismic-related ground failure, including liquefaction
    d. Landslides
2. Result in substantial soil erosion or the loss of topsoil.
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
5. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

Baseline conditions of the Project are defined as those occurring at the time the NOP was circulated.

4.10.3 Effects Analyses of the Proposed Project

Potentially significant Proposed Project effects and related mitigation measures are described below.

IMPACT GS-1/WQ-5: Potentially Significant Loss of Soil from Mechanical Methods. There is potential for an increase in soil erosion and a resulting decrease in salt marsh elevation due to soil disturbing *Spartina* control methods. For example, in a study by Pickart (2011), a "light grind" method resulted in a slightly greater elevation decrease (0.26 in) than a "deep grind" method (0.18 in). Elevation in treated areas fully recovered elevation losses by 1.5 years post-treatment, when there were no significant differences in elevation between treated and control plots. Results of this study may not represent what will occur throughout the Management Area. Other *Spartina* control methods which directly disturb the soil such as tilling, disking and digging/excavating may also result in erosion and marsh elevation changes. The erosion effects of soil disturbing *Spartina* control methods are likely more significant in areas that are prone to wave action. In these areas, wave action could exacerbate erosion by carrying loose soils away and potentially eroding intact soil where there is a lack of vegetation and minimal remaining root systems to retain soils. On a site-specific basis, erosion could be potentially significant. However, with implementation of the following mitigation measure the impact is less than significant.

MITIGATION GS-1/WQ-5: Erosion Control. *Spartina* control methods which directly impact the soil (i.e., grinding, tilling, disking, digging and excavation) shall not be conducted on salt marsh areas that are within 15 ft of a salt marsh edge that is directly exposed to wave action. Other control methods can be used in these areas. This mitigation measure only applies to salt marsh edges along Humboldt Bay proper where wave action is relatively high, not attached sloughs/channels nor the Eel River or Mad River estuaries. Future research may reveal that control methods that directly impact the soil do not result in a significant level of erosion and that this mitigation is not necessary.

4.10.4 Effects Analyses of Alternative 1, Mechanical Treatment Only

Potentially significant effects of erosion could be slightly higher under Alternative 1 compared to the Proposed Project. Some of the mechanical methods (grinding, tilling and disking, digging and excavating) will likely cause more erosion than other mechanical methods (top mowing, crushing, covering, flooding) and chemical methods. However, by limiting treated areas, selecting treatment methods to fit specific site conditions, and mulching and actively re-vegetating sites that are highly erosive, effects of erosion under Alternative 1 would be less than significant with mitigation.

4.10.5 Effects Analyses of Alternative 2, No Project

Erosion is likely to be less under Alternative 2 (the No Project Alternative) than under the Proposed Project, because the extent of eradication would likely be less at any one time. Assuming that

eradication funding and progress remains at present conditions, erosion effects could be less than significant, needing no mitigation.

4.11 Hazards/Hazardous Materials

This section describes existing conditions related to hazardous materials in the Humboldt Bay area, Eel River estuary and Mad River estuary, and the types of hazardous materials that may be utilized during implementation of *Spartina* control efforts. Potential effects of treatment methods on *Spartina* control workers, and sensitive receptors are evaluated, and mitigation measures are identified where necessary to address identified impacts.

4.11.1 Summary of Present and Possible Future Conditions

4.11.1.1 Potentially Exposed Populations

The *Spartina* control project encompasses numerous potential sites around Humboldt Bay, including the South Bay, Arcata Bay, the Eel River estuary and the Mad River estuary. Some of the project areas include human populations that would be sensitive to health risks that may be posed by the Proposed Project, while aquatic organisms are present throughout the proposed control areas. *Spartina* is widespread and grows adjacent to a variety of land uses. It is found along areas ranging from heavily industrialized to minimally developed. Residential areas, including the neighborhood of Fields Landing, are also present along Humboldt Bay shoreline where *Spartina* is found.

4.11.1.2 Sensitive Receptors

Sensitive receptors include: children, the elderly, people with illnesses, or others who are especially sensitive to the effects of hazardous materials; facilities that house or attract these types of people; transient and sessile aquatic organisms (flora and fauna); and, wildlife that reside in or visit the proposed treatment areas (i.e. rodents; raptors, insects, etc.). Hospitals, schools, convalescent facilities, and residential areas are examples of human sensitive receptors. For the Proposed Project the area of concern includes sensitive receptors within and near the bay and estuary margins that are in close proximity (e.g. within ¼ mile) to areas infested with non-native *Spartina* that will be treated by the Proposed Project. Residential areas in Eureka, Arcata, King Salmon, Fields Landing, Ferndale, Samoa, McKinleyville, Fairhaven and Manila meet this criterion. Birders, bicyclists, joggers, pedestrians, and users of recreational facilities (including parks, marinas, launch ramps, fishing piers, and beaches) in the Management Area also could be exposed to hazardous materials. For example, several possible treatment sites are located near recreational trails, including PALCO Marsh and Arcata Marsh.

4.11.2 Definition of Significance and Baseline Conditions

This report considers to what degree the Proposed Project will involve: (a) potential transportation, storage or use, on a regular basis, of chemicals that could be hazardous if released into the environment; (b) operating conditions that could potentially result in the release of hazardous materials; (c) use of hazardous materials, because of *Spartina* control activities or operations, within a quarter-mile of existing or proposed schools, hospitals, or other sensitive receptors; (d) project-related increase in use intensity by people within the boundaries of or within 2 mi of chemical application areas; (e) project-derived physical changes that would interfere with emergency responses or evacuations; and, (f) an increased potential risk to people or structures because of wildfire.

4.11.3 Effects Analyses of the Proposed Project

The use of hazardous materials, other than petroleum based fuels and lubricants, will not be associated with the *Spartina*-control project if herbicide-use treatment methods are not selected. The following responses are based on the assumption that herbicide-use treatment methods may be selected, involving imazapyr and associated surfactants/colorants. Hazards of petroleum based fuels and lubricants are well known and are briefly evaluated as part of this document.

4.11.4 Imazapyr

Habitat® or Polaris™ are solutions of 28.7% isopropylamine salt of imazapyr in water, equivalent to 22.6% imazapyr acid equivalents or 2 pounds acid per gallon, and contain a small amount of an acidifier. No information has been found in the published literature on manufacturing impurities associated with imazapyr. Because virtually no chemical synthesis yields a totally pure product, commercial grade imazapyr most likely contains some impurities. However, to some extent, concern for impurities in technical grade imazapyr is reduced by the fact that most existing toxicity studies on imazapyr were conducted with the technical grade product and encompass the toxic potential of the impurities (Durkin and Follansbee 2004). Imazapyr inhibits an enzyme in the biosynthesis of the 3 branched-chain aliphatic amino acids valine, leucine, and isoleucine. Animals do not synthesize branched chain aliphatic amino acids, but instead obtain them from eating plants and other plant-eating animals. Therefore, the engineered mechanism for plant toxicity, i.e. the interruption of protein synthesis due to a deficiency of the amino acids valine, leucine, and isoleucine, does not adversely impact birds, mammals, fish or invertebrates. At the standard application rate of 1.5%, an average-sized person would have to drink 25 gallons (400 cups) of imazapyr mixture to reach lethal levels. At the highest application rate, an applicator would have to wear a contaminated glove for 50 h (~2 days) to reach a level of concern. Consequently, U.S. EPA and the State of California place no post-treatment restrictions on recreational use of the adjacent surface waters for swimming or fishing.

Upon direct application, or indirect release into surface water, photolysis is the sole identified mechanism for imazapyr degradation in the environment. The half-life of imazapyr is approximately 3 to 5 days in surface water. The major identified metabolites were pyridine hydroxy-dicarboxylic acid, pyridine dicarboxylic acid, and nicotinic acid. Metabolites are expected to be no more toxic than the parent compound. Additionally, pyridine hydroxy-dicarboxylic acid is considered to be less stable than the parent compound. Nicotinic acid (also called Niacin and referred to as Vitamin B3) is considered an essential nutrient. Imazapyr is not expected to bioaccumulate in aquatic organisms because it exists as an anion at typical environmental pHs (WSDT 2006). Imazapyr is not listed as a persistent organic pollutant by the United Nations Environment Program (May 2001). According to the USEPA, imazapyr is both persistent and mobile in soil. Laboratory studies show imazapyr is essentially stable to hydrolysis, aerobic and anaerobic soil degradation, as well as aerobic and anaerobic aquatic metabolism. Field dissipation study observations are consistent with imazapyr's intrinsic ability to persist in soils and move via runoff to surface water, where it can be broken down by photolysis as described above.

A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within 2 months (Pless 2005). In estuarine systems, dilution of imazapyr with the incoming tides contributes to its rapid dissipation (Kegley 2008, Pless 2005). Aquatic degradation studies under laboratory conditions demonstrated rapid initial photolysis of imazapyr with reported half-lives ranging from 3 to 5 days (Durkin and Follansbee 2004). The 2 primary photodegradation products were rapidly degraded with half-lives less than or equal to 3 days and eventual mineralization to carbon dioxide (Entrix Inc 2003). Degradation rates in turbid and sediment-laden waters, common in estuarine environments and in the Management Area, are expected to be lower than those determined under laboratory conditions. SFEISP's National Pollutant Discharge Elimination System (NPDES) water quality monitoring at treatment sites over the past several years has found a standard reduction in imazapyr in the adjacent surface water of more than 95% one-week after treatment over the amount present immediately after the application (Kerr 2010).

According to the SFEISP, the Conservancy approved the use of imazapyr, as an alternative herbicide option, through an Addendum to the Project's PEIR. The Addendum considered detailed scientific data concerning the potential impacts of imazapyr on biological resources and on humans. Imazapyr is a systemic aquatic herbicide approved by the U.S. EPA and the State of California for use in sensitive estuarine environments. It has become the preferred *Spartina* control method in many cases because it is very effective on *Spartina alterniflora*, which is not present in the Management Area but has invaded large areas in the San Francisco Estuary and Washington State. Imazapyr may be less

effective on *S. densiflora*, the species present in the Management Area, than on *S. alterniflora,* though definitive study results are not available regarding this.

4.11.4.1 Surfactants and Colorant

Surfactants improve efficacy by lowering the surface tension of liquids and thereby improving the spread of the liquid herbicide mixture over the leaf surface, increasing adherence of the formulation to the leaf (wetting) while reducing runoff, and enhancing the penetration of the leaf cuticle. The herbicide imazapyr would be mixed with a surfactant to facilitate absorption by *Spartina*. The 2 surfactants proposed for the Humboldt Bay region and currently being utilized by the SFEISP include either the lecithin [soy bean] based (Liberate®, Loveland Industries, Inc.), or a methylated vegetable oil (Competitor®, Wilbur-Ellis). Competitor® is recommended for use with imazapyr by the original manufacturer (BASF). This product strikes a good balance by combining one of the lowest relative toxicities to aquatic life of the available surfactants while consistently yielding high efficacy results. Liberate® is presumed to have rapid biodegradation due to its natural basis, and this product also acts as a drift retardant which aids in high pressure hose applications, has a relatively low toxicity to aquatic life, and has been highly effective on hybrid *Spartina*. No surfactants containing nonylphenol ethoxylate would be used, because of the potential for endocrine disruption in fish.

A harmless, inert colorant would also be used to help indicate which areas have been sprayed. The colorant to be used would likely be Blazon® Spray Pattern Indicator "Blue" ("Blazon® Blue"), which has been used successfully in the San Francisco Estuary control program. Blazon® Blue is a water-soluble non-ionic polymeric colorant. As with most colorant products, the active ingredients are proprietary; the MSDS indicates that it is non-hazardous and non-toxic. The product information sheet reports that the product is non-staining to the skin or clothing. As stated in the SFEISP Final PEIR/S (CSCC and USFWS 2003), a literature survey on the toxicity of color indicators performed for the U.S. Department of Agriculture reports "most commercial indicators are blue... and most often a form of Acid Blue 9..." Acid Blue 9 is a disodium salt classed chemically as a triphenylmethane color. The Cosmetic, Toiletry, and Fragrance Association name for certified batches of Acid Blue 9 is FD&C blue No. 1. Blazon Blue is utilized in the tank mix for ground-based treatment for the SFEISP. The colorant is typically added at a rate of 3 quarts per 100 gallons of solution, or 16 to 24 ounces per acre sprayed. Depending on the application method, Habitat® or Polaris™ tank mixes will be applied with varying concentrations at 1 to 1.5 pounds of the active ingredient imazapyr (as acid equivalent) per acre (lb imazapyr a.e./acre). High-volume hand-held sprayers will typically use a spray volume of 100 gallons per acre (gal/acre). Low-volume directed sprayers will use about 20 gal/acre.

4.11.5 Effects Analysis of the Proposed Project

Prior to the use of treatment methods that disturb soil and/or sediment, current site conditions should be reviewed to determine if treatment activities have the potential to disturb soil and/or sediments impacted by hazardous chemicals of concern. This concern is further addressed in the Water Quality/Hydrology section of this report (Section 4.12), including potential impacts that could occur and mitigation measures to address those impacts.

Dependent on the *Spartina* treatment method selected, disturbance of soil and/or sediment may release contaminants of concern to waters of Humboldt Bay, and/or may have the potential to impact the human health of the treatment workers. Treatment methods which disturb soil and/or sediment in known or suspected cleanup site areas should be restricted to workers who have been properly trained in the identification of contaminants of concern, and have been trained in the selection and use of appropriate personal protective equipment (PPE).

Chemical interactions have not been evaluated between existing known and/or suspected chemicals of concern in soil and/or sediment and herbicide chemicals proposed to be used for chemical treatment of *Spartina*. Research regarding potential reactions, potential synergistic effects, and/or potential chemical mixture effects between *Spartina* treatment chemicals and known and/or suspected chemicals of concern in soil and/or sediment has not been identified.

Primary types of impacts which could be associated with the treatment of non-native *Spartina* infestations include:

- Safety impacts to workers associated with manual labor and the use of potentially dangerous mechanical equipment during treatment activities;
- Health effects to workers and sensitive receptors associated with the routine application of imazapyr (including surfactants and colorants); and,
- Health effects to sensitive receptors and the environment associated with accidents involving release of herbicide or other hazardous materials into the environment.

IMPACT HHM-1: Safety Concerns for Workers. Implementation of manual or mechanical methods to treat non-native *Spartina* may result in injuries to workers during treatment activities. The impact would depend on the specific methods and equipment used and the size of the area to be treated. Workers involved in *Spartina* control could be exposed to the risk of cuts, bruises, burns or sprains associated with working in the mud, from manual labor and ignition sources, and the use of mechanized equipment. Workers would also be exposed to the risk of hearing damage from chronic exposure to equipment noise. Workers involved in manual spraying operations could be subject to

similar types of mechanical injuries. Accidents involving machinery could cause serious injury, and falls might occur when traversing uneven terrain or upon contact with slippery soils. This potentially significant impact would be mitigated to a less than significant level with the implementation of mitigation measure HHM-1 below.

MITIGATION HHM-1: Worker Injury from Accidents Associated with Manual and Mechanical Non-native Spartina Treatment. A health and safety plan shall be developed to identify and educate workers engaged in *Spartina* removal activities. Appropriate safety procedures and equipment, including hearing, eye, hand and foot protection, and proper attire, shall be used by workers to minimize risks associated with manual and mechanical treatment methods. Workers shall receive safety training appropriate to their responsibilities prior to engaging in treatment activities.

IMPACT HHM-2: Accidental Spills. When equipment is operating, an accident could occur and motor fuel could be released into a marsh, riparian area, or waterway. This could happen at any time in any location, and is not peculiar to a given site or to the Proposed Project. This type of work occurs frequently without incident, and could be a potential significant impact. Additionally, if chemical treatment options are selected, herbicides could also be released to the environment during an accident. Implementation of the following mitigation measures will reduce this potential impact to less than significant.

MITIGATION WQ-2: Minimize herbicide spill risks (see Section 4.12.19).

MITIGATION HHM-2: Accidents Associated with Release of Chemicals and Motor Fuel. Contractors and equipment operators on site during treatment activities will be required to have emergency spill cleanup kits immediately accessible. If fuel storage containers are utilized exceeding a single tank capacity of 660 gallons or cumulative storage greater than 1,320 gallons, a Hazardous Materials Spill Prevention Control and Countermeasure Plan (HMSPCCP) would be required and approved by the NCRWQCD. The HMSPCCP regulations are not applicable for chemicals other than petroleum products; therefore, the contractor shall prepare a spill prevention and response plan for the specific chemicals utilized during treatment activities. This mitigation is intended to be carried-out in conjunction with Mitigation WQ-2.

IMPACT HHM-3: Toxicity of Imazapyr and Surfactants

Imazapyr. Mild irritation to the eyes can result from accidental splashing with imazapyr. This effect will be minimized or avoided by exercising care to reduce splashing and wearing safety goggles during the handling of the herbicide (see HHM-1). Pless (2005) evaluated potential impacts to human health and safety from imazapyr application for *Spartina* control. Their analysis was based on a risk

assessment for the application of imazapyr in forestry applications, which evaluated worst-case scenarios for both workers and members of the general public, e.g., recreational users or residents. Based on this assessment, typical exposures to imazapyr do not lead to doses that exceed screening levels for either workers or members of the general public. Workers and members of the general public are not expected to experience substantial risk from acute or longer-term exposure to imazapyr.

The maximum proposed application rate of imazapyr for control of *Spartina* would not result in aquatic concentrations or terrestrial doses that exceed screening levels for toxicity to aquatic or terrestrial mammals, birds, invertebrates, or benthos, even under extremely conservative assumptions and risk scenarios (Patten 2003, Pless 2005). The more stringent screening levels for acute toxicity to endangered fish species could marginally exceed the highest modeled imazapyr concentrations in the leading edge of an incoming tide (ibid). The conditions and assumptions for these concentrations are extremely conservative and would be transient in a relatively small volume of water.

Surfactants. Impacts to human health could also result from exposure to surfactants that are used with imazapyr, and trace impurities in imazapyr or its surfactants. Information on the toxicity of surfactants, impurities, and chemical mixtures is limited. Mammalian studies indicate that the surfactants Agridex®, R-11®, and LI-39 700® are practically nontoxic to rats and rabbits, but are rated as corrosive, based on eye irritation in rabbits. LI-700® is also rated corrosive based on dermal irritation in rabbits. However, the concentrations of surfactant required to elicit these responses are substantially greater than the concentrations that would be applied to treat non-native *Spartina*.

Proposed surfactants include products composed primarily of soybean and/or vegetable oil. It is anticipated that these products would not present a hazard to aquatic life as they float on the water surface, are non-toxic, and are expected to disperse rapidly with tidal and wind action. Proposed colorants are reported by the manufacturer to be non-toxic and non-hazardous. Due to the proprietary nature of the chemical ingredients in the colorants, more specific aquatic impacts are not available.

Project Worker Exposure Effects. The potential for human health effects from the application of herbicides depends on the potential exposure routes, and the toxicity of the herbicide and associated surfactants and impurities. "Exposure routes" describe the ways in which people can be exposed to contaminants in a particular area. Workers could be exposed to imazapyr and other substances if they inhale spray droplets or windblown soil particles; if they touch the liquid herbicide during mixing and loading (dermal contact); or by ingesting small amounts of soil or sediment containing herbicide residues (e.g., for example, sediment clinging to hands or face). It is unlikely that workers applying imazapyr and surfactants with hand-held sprayers or from vehicles or boats would willfully inhale or ingest quantities of these substances that would cause serious injury. However, some spray drift may

occur during application of herbicide using boats, trucks, Marsh Masters, and ATVs mounted with a boom sprayer or spot spraying with a hose from these vehicles.

Herbicide application methods involve the potential for dermal (skin) contact from splashes during mixing and loading. Primary acute health effects from herbicide use include eye and skin irritation. Use of PPE, including protective eyewear and gloves, as specified on the product label, would minimize this risk. Proper handling of herbicides and surfactants in accordance with the manufacturer labeling requirements would reduce the potential for eye and dermal irritation in workers. This potentially significant impact would be mitigated to less than significant with the implementation of mitigation measure HHM-3, below.

Mitigation HHM-3: Worker Health Effects from Herbicide Application. Appropriate health and safety procedures and equipment, as described on the herbicide or surfactant label, including PPE as required, shall be used by workers to minimize risks associated with chemical treatment methods. Mixing and applying herbicides shall be restricted to certified or licensed herbicide applicators.

Health Effects to the Public from Herbicide Application. Routine application of imazapyr and surfactants to treat *Spartina* may result in adverse health effects to the public, including area residents, recreational visitors, and sensitive subpopulations including children and the elderly. The impact would depend on the herbicide application method, the specific site location, potential receptors in the area, and the size of the area to be treated.

Drift of chemical spray could potentially affect residents living in close proximity to the affected areas, or recreational visitors to the area. Drift from ground application can extend up to approximately 250 ft, with herbicides concentrations diminishing as the drift gets farther from the source. For perspective, herbicide drift from aerial (helicopter) application, which is not being proposed as a Proposed Project treatment method, has been measured up to 2,600 ft (approximately half a mile) from the source (NCAP 2002).

Surfactants are only slightly toxic via the inhalation pathway (DAS 2004, Monsanto 2001, USEPA 1993). The U.S. EPA considers imazapyr moderately toxic if inhaled (WSDT 2006).

Potential imazapyr exposure routes for the public include:

- Inhalation of fine imazapyr spray droplets;
- Dermal (skin) contact with airborne imazapyr or residues on vegetation, soil, sediments, or surface water;

- Incidental ingestion of imazapyr in soil or sediments by inadvertently swallowing soil or sediment (e.g., by touching dirty hands to mouth or by placing dirty objects, such as toys, into the mouth); this exposure route is of greatest importance for children; and,
- Ingestion of imazapyr by eating food containing imazapyr or residues, such as berries, garden vegetables, fish, or shellfish.

People who use treated areas for recreation could come into direct contact with vegetation that has recently been sprayed, thus posing a minor risk of skin irritation. Individuals could be exposed to imazapyr and surfactants while playing, walking, swimming, or fishing at or near treatment sites.

Surfactants are poorly absorbed through the skin (USEPA 1993), therefore dermal contact is not likely to cause significant health effects. Imazapyr has low acute dermal toxicity (WSDT 2006).

People who consume plants or wildlife (including fish and shellfish) harvested near the spray area could be exposed to herbicides and surfactants if present in the plant or animal. However, imazapyr is minimally retained and rapidly eliminated in fish, birds, and mammals (USEPA Undated, WSDT 2006). Based on these characteristics, and the water solubility and degradation of herbicides, they are not expected to bioconcentrate in aquatic organisms, therefore, the potential use of herbicides poses minimal risk to humans via consumption of aquatic organisms, and no mitigation is proposed.

Based on the discussion above, imazapyr and surfactants would have a low and not significant potential to cause adverse human health impacts. The following mitigation measures are recommended to be adopted to further reduce human health risks from exposure to chemical treatment.

MITIGATION HHM-4: Avoid Health Effects to the Public and Environment from Herbicide Application. For areas targeted for application of herbicides that are within 500 ft of human sensitive receptors (i.e., houses, schools, hospitals), prepare and implement an herbicide drift management plan to reduce the possibility of chemical drift into populated areas. The Plan shall include the elements listed below. To minimize risks to the public, mitigation measures for chemical treatment methods related to timing of herbicide use, area of treatment, and public notification, shall be implemented by entities engaging in treatment activities as identified below:

- Coordinate herbicide applications with the County Agricultural Commissioner. Identify nearby sensitive areas (e.g., houses, schools, hospitals) and/or areas that have non-target vegetation that could be affected by the herbicide and provide advanced notification.
- Establish buffer zones to avoid affecting sensitive receptors.

- Identify the type of equipment and application techniques to be used in order to reduce the amount of small droplets that could drift into adjacent areas. Consult with herbicide manufacturer for proper application instructions and warnings.
- Herbicide shall not be applied when winds are below 3 mile per hour or in excess of 10 mi per hour or when inversion conditions exist (consistent with Supplemental California Manufacturer Labeling), or when wind could carry spray drift into inhabited areas. This condition shall be strictly enforced by the implementing entity. Herbicide applications should not be conducted when surface-based inversions are present. Refer to Section 4.7, Air Quality, for discussion on inversions. The site-specific work plan should identify how meteorological conditions would be obtained.
- Signs shall be posted at and/or near any public trails, boat launches, or other potential points of access to herbicide application sites a minimum of one week prior to treatment.
- Application of herbicides shall be avoided near areas where the public is likely to contact water or vegetation.
- At least one week prior to application, signs informing the public of impending herbicide treatment shall be posted at prominent locations within a conservative 500-foot radius of treatment sites where sensitive receptors could be affected. Schools and hospitals within 500 ft of any treatment site shall be separately noticed at least one week prior to the application.
- No surfactants containing nonylphenol ethoxylate will be used.

Health Effects to Workers, Public and the Environment from Accidents Associated with Chemical Treatment. Application of imazapyr and surfactants/colorants to treat non-native *Spartina* may result in adverse health effects to workers, the public and the environment from reasonably foreseeable upset or accident conditions. Short-term, acute exposure to hazardous chemicals could occur during accident or upset conditions. Exposures could result from accidental spills or improper disposal of chemicals. The risk of health effects is highest for workers and the environment during non-native *Spartina* treatment. The impact would depend on the specific site location, potential receptors in the area, and weather conditions at the time of the accident. The following mitigation measure will be adopted to further reduce health risks from exposure to chemical treatment.

MITIGATION HHM-5: Health Effects to Workers, the Public and the Environment Due to Accidents Associated with Chemical Spartina Treatment. Appropriate health and safety procedures and equipment shall be used to minimize risks associated with *Spartina* treatment methods, including exposure to or spills of fuels, petroleum products, and lubricants. These shall include the preparation of a health and safety plan, a spill contingency plan, and if threshold onsite storage values are exceeded, an HMSPCCP (see mitigation measure HHM-2 and the mitigation measures in Water Quality Section 4.12).

Implementation of the mitigation measure identified above would reduce human health impacts to a less than significant level.

The Proposed Project will involve the transportation, storage and use, on a regular basis, of hazardous chemicals that could be released into the environment. Effects of potential release of hazardous chemicals are mitigated by HHM-2 and HHM-4.

The Proposed Project is not expected to generate an increase in use intensity by people within 2 mi of the chemical application areas. Implementation of mitigation measure HHM-4 is expected to have the opposite effect, decreasing the use intensity due to public awareness of the potential dangers.

The Proposed Project will not have detectable effects on airport operations or management, nor on the physical elements of airport properties. The Management Area includes marshes adjacent to Murray Field Airport, within the airspace analysis zone identified in the 1993 Airport Land Use Compatibility Plan for Murray Field. The Management Area also includes areas adjacent to the City of Eureka owned Samoa airstrip.

The Proposed Project will neither affect emergency response plans or responses to those plans, nor interfere with potential evacuations. It is possible, though unlikely, that a spark from mechanical equipment could cause a fire in *Spartina* marshes or riparian areas, although marsh and riparian soils are typically wet and regularly inundated. Wild fires are therefore extremely unlikely to occur in the Management Area, and the Proposed Project will not result in an increase in wildfires.

IMPACT HHM-4: Existing Hazardous Waste Sites near Potential *Spartina* Control Sites. The State of California GeoTracker database shows a number of cleanup sites present along the margins of Humboldt Bay, and some of these cleanup sites are located in areas where *Spartina* treatment activities may occur. Cleanup sites include facilities that are known or suspected to have released various hazardous chemicals, including dioxins, heavy metals, polychlorinated biphenyls (PCBs) and petroleum hydrocarbons. Additionally, various historical lumber mill operations may have occurred around the Humboldt Bay margin, and some of these operations may not currently be identified in government databases. This PEIR does not examine the precise locations of known or suspected cleanup sites in relationship to identified locations of *Spartina* populations, because of the uncertainty/unknown nature of the cleanup sites, private property constraints, and because this level of detail would be analyzed on a site-specific project basis and is outside the scope of this PEIR. Existing hazardous waste could be released to the environment by *Spartina* control measures that disturb the soil (e.g., grind technique, excavating, disking). This impact will be less than significant with implementation of the following mitigation measure.

MITIGATION HHM-6/WQ-4: Assess Existing Contamination (see Section 4.12.19).

4.11.6 Effects Analyses of Alternative 1, Mechanical Treatment Only

Under this alternative, there would be no impact associated with the potential exposure of workers, the public or the environment to herbicides, since herbicides would not be used. Use of manual or mechanical treatment methods under this alternative could result in increased worker safety impacts due to the increased use of manual labor and mechanical equipment, and associated hazards of using manual/mechanical control methods in areas of soft and uneven ground. Mitigation measures HHM-1, HHM-2 and HHM-5 would apply to this alternative. Mitigation measures HHM-3 and HHM-4 would not apply since they solely address herbicide-related exposure hazards.

4.11.7 Effects Analyses of Alternative 2, No Project

Under Alternative 3, limited uncoordinated *Spartina* control efforts would take place, similar to previous limited treatments performed by various organizations. The impacts from this alternative would be similar to impacts associated with Alternative 1, except that treatment efforts and resultant impacts would be expected to be smaller in areal extent and therefore less widespread. The efforts would also likely be less coordinated resulting in less efficient *Spartina* control, increasing the time that it will take to control *Spartina* and related control activities and impacts.

4.12 Hydrology/Water Quality

This section describes present and possible future conditions of hydrology and water quality in the Management Area, which includes Humboldt Bay, and the Eel and Mad River estuaries. The threshold of significance effects on hydrology and water quality are defined by CEQA "Appendix G" criteria, the Basin Plan (NCRWQCB 2011), and policies within the County General Plan (County of Humboldt 2005) and its supporting documents.

4.12.1 Summary of Present and Possible Future Conditions

This section describes existing hydrology, water quality and regulatory framework, with an emphasis on tidal flats and marsh habitat in the Management Area. Potential effects of *Spartina* treatment methods on water quality are evaluated, and mitigation measures are identified to address potentially significant effects and/or as precautionary guidance for less than significant effects. The region of influence for impacts to water quality includes the tidal flats and marshes where treatment will occur, and the shallow tidal waters immediately adjacent to these areas.

Water quality within the Management Area is connected to and affected by complex regional and local natural processes. Hydrologic relationships between the Pacific Ocean tidal circulation and the

freshwater tributaries govern salinity levels in different portions of the estuarine environment. Variable natural factors such as tidal cycles, local winds, basin bathymetry, and salinity gradients interact with freshwater inflows and affect the circulation of estuarine waters through channels, estuarine margins, and bays, distributing nutrients, salt concentrations, and pollutants. Major processes affecting water quality within the Management Area are described below. Available baseline water quality and sediment quality parameters are described below for the 3 estuaries in the Management Area: the Humboldt Bay, Eel and Mad River estuaries.

4.12.1.1 Humboldt Bay

Humboldt Bay is the largest estuary in California north of San Francisco. Sand spits separate the Bay from the Pacific Ocean. Humboldt Bay consists of 3 connected bays: the South Bay, Entrance Bay and North Bay (also referred to as Arcata Bay). Humboldt Bay consists mainly of shallow mudflats drained by deeper channels, portions of which are dredged for navigation. The North Bay Channel bifurcates into 2 maintained smaller channels, the Samoa Channel to the west and the Eureka Channel outer reach and inner reach to the east. The Humboldt Bay watershed is 223 mi^2 in area with its headwater tributaries originating in nearby hills, which separate the watershed from the Mad and Eel River watersheds to the north and south, respectively. The 4 major tributaries include Jacoby Creek (draining 17 mi^2) and Freshwater Creek (draining 31 mi^2) to the North Bay, Elk River (draining 29 mi^2) to the Entrance Bay, and Salmon Creek (draining 17 mi^2) to the South Bay. Smaller streams flow primarily into the North Bay and make up a total of approximately 35 mi^2 of the total Humboldt Bay watershed area. Streamflow in Humboldt Bay peaks in the winter (November through March) and is lowest during the summer (County of Humboldt 2005). Humboldt Bay has a small watershed, and the lack of significant riverine input minimizes the sediment load to the interior portions of the Bay, except in a few localized depositional areas such as the mouth of Freshwater Creek (Costa and Glatzel 2002). There is little natural salt marsh remaining around Humboldt Bay, following a long history of diking, dredging, and filling (Costa and Glatzel 2002).

4.12.1.1.1 Tidal Cycles

Under current conditions, Humboldt Bay generally represents 2 shallow, broad tidal flat expanses in the North and South Bay separated by a deeper but smaller embayment. The tidal flats are drained by tidal channels, which are shallow at their upper ends and deepen substantially as they enter the inner embayment. Tidewater enters and exits Humboldt Bay through a narrow inlet adjacent to the Entrance Bay (HBHRCD 2006). The tidal prism of Humboldt Bay has been estimated by a number of investigators, and appears to be about 3.4 to 3.5 $\times$ 10^9 cu ft on a spring tidal range and about 70% of that value on a mean tidal range. Approximately 50% of the prism is contributed by North Bay and nearly 30% by South Bay, with the remainder attributed to Entrance Bay (Costa and Glatzel 2002). Approximately 70% of Humboldt Bay is tidal mudflat exposed at low-water elevations.

4.12.1.1.2 Currents and Circulation

Circulation patterns within Humboldt Bay are influenced by freshwater inflows, gravitational currents, and tide- and wind-induced horizontal circulation. The annual freshwater input to Humboldt Bay is similar in magnitude to the Bay's tidal prism. Circulation within Humboldt Bay is tidally dominated, and the hydrography of the Bay is normally unstratified marine water (Costa and Glatzel 2002). Estuarine conditions are typically found in seasonal, localized river and creek mouth or slough areas.

Currents created by tides, freshwater inflows, and winds cause erosion and transport of sediments. In the absence of significant freshwater inflow, tides are the predominant driving forces for currents in Humboldt Bay. Wind can be a significant secondary force, particularly in the large shallow tidal flats at high tide.

The orientation of Humboldt Bay and the prevailing wind direction result in locally generated wind waves throughout the interior of the Bay, resulting in localized erosion and suspension of sediments in the interior portions. Most of the interior shoreline, although previously showing signs of erosion, appears to be fairly stable today.

4.12.1.1.3 Water Quality

Under Section 303(d) of the CWA, Humboldt Bay is 303(d) listed for PCBs and dioxin/furan compounds. The Management Area includes the estuarine reaches of the primary Bay tributaries including Salmon Creek, Elk River, and Freshwater Creek all of which are listed under the CWA Section 303(d) as sediment impaired. Based on the listing, the long-term goal includes developing and implementing a Total Maximum Daily Load (TMDL) program to restore and maintain the sediment impaired beneficial uses of the water body. Given the existence of *Spartina* within the estuarine reaches of these tributaries, the 303(d) listing for sediment impairment will be taken into consideration in the effects analysis (below).

4.12.1.1.4 Current Water Quality Monitoring Programs

The most current comprehensive information describing water quality in Humboldt Bay comes from the Wiyot Tribe Water Pollution Control Program. Additionally, researchers and entities conducting permit-specified monitoring of waste discharges conduct numerous short-term studies that focus on specific sites, resources, or pollutants. The Tribe's water quality monitoring program began in 2003 and has continued to September 2011. Additional water quality data is collected by:

- California State University System – Center for Integrative Coastal Observation Research and Education

- City of Arcata and City of Eureka
- Humboldt Baykeeper – 1st Flush: Citizen Water Quality Monitoring Program
- Humboldt State University – Central and Northern California Ocean Observing System
- USFWS – Water Quality Monitoring Program

The primary water quality parameters discussed below are: temperature, salinity, dissolved oxygen (DO), pH, turbidity, total suspended solids (TSS), and pollutants.

Temperature. Water temperatures in Humboldt Bay fluctuate seasonally and spatially and range from approximately 8° to 16°C (46°F to 60°F). Seasonal solar cycles, water depth and variable inputs of freshwater inflow and coastal ocean waters influence temperatures throughout the Management Area.

Salinity. The salinity of Humboldt Bay varies spatially and temporally. Near the entrance, the mean annual salinity is approximately 33 parts per thousand (ppt). Salinities in the South and North Bay range from 25 to 33ppt (NHE 2011). Freshwater inflow has the greater influence on salinity distribution due to wide variations throughout Humboldt Bay, while small variations in ocean inputs occur. In winter, high flows of freshwater from the tributaries lower the salinity throughout Humboldt Bay's northern and southern reach. In contrast, during the summer, when freshwater inflow is low, saline water from the Bay intrudes into the delta reaches.

Dissolved Oxygen. Oxygen concentrations in estuarine waters are increased by the mixing action of wind, waves, and tidal currents. Photosynthesis by phytoplankton and other aquatic plants and high DO in freshwater inflow also influence oxygen concentrations. DO concentrations are lowered by plant and animal respiration, chemical oxidation, and bacterial decomposition of organic matter (Sawyer et al. 2003).

Monitoring at Indian Island, an area highly impacted by *Spartina*, conducted by the Wiyot Tribe has shown levels of DO lower than the NCRWQCB objective for estuaries (6.0 mg/L). While there have been observations of isolated, ephemeral dips in DO concentration below 6.0 mg/L since monitoring at the site began in 2005, more significant concern arises from extended periods of low DO concentrations, of which none were detected during 2011. The period from May through early August 2007 exhibited frequent sustained depressions of DO concentrations below 6.0 mg/L in the water column off Indian Island. In contrast, the monitoring period from October 2010 through September 2011 did not indicate any sustained depressed DO concentrations, just abbreviated dips below 6.0 mg/L. For a 2 week deployment in July, DO concentrations were recorded below the minimum criteria of 6.0 mg/L for 7% of the total samples collected, with the lowest level of DO concentration recorded at 2.12 mg/L (WTED 2011).

pH. The pH of the water in Humboldt Bay is relatively constant and typically ranges from 7.7 to 8.2 (WTED 2011) although tide, and water temperature can result in variations within this range depending on site characteristics.

TSS, Turbidity and Sedimentation. Turbidity and TSS are generally used as measures of the quantity of suspended particles in water. The distinction between the 2 is mainly in the method of measurement. Generally, higher TSS equates to more turbid water. Discrete TSS sampling conducted by the Wiyot Tribe at 3 locations in Humboldt Bay (Indian Island, Mad River Slough and the Bay Entrance) between 2005 and 2011 resulted in a TSS range from 5.6 to 83 mg/L or NTU (WTED 2011). TSS levels in Humboldt Bay vary greatly depending on the season and can also vary with tidal stage and depth. Shallow areas and channels adjacent to shallow areas generally have the highest suspended sediment concentrations resulting from wind induced erosion and sediment loading from Humboldt Bay tributaries. In the winter months when runoff carrying suspended sediment is highest, the tributary mouths at their confluences with the Bay become mixing zones where turbidity can greatly exceed the ranges measured between 2005 and 2011 at Indian Island, Mad River Slough and the Bay Entrance. Turbidity sampling in the fluvial reaches of Elk River and Freshwater Creek during hydrologic year 2005 reported peak turbidity of 1,636 and 1,025 NTU, respectively (Fenton 2006).

Sedimentation in Humboldt Bay is understood to have 2 sources, with the primary source identified as the near-shore Pacific Ocean currents that transport sediment northward from the Eel River mouth and, secondarily, suspended sediment transported into the Bay from the tributaries during winter runoff periods. Tidal dynamics and wind-driven waves within Humboldt Bay distribute sediment throughout the Management Area. Fine sediments such as clays and silts are carried to higher elevations on tidal mudflats and salt marshes. Coarser sediments such as fine sands are generally moved to lower intertidal and shallow subtidal zones near small channels. Coarser sands, gravels and larger shell debris are generally deposited in larger channels where fine sediments can be carried out by more competent flows (HBHRCD 2006).

A study conducted by Borgeld and Stevens (2004) suggests that the sand-dominated marine sediments, characteristic of the channels in the lower reaches of Humboldt Bay, have propagated both northward and southward in the main tidal channels and away from the Entrance Bay.

The Harbor District has participated as a local sponsor in 2 federally authorized channel deepening projects with the USACE. The Corps of Engineers is obligated to annually maintain the shipping channels in Humboldt Bay. The Harbor District is also responsible for completing periodic (5-8 years) maintenance dredging on Harbor District facilities such as Woodley Island Marina (HBHRCD Undated). These dredging channels area located within the Management Area, adjacent to areas heavily impacted by *Spartina*. Material dredged by the USACE is disposed of in the designated

offshore Humboldt Open Ocean Dredged Site (HOODS). The HOODS was established as a permanent ocean dredged material disposal site in 1995 for Humboldt Bay and the north coast of California.

Fecal Coliform. The NCRWQCB objective for fecal coliform in aquaculture areas (the most stringent objective that applies to the monitoring area) is an instantaneous maximum of 49 MPN/100ml (WTED 2011).

Metals. Thirteen metals including Antimony (Sb), Arsenic (As), Beryllium (Be), Cadmium (Cd), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Selenium (Se) , Silver (Ag), Thallium (Ti) and Zinc (Zn) were sampled from Humboldt Bay water taken at the Indian Island monitoring station in 2006 and 2007 (Table 4-9). Of the 13 metals, all were non-detect during the 2006 sampling, and 3 were detected in 2007: Arsenic (64 ug/L), Copper (130 ug/L) and Selenium (200 ug/L). Given the number of non-detects and low concentrations of the metals detected in 2007, the Tribe decreased the monitoring frequency for metals (WTED 2011).

Table 4-9. Humboldt Bay Water Quality Monitoring Program Trace Metals (ug/L) in Water Samples Taken at Indian Island (WTED 2011)

Year	Sb	As	Be	Cd	Cu	Pb	Hg	Ni	Se	Ag	Ti	Zn
2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2007	ND	64	ND	ND	130	ND	ND	ND	200	ND	ND	ND

ND = Non-detect

Water Quality. Table 4-10 presents a summary of the above mentioned water quality parameters, specifically the mean, minimum and maximum bi-weekly results from Indian Island, the Bay Entrance and Mad River Slough for 2011.

Table 4-10. Summary of Humboldt Bay Water Quality Data for 2011 (WTED 2011)

Sample Site	Bi-Weekly Discrete Sampling	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)
Indian Island	Mean	10.00	31.46	9.13	7.81	9.36
	Min	8.49	29.65	8.12	7.69	3.90
	Max	11.60	33.23	10.96	8.01	33.60
Bay Entrance	Mean	10.20	32.22	8.52	7.81	4.76
	Min	8.40	28.82	5.92	7.45	1.03
	Max	12.47	33.79	10.39	8.12	24.14

Sample Site	Bi-Weekly Discrete Sampling	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)
Mad River Slough	Mean	14.09	29.22	8.51	7.81	8.10
	Min	8.55	21.33	6.27	7.53	4.16
	Max	20.71	33.72	10.10	8.13	19.16

4.12.1.1.5 Sediment Quality

Pollutants enter the aquatic system through atmospheric deposition, runoff from agricultural and urbanized land (non-point sources), and direct discharge (point sources) of waste from wastewater treatment facilities and from municipal and industrial activity. Humboldt Bay's sediment can be both a source and a sink for pollutants in the overlying water column. The overall influx of pollutants from surrounding lands and waste discharges can cause increases in sediment pollutant levels. Natural re-suspension processes, biological processes, sediment disposal and other mechanical disturbances can remobilize particulate-bound pollutants. Concentrations of trace metals and organics in sediments vary according to grain size, organic carbon content, and seasonal changes associated with riverine flow, flushing, sediment dynamics, and anthropogenic influences. The 3 primary pollutants of concern in Humboldt Bay sediments include Polychorinated Biphenyls (PCBs), Dioxin/Furans and Pentachlorophenol (PCP) as they are 303(d) listed.

PCBs. PCBs enter the air, water, and soil during their manufacture, use, and disposal. PCBs do not readily break down in the environment. In water, small amounts of PCBs may remain dissolved, but most bind to organic particles and sediments and can be taken up by small aquatic organisms and fish and their predators (HBHRCD 2006). PCBs bind strongly to sediments and therefore are rarely sampled for in water.

Although uncommonly monitored in Humboldt Bay and/or observed above detection limits in water, limited sampling for PCBs has been conducted by the Wiyot tribe. Between 2005 and 2007, PCBs were sampled for by the Wiyot Tribe in the water at the Bay Entrance, Indian Island, and Mad River Slough sampling locations. The results indicated non-detects of 7 common PCBs and therefore the PCB monitoring frequency was decreased (WTED 2011). Despite the non-detection of PCBs in recent water quality monitoring, Humboldt Bay is listed 303(d) as impaired on the basis of positive test results for the presence of PCBs in a small number of tests of fish tissue samples collected in the Bay. Neither the State Water Resources Control Board (SWRCB) nor the USEPA identified apparent adverse effects on the Beneficial Uses identified for Humboldt Bay, and the "priority" for developing a TMDL for the "impaired" bay was agreed to be "low" (HBHRCD 2006).

Dioxin/Furans and PCPs. Dioxin/Furans are chemical compounds that are created as byproducts or contaminants when chemically complex hydrocarbon structures are reacted commercially to add

chlorine to one or more of the constituents. Dioxins/furans are a constituent in a variety of commercial-grade products containing chlorine, including herbicides and pesticides, as well as compounds used to inhibit biological activity in other contexts. One of the categories of compounds in which dioxin/furans has been found is wood preservatives. Such chemicals were used in many wood products manufacturing facilities or mills in the 1950s and 1960s as anti-fungal or preservative agents for wood products. The most widely known of these compounds was PCP. PCP is itself a toxic material that is now banned from use in the United States. PCP can be found in both fresh and salt water and in the tissues of fish, in plankton, invertebrates, and sediment.

Dioxin-contaminated PCP was used at several lumber-processing mills in the Humboldt Bay region (HBHRCD 2006). Humboldt Bay is 303(d) listed for dioxin toxic equivalents based on 9 lines of evidence (LOE). The LOEs are based on exceedances of evaluation guidelines related to toxic equivalent screening value for fish and shellfish tissue per the Office of Environmental Health Hazard Assessment (OEHHA), as well as exceedances of the Canadian Sediment Quality Guidelines used to interpret the toxicity water quality objectives for Marine Habitat Beneficial Uses (NCRWQCB 2010).

Pollutant and Metal Concentrations in Bay Sediments. In 2005, the City of Eureka and the Harbor District sponsored maintenance dredging within Humboldt Bay and along waterfront facilities in Eureka. As part of the effort, sediment samples from 12 sites slated for dredging were tested for dioxin/furans including polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofuran and PCP. These sampling sites are adjacent to the Indian Island and Eureka Slough areas within the Management Area. Three of the sites, Coast Seafoods dock, Fisherman's Terminal, and 'F' Street dock, were also tested for PCBs. The results from the testing verified that the material slated for dredging met the standards for ocean/beach disposal on the Samoa Peninsula. The beach disposal site was also tested for dioxins/furans, PCBs, PCP, and grain size distribution. At each of the sample sites, core samples were collected from the surface to a depth of 6 in below the proposed dredging depth. The results of the sampling are presented in Tables 4-11 and 4-12. Tables 4-11 and 4-12 also compare measures of California Human Health Screening Levels (CHHSLs). The CHHSLs were developed by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of Cal/EPA and are not intended to establish policy or regulation. The presence of a chemical at concentrations in excess of a CHHSL does not indicate that adverse impacts to human health are occurring or will occur but warrants further evaluation of potential human health concerns (CEPA 2005).

Table 4-11. Dioxin/Furans Sediment Concentrations (pg/g, ppt) for Eureka Waterfront Sites, Woodley Island Marina and Beach Disposal Site. PCP Sediment Concentrations (μg/kg, ppb) Detected at the City of Eureka Waterfront Sites, Woodley Island Marina, and the Beach Disposal Site (CEPA 2005)

	Dioxin/Furans		Pentachlorophenol (PCP)	
Sample Site	**2,3,7,8-TCDD TEQ**	**"Overall" A 2,3,7,8-TCDD TEQ**	**PCP (ppb)**	**Reporting Limit (ppb)**
Dock 'B'	0.8	2.81	ND	160
Small Boat Basin	2.04	3.74	ND	170
	1.39	2.57	3.7[A]	17
Commercial Street Dock	2.00	3.13	ND	16
Coast Seafoods Dock	4.94	7.7	ND	850
	6.03	6.99	ND	300
Fisherman's Terminal	1.66	3.44	ND	320
F Street Dock	1.76	2.87	ND	16
I Street Dock	2.91	3.86	8.3[A]	16
J Street Dock	1.62	2.46	ND	16
Adorni Dock	0.80	1.95	ND	18
Bonnie Gool Guest Dock	1.31	2.28	ND	17
	3.49	4.57	ND	17
Samoa Bridge Launch Ramp	2.52	4.18	ND	21
Woodley Island Marina	1.13	2.03	3.3[A]	17
	0.78	1.78	2.8[A]	17
	0.83	1.89	ND	18
	0.96	2.16	ND	20
Beach Disposal Site	ND	1.3	1.9[A]	11
	ND	1.54	1.8[A]	12
CHHSL		**4.6**	**4,400**	**-**

ND = Non-detect
An "Overall" TEQ is calculated by including one-half of the reporting limits when an isomer is non-detect and multiplying half the reporting limit by the TEF
[A] Estimated result, result is lower than the reporting limit
CHHSL = 2005 CHHSLs from California EPA

Table 4-12. PCB Sediment Concentrations (μg/kg, ppb) at Sites with Detectable PCBs (CEPA 2005)

	Total PCBs (ppb)	
Sample Site	**February 2005**	**November 2005**
Coast Seafoods Dock	195.2	89
Fisherman's Terminal	33.6	ND
F Street Floating Dock	46.8	ND
Beach Disposal Site	ND	ND
CHHSL	**89**	

ND = Non-detect
CHHSL = 2005 California Human Health Screening Levels from California EPA

In 1995 the USACE conducted sediment sampling for trace metals in the Eureka, Samoa and Fields Landing channels of Humboldt Bay. Ranges in sediment metals from the 1995 sampling and analysis effort are presented in Table 4-13 (Toxscan Inc and KLI 1996). Table 4-13 also compares measured concentrations to effects range-low (ERL) and effects range-median (ERM) values, which are levels that are rarely associated with adverse effects to benthic organisms from exposures to sediment-associated contaminants and levels that are frequently associated with adverse impacts, respectively (Long et al. 1995). For most pollutants, measured concentrations were below the ERL values with the exception of chromium, nickel and silver however only nickel exceeded the ERM value. Arsenic was the only constituent that exceeded the CHHSL.

The sediment quality data presented below is from sediments located in the deeper channels of Humboldt Bay where coarser sands, gravels and larger shell debris are generally deposited. Constituent concentration from tidal marsh sediments such as clays, silts and fine sands, where *Spartina* colonizes is currently unavailable, and, therefore, it is unknown if pollutant concentrations at the project-specific sites will be comparable to the data presented for the deeper bay channels. The tidal marsh sediments are subject to dynamic morphology, induced by tidal, wind and wave forces allowing for continual erosion and accretion of fine suspended sediments from freshwater tributaries, the Pacific Ocean, and other areas within Humboldt Bay. Therefore, it is difficult to predict sediment quality spatially, vertically and temporally in the Management Area relative to the data presented below.

Table 4-13. Bulk Sediment Analytical Results (mg/kg, ppm) from Composite Sampling Locations in Humboldt Bay (Toxscan Inc and KLI 1996)

Sample	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn
Samoa Channel	3.7	0.2	120	11	4.9	0.096	86	0.1	1.4	44
Eureka Upper Channel	4.0	0.1	130	27	15	0.1	120	0.2	1.4	81
Eureka Channel	4.7	0.2	130	30	11	0.13	130	0.2	1.6	94
Fields Landing Channel	4.9	0.2	120	25	8.6	0.1	120	0.2	1.3	56
CHHSL	**0.07**	**1.7**	**NA**	**3,000**	**150**	**18**	**1,600**	**380**	**380**	**23,000**
Effects Level	**8.2-70**	**1.2-9.6**	**81-370**	**34-270**	**47-218**	**0.15-0.71**	**21-52**	**NA**	**1-3.7**	**150-410**

All samples were non-detect (µg/g) for Herbicides/Pesticides, PCBs, TPH-Diesel, TPH-Motor Oil, TPH-Gasoline, Tolulene, 4-Isopropyltoluene, other VOCs
CHHSL = 2005 CHHSLs from California EPA
Effects Level: (ERL - ERM)

4.12.1.2 Eel and Mad River Estuaries

The Eel River is the 3rd largest river system in California, encompassing approximately 3,684 mi^2 and 3,488 mi of streams within Humboldt, Mendocino, Trinity, and other Northern California counties. The Eel River system's major watersheds include the mainstem (1,477 mi^2), Middle Fork (753 mi^2), South Fork (690 mi^2), Van Duzen (428 mi^2), and the estuary and delta (50 mi^2). The mean annual discharge is approximately 6 million ac-ft (County of Humboldt 2005).

The Mad River watershed is approximately 497 mi^2 and flows through Trinity and Humboldt Counties. The watershed is a mix of private and USFS timberland with a long history of timber harvest. Other major land uses in the watershed include agricultural grazing lands, gravel extraction, and rural-residential/urban development. Gravel mining, which impacts channel morphology, occurs in the lower portions of the watershed. The Mad River supplies water for municipal and industrial use in the Humboldt Bay region. Discharge ranges from 45 cfs in late summer to 3,646 cfs midwinter with flood stage occurring at 81,000 cfs (County of Humboldt 2005).

4.12.1.2.1 Estuary Dynamics

The dynamics and specific position of the Eel and Mad River estuaries are controlled by stream discharge and sediment load during large storms, wave energy, tidal currents, and anthropogenic changes. Salinity levels and spatial distribution are a result of the rate at which freshwater enters the system, tidal amplitude and local bathymetry. Estuaries are typically stratified by salinity for most of the year, with denser saltwater often not mixing completely with the less dense freshwater, causing the

formation of a salt wedge along the bottom of the estuary. Based on anecdotal information, during low summer flows surface water does not flow to the ocean, temporarily closing the mouths of the both the Eel and Mad River. The limited water exchange may preclude pollutants introduced into the estuary from being flushed out.

4.12.1.2.2 Water Quality – Eel River Estuary

The Lower Eel River TMDLs for *sediment/turbidity* and *temperature* have been established in accordance with Section 303(d) of the CWA. Based on the listing, the long-term goal includes developing and implementing a TMDL program to restore and maintain the sediment impaired beneficial uses of the water body. The TMDLs for temperature and sediment in the Lower Eel River were established in the 2007 (USEPA 2007). The sediment TMDL for all stream reaches is 898 tons/mi^2/yr, 125% of the calculated natural sediment loading. Fenton (2011) estimated the Eel River average annual suspended sediment load as 4,330 tons/mi^2/yr.

The most current comprehensive information describing water quality in the Eel River Estuary comes from the Wiyot Tribe Water Quality Monitoring Program. In addition, 2 short-term studies that focused on specific sites, resources, or pollutants include the City of Ferndale Wastewater Treatment Facility (WWTF) discharge study and the Salt River Ecosystem Restoration Project (SRERP).

Wiyot Tribe Water Quality Monitoring Program. The Wiyot Tribe's water quality monitoring program began in 2005 and has continued to November 2011. The Tribe samples for temperature, salinity, DO, pH, turbidity and total/fecal coliforms at a single location in McNulty Slough located in the northern portion of the estuary. Table 4-14 contains the mean, minimum and maximum results for the 2005 to 2011 sampling period.

Table 4-14. Summary of Eel River Estuary Water Quality Monitoring Program between 2005 and 2011 (WTED 2011)

Sample Site	Range	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)
McNulty Slough	Mean	14.06	16.45	7.24	7.49	14.65
	Min	6.50	1.19	2.79	6.93	3.34
	Max	21.73	30.92	11.79	8.22	49.34

McNulty Slough has consistently shown low levels of DO. During the monitoring period, approximately 33% of the sampling events have shown levels below the Basin Plan objective (6.0 mg/L), particularly during the summer months. The low DO concentrations could be due to eutrophication and/or relatively higher summer water temperatures, which are common in coastal estuaries.

Between 2005 and 2007 the Wiyot Tribe sampled for PCBs including Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260 and Total Petroleum Hydrocarbons including gasoline, diesel, and oil. Results indicated non-detects for all constituents (WTED 2011).

Additional Water Quality Data. As part of the planning process for the City of Ferndale wastewater treatment plant improvement project, water level and water quality measurements were taken during the spring and summer of 2008 at the mouth of the Salt River in the southern portion of the Eel River estuary. Notable findings from the monitoring results at the Salt River mouth include: average daily salinity concentrations increase with time as freshwater inflow decreases; the amplitude of daily variability in salinity concentration decreases with time as freshwater inflow decreases; and high Eel River runoff events during March and April temporarily depress salinity concentrations as the freshwater inflow propagates through the estuary.

The City of Ferndale's monitoring results indicate variability in water quality in the Salt River (southern estuary) relative to McNulty Slough (northern estuary), particularly with regards to DO. Variations in tidal currents, estuary circulation and seasonality likely influence these water quality characteristics.

Sedimentation. In an effort to guide the design process for the SRERP, Kamman Hydrology & Engineering, Inc. assessed spatial patterns of recent sediment deposition by comparing topographic survey data from 1967 and 2006 (KHE 2007). The approach assumes that a change in elevation between the 2 topographic surveys indicates the approximate depth of sediment erosion or deposition at a given location. Comparison of the digital terrain models developed from each topographic map yielded an estimate of approximately 5 million cubic yards of sediment deposition during the period 1967-2006 within that project study area. Of this total, approximately 1.6 million cubic yards were deposited downstream of Reas Creek confluence and within the *Spartina* Project Management Area. This deposition is largely due to historic land management practices and erosive geology in the tributaries to the lower Eel River estuary. The SRERP proposes to restore historic hydrologic conditions to the lower Salt River through channel excavation, levee removal and expansion of the tidal prism (GEC et al. 2011).

4.12.1.2.3 Sediment Quality – Eel River Estuary

Available sediment quality data in the Eel River estuary is limited to the information collected to support the SRERP. In 2007, sediment sampling was conducted in the lower tidal reach of the Salt River channel, immediately upstream from its confluence with the Eel River. The purpose of the sampling was to screen for potential contaminants in the sediments that would be excavated as part of the restoration project. Samples were taken from 4 locations within the Management Area, along the

lower 2 mi of the Salt River channel. The samples were taken along the channel edge and from a composite of material at depths of 0 to 3 ft below ground surface (Table 4-15; FES 2008). For comparison, CHHSL values are included. For most pollutants, measured concentrations were below the ERL values, with the exception of chromium, copper and nickel. However, only nickel exceeded the ERM value. Arsenic was the only constituent that exceeded the CHHSL.

Table 4-15. Laboratory Analytical Results (mg/kg) from 4 Sediment Sampling Locations in the Lower Salt River (FES 2008)

Sample	Sb	As	Be	Cr	Cu	Pb	Hg	Ni	Se	Zn
SR-11	ND	2.2	ND	27.3	7.3	2.6	0.23B	38.1	ND	27.5
SR-12	ND	3.0	0.19B	41.2	14.7	4.2	0.056	53.5	0.26B	43.6
SR-13	1.4B	6.9	0.49	96.5	39.0	10.9	0.048B	128.0	0.19B	108
SR-14	ND	3.3	0.24B	50.3	18.7	5.0	0.031B	66.7	0.26B	49.6
CHHSL	**30**	**0.07**	**150**	**NA**	**3,000**	**150**	**18**	**1,600**	**380**	**23,000**
Effects Level	**NA**	**8.2-70**	**NA**	**81-370**	**34-270**	**47-218**	**0.15-0.71**	**21-52**	**NA**	**150-410**

CHHSL = 2005 CHHSLs from California EPA
Effects Level: (ERL - ERM)

4.12.1.2.4 Water Quality – Mad River Estuary

Similar to the Eel River, under Section 303(d) of the CWA, there are established TMDLs for *sediment/turbidity* and *temperature* for the Mad River. The TMDLs for temperature and sediment in the Mad River were established in 2007 (USEPA 2007). The sediment TMDL for all stream reaches was set equal to 1,073 tons/mi^2/yr, 125% of the calculated natural sediment loading. Fenton (2011) estimated the Mad River average annual suspended sediment load as 3,600 tons/mi^2/year.

The Mad River estuary does not have the extensive tidal lands that characterize the Eel River estuary and Humboldt Bay. There are currently approximately 7 acres of *Spartina* identified in this estuary. Water quality and sediment quality data for the Mad River estuary are not readily available. The 2007 TMDL for Mad River is based on pre-2006 data (NCRWQCB 2007). Post-2006 data is only available through the SWRCB 303d/305 integrated report database. The Wiyot Tribe Water Quality Monitoring Program does not have monitoring points on the Mad River (WTED 2011), nor does the 2000-2007 Surface Water Ambient Monitoring Program Report characterize water quality for Mad River (SWAMP 2008).

The McKinleyville Community Services District (MCSD) wastewater treatment plant discharges treated effluent to the Mad River through an outfall discharge pipe under the Hammond Trail railroad bridge. MCSD is currently permitted to discharge from October 1 through May 14 if river flows are

greater than 100 times the wastewater flow and the flow in the river is greater than 200 cu ft per second. If the flow conditions are not met, effluent is discharged to the percolation ponds adjacent to the river and/or to land for reclamation (used as irrigation water). Receiving waters are monitored by MCSD in the Mad River at the Highway 101 bridge upstream of the influence of the discharge and on the north bank of the Mad River as close as possible to the discharge point under the Hammond Trail Bridge. Receiving water samples collected at these locations are compared to receiving water limitations based on the water quality objectives contained in the Basin Plan for the Mad River. The receiving water limitations address water quality objectives for DO, specific conductance, pH, turbidity, floatables, taste- and odor-producing substances, coloration, bottom deposits (total dissolved solids (TDS)), biostimulants, toxic substances, temperature, pesticides, oils/grease, and other chemical constituents as specified in the Basin Plan (MCSD and SHN 2011).

4.12.2 Sea Level Rise

The National Oceanic and Atmospheric Administration's (NOAA) National Ocean Survey (NOS) is the federal agency responsible for sea level monitoring, providing tidal data, and periodically updating tidal datums to account for sea level rise. Based on historic measurements from 1977 to 2006, NOS estimates a 4.73 mm per year (mm/yr) sea level rise (equivalent to 1.55 ft in 100-years) at the Humboldt Bay North Spit gage. Conversely, NOS estimates a -0.65-mm/yr decline (equivalent to a change of -0.21 ft in 100-years) in sea level based on monthly sea level data from 1933 to 2006 at the Crescent City gage. Additionally, a recent study of sea level rise by the Pacific Institute predicts that mean sea level along the coast of California is projected to rise from 1.0- to 1.4 m by the 2100 (Heberger et al. 2009). The USACE has established guidance (USACE 2009) for incorporating direct and indirect physical effects of projected future sea-level rise change in managing, planning, engineering, designing, constructing, operating and maintaining all USACE civil works projects. The USACE reports an estimated range of sea-level rise between 20- and 59 in by the year 2100 (Adapted from GEC et al. 2011).

4.12.3 Regulatory Framework

Actions that may affect surface water in the Management Area are subject to the requirements of the Federal CWA and associated regulations, the State Porter-Cologne Water Quality Control Act (SPWQCA) and associated regulations, and to requirements established by the U.S. EPA, SWRCB, NCRWQCB and County of Humboldt. Under the permit, the agencies have responsibility for storm water management and protection within their respective jurisdictions, and they may prohibit or set limits for discharges to meet water quality objectives set forth in the permit. The NCRWQCB is the lead agency for implementing all state regulations, and it has been designated by U.S. EPA as the state agency responsible for implementing the Federal CWA Section 402 (NPDES) and Section 401

(certification of federal permits that might result in discharge to state waters/wetlands). These agencies and their permitting responsibilities with respect to the Proposed Project are discussed below.

4.12.4 The Coastal Act

The Coastal Act requires water quality protection of certain areas, including areas where *Spartina* control efforts are being considered. The following sections of the Coastal Act are particularly relevant.

Section 30321 states "The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams."

Section 30232 states "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."

4.12.5 U.S. Army Corps of Engineers

When earthwork or ground disturbance is conducted in a river, estuary, or wetland, a USACE permit may be required. The regulatory authority of the USACE for riparian projects is based on Section 404 of the CWA and Section 10 of the Rivers and Harbors Act (RHA). Section 404 of the CWA requires USACE authorization for work involving intentional or unintentional placement of fill or discharge of dredged materials into any "waters of the United States." This applies even if there is a chance the winter rains may cause erosion leading to sediment discharges into the "waters." Section 10 of the RHA requires USACE authorization for work or structures in or affecting "navigable waters." USACE jurisdiction extends up to the ordinary high water line for non-tidal waters and up to the line of high tide (for dredge and fill) or mean high water line (for work or structures) for tidal waters. The USACE is required to consult with NMFS and USFWS under the CWA for projects that may affect federally listed species under the ESA.

4.12.6 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) prepares maps of flood zones that define varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map or

Flood Hazard Boundary Map. Portions of the Management Area are located with a FEMA flood zone and therefore treatment techniques that include the placement of structures into designated flood zones will be subject to FEMA regulations.

4.12.7 National Wild and Scenic Rivers Act

The National Wild and Scenic Rivers System was created by Congress in 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection. Each river is administered by either a federal or state agency. Regardless of classification, each river in the National System is administered with the goal of protecting and enhancing the values that caused it to be designated. The Eel River was designated a Wild and Scenic River on January 19, 1981 from the mouth of the river to 100 yards below Van Ardsdale Dam. The primary agencies managing the river under the National Wild and Scenic Rivers Act include the California Resources Agency, Bureau of Land Management (BLM), Six Rivers National Forest, Mendocino National Forest, and Round Valley Reservation.

4.12.8 Federal Clean Water Act

The CWA consists of the Federal Water Pollution Control Act of 1972 and subsequent amendments, and it established the basic structure for regulation of discharges of pollutants into surface waters of the Unites States. It authorizes the EPA to set effluent limits for discharges and requires the EPA to set water quality standards for constituents in surface waters. The CWA established a framework for regulation of municipal and industrial storm water discharges under the NPDES Program. The CWA requires dischargers to obtain a permit that establishes effluent limits and specifies monitoring and reporting requirements.

4.12.9 Federal Antidegradation Policy

The federal antidegradation policy is set forth in 40 CFR §131.12. SWRCB Order No. 68-16 incorporates the federal antidegradation policy into the state policy for water quality control and ensures consistency with Federal CWA requirements. This federal regulation establishes a 3-part test for determining when increases in pollutant loadings or other adverse changes in surface water quality may be permitted:

1. Existing in-stream water use and level of water quality necessary to protect the existing uses shall be maintained and protected.

2. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control.
3. Where high quality waters constitute an outstanding National resource, such as waters of National and State Parks and wildlife refuges and waters of exceptional recreational or ecological significance, water quality shall be maintained and protected.

The federal anti-degradation policy serves as a catch-all water quality standard to be applied where other water quality standards are not specific enough for a particular water body or where other water quality standards do not address a particular pollutant.

4.12.10 North Coast Regional Water Quality Control Board

With the passage of the SPWQCA by the State of California in 1969, SWRCB and the 9 Regional Boards became the principal state agencies with responsibility for the coordination and control of water quality. Per the Water Code, the SWRCB is generally responsible for setting statewide water quality policy and is solely responsible for the allocation or determination of surface water rights. One of the most important SWRCB functions is preparing and periodically updating Basin Plans, which are water quality control plans. Regional Boards regulate all pollutant or nuisance discharges that may affect either surface water or groundwater in California.

Humboldt County is located within the jurisdiction of NCRWQCB, Region 1. The NCRWQCB primarily administers water pollution control of waste discharges to lands that might impact surface water and groundwater, as well as direct point source and diffuse or non-point source discharges. Although the Regional Board has many separate programs to help administer, monitor, and enforce its water quality protection authority, the primary programs include: 1) the NPDES Program, 2) the TMDL Program, 3) the Conditional Waiver Program for Agriculture, and 4) the Watershed Management Initiative. In addition to these, the Regional Board often is involved in the review and issuance of Section 401 water quality certifications for Section 404 (wetland dredge & fill) permit requests. The permits needed from NCRWQCB office are as follows:

- National Pollutant Discharge Elimination System Permit – This permit is required when proposing to discharge, or discharging waste into any water of the state. For discharges to surface waters, these requirements become a federal NPDES Permit from the Regional Board in the Project Area.
- Federal CWA Section 401 Water Quality Certification – This certificate is required for federal permit or license for activities that may result in a discharge into waters in the United States. Activities include flood control channelization, channel clearing, and placement of fill. Federal CWA Section 401 requires that every applicant for a USACE CWA Section 404 permit or RHA Section 10 permit must request state certification from the Regional Board that the proposed activity will not violate state and federal water quality standards. The Regional Board reviews the request for certification and may waive certification, or may recommend either certification or denial of certification to the State Board Executive Director.

4.12.11 Applicable Regulatory Standards TMDLs

Section 303(d) of the Federal CWA requires states to develop TMDLs for impaired water bodies. A TMDL is a written plan that describes how an impaired water body will meet water quality standards. It contains:

- A measureable feature to describe attainment of the water quality standard(s).
- A description of required actions to remove the impairment.
- An allocation of responsibility among dischargers to act in the form of action or water quality conditions for which each discharger is responsible.

TMDLs in California are developed either by RWQCBs or by USEPA. TMDLs developed by RWQCBs are designed as Basin Plan amendments and include implementation provisions. TMDLs developed by USEPA typically contain the total load and load allocations required by Section 303(d), but do not contain comprehensive implementation provisions. TMDLs are currently required for all waters and pollutants on the 303(d) list.

As noted above, the Lower Eel River and the Mad River TMDLs for *sediment/turbidity* and *temperature* have been established, under Section 303(d) of the CWA, because the State of California has determined that the water quality standards are not met due to excessive sediment and temperature. Humboldt Bay is 303(d) listed for *dioxins* and *PCBs*.

In accordance with Section 303(d), the State of California periodically identifies "those waters within its boundaries for which the effluent limitations ... are not stringent enough to implement any water

quality standard applicable to such waters." The primary purpose of the TMDLs is to assure that beneficial uses are protected from elevated levels of sediment, temperature, or other contaminants. The TMDLs set the maximum levels of pollutants that the water body can receive without exceeding water quality standards.

4.12.12 Water Quality Control Plan (Basin Plan)

The NCRWQCB is the primary agency responsible for protecting water quality in natural waters ("waters of the State") within the Management Area. The NCRWQCB's Water Quality Control Plan for the North Coast Region ("Basin Plan") (NCRWQCB 2011) identifies beneficial uses of surface waters, establishes numeric and narrative objectives for protection of beneficial uses, and sets forth policies to guide the implementation of programs to attain certain objectives (Table 4-16). The Basin Plan is concerned with all factors and activities, which might affect water quality. It emphasizes, however, actions to be taken by the State Water Board and the NCRWQCB, as they have primary responsibility for maintenance of water quality in the North Coast Region.

Table 4-16. Designated Beneficial Uses of Humboldt Bay, Lower Eel River, and Mad River as Defined by the Regional Board (NCRWQCB 2011)

Statewide Standard Basin Plan Beneficial Use Designations	Humboldt Bay (Eureka Plain HU)	Eel River (Lower Eel River HA) (includes delta)	Mad River (Blue Lake HA) (includes estuary)
Municipal And Domestic Supply	Existing	Potential	Existing
Agricultural Supply	Existing	Potential	Existing
Industrial Service Supply	Existing	Potential	Existing
Industrial Process Supply	Potential	Potential	Existing
Groundwater Recharge	-	-	Existing
Freshwater Replenishment	Existing	Potential	Existing
Navigation	Existing	Existing	Existing
Hydropower Generation	Potential	Potential	Potential
Water Contact Recreation	Existing	Existing	Existing
Non-contact Water Recreation	Existing	Existing	Existing
Commercial and Sport Fishing	Existing	Potential	Existing
Warm Freshwater Habitat		Potential	
Cold Freshwater Habitat	Existing	Existing	Existing
Preservation of Areas of Special Biological Significance	-	-	-
Inland Saline Water Habitat	-	-	-
Wildlife Habitat	Existing	Existing	Existing
Rare, Threatened or Endangered Species	Existing	Potential	Existing
Marine Habitat	Existing	Existing	Potential

Statewide Standard Basin Plan Beneficial Use Designations	Humboldt Bay (Eureka Plain HU)	Eel River (Lower Eel River HA) (includes delta)	Mad River (Blue Lake HA) (includes estuary)
Migration of Aquatic Organisms	Existing	Existing	Existing
Spawning, Reproduction, and/or Early Development	Existing	Existing	Existing
Shellfish Harvesting	Existing	Existing	
Estuarine Habitat	Existing*	Existing	Existing
Aquaculture	Existing	Potential	Existing
Native American Culture	Existing	Potential	Existing
Flood Peak Attenuation/Flood Water Storage	-	-	-
Wetland Habitat	-	-	-
Water Quality	-	-	-

Source: NCRWQCB 2011
HU: Hydrologic Unit
HA: Hydrologic Area
*EST use applies only to the estuarine portion of the water body

4.12.13 Applicable Water Quality Objectives for Surface Water and Estimates

It is unknown at this time whether the NCRWQCB would choose to regulate all or part of the Project Elements within the Management Area and various treatment activities under Waste Discharge Requirements (WDRs). However, the following Basin Plan water quality objectives would generally apply for project compliance with Basin Plan objectives.

Color. Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

Tastes and Odors. Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance or adversely affect beneficial uses. Numeric water quality objectives with regards to taste and odor thresholds have been developed by the State Department of Health Services and the U.S. EPA. These numeric objectives, as well as those available in the technical literature, are incorporated into WDR and cleanup and abatement orders as appropriate.

Floating Material. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

Suspended Material. Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

Settleable Material. Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.

Oil and Grease. Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

Sediment. The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Turbidity. Turbidity shall not be increased more than 20% above naturally occurring background levels. Allowable zones of dilution within which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.

Conductance. The conductance shall conform to a 90% upper limit of 375 micromhos at 77° F and a 50% upper limit of 225 micromhos at 77° F.

Total Dissolved Solids. TDS shall conform to a 90% upper limit of 275 mg/L and a 50% upper limit of 140 mg/L. Per Table 3-1 in the May 2011 Basin Plan these objectives do not apply to the Eel and Mad River Estuaries and TDS limits for Humboldt Bay are not specified.

pH. The pH shall fall between 6.5 and 8.5. Changes in normal ambient pH levels shall not exceed 0.2 units in waters with designated marine (MAR) or saline (SAL) beneficial uses nor 0.5 units within the range specified above in fresh waters with designated COLD or WARM beneficial uses.

Dissolved Oxygen. For the Mad and Eel River Estuaries, DO concentrations shall conform to a 90% lower limit of 7.5 mg/L and a 50% lower limit of 10.0 mg/L. For Humboldt Bay, DO concentrations shall conform to a 90% lower limit of 6.2 mg/L and a 50% lower limit of 7.0 mg/L.

Bacteria. The bacteriological quality of waters of the North Coast Region shall not be degraded beyond natural background levels.

Temperature. Temperature objectives for COLD interstate waters, WARM interstate waters, and Enclosed Bays and Estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California" including any revisions thereto. In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses.

- At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature. At no time or place shall the temperature of WARM intrastate waters be increased more than 5°F above natural receiving water temperature.

Toxicity. All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Water Boards.

Pesticides. No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no bioaccumulation of pesticide concentrations found in bottom sediments or aquatic life. Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64444.5, and listed in Table 3-2 of the Basin Plan.

4.12.14 California Toxics Rule

In May 2000, U.S. EPA promulgated water quality criteria for priority toxic pollutants for California's inland surface waters and enclosed bays and estuaries. Included are both human health and aquatic life protective criteria. The California Toxics Rule (CTR) criteria, along with the beneficial use designations in the Basin Plans, are directly applicable water quality standards for these toxic pollutants in these waters. Implementation provisions for these standards are provided in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Water Resources Control Board Resolution No. 2000-015). The CTR and other criteria for selected pollutants are listed in Table 4-17.

Table 4-17. Water Quality Criteria for Selected Constituents

	CTR Criteria Saltwater[a]		MCL Concentrations in Domestic and MUN Source Waters[b]	Drinking Water State and U.S.[c]
Constituent	CMC[d] µg/L	CCC[d] µg/L	MCL µg/L	MCL µg/L
Arsenic	69	36	50	10
Cadmium	40	8.8	10	5
Chromium	1,100	50	50	10
Copper	4.8	3.1	NA	1,300

	CTR Criteria Saltwater[a]		MCL Concentrations in Domestic and MUN Source Waters[b]	Drinking Water State and U.S.[c]
Constituent	**CMC[d] µg/L**	**CCC[d] µg/L**	**MCL µg/L**	**MCL µg/L**
Lead	210	8.1	50	15
Mercury	1.8	0.94	2	2
Nickel	74	8.2	NA	NA
Selenium	290	71	10	50
Silver	1.9	NA	50	NA
PCBs	NA	0.03	NA	0.5
PCPs	13	7.9	NA	1
Glyphosate	NA	NA	NA	700
Dioxin (2,3,7,8 TCDD)	NA	NA	NA	0.03 (pg/L)

[a] Numeric Criteria for Priority Pollutants for the State of California (CTR) and applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA
[b] NCRWQCB (2011) Basin Plan
[c] State and USEPA drinking water Maximum Contaminant Level s (MCLs) are provided for comparison only
[d] Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter and pg/L equals picogram per liter.
NA = Criteria not available

4.12.15 Sediment Quality Criteria

There currently are no Basin Plan objectives or other regulatory criteria for sediment quality and sediment reuse. The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) has developed sediment screening and testing guidelines for determining the general suitability of dredged material for beneficial reuse projects such as wetland restoration (SFBRWQCB 2000). The guidelines include sediment chemistry, acute toxicity, contaminant mobility, and elutriate chemistry and toxicity and are used as screening tools for determining sediment suitability for beneficial reuse. Screening standards for upland disposal of dredged or excavated Humboldt Bay sediments has not been established.

The SFBRWQCB guidelines for sediment chemistry for beneficial reuse are shown in Table 4-18. The sediment chemistry guidelines are divided into 2 levels, one for material that will be placed at or near the wetland surface (surface material) and one for material that will be placed at a minimum specified distance below the wetland surface (foundation material). If acceptable, these guidelines could be used

as screening criteria in situations where sediment will be dredged or excavated, to evaluate beneficial reuse options for dredged material and the potential adverse effects of these and other sediment disturbing activities. The guideline approach would also be used to evaluate effects of herbicide and surfactant residue in sediment. These criteria would be reviewed by the NCRWQCB and as part of the NPDES process may also require different or additional criteria for specific sites as part of CWA Section 401 review.

Table 4-18. Sediment Chemistry Screening Guidelines (from Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines [SFBRWQCB 2000])

	Wetland Surface Material		Wetland Foundation Material	
Analyte	**Concentration**	**Decision Basis**	**Concentration**	**Decision Basis**
Metals (mg/kg)				
Arsenic	15.3	Ambient Values	70	ER-M
Cadmium	0.33	Ambient Values	9.6	ER-M
Chromium	112	Ambient Values	370	ER-M
Copper	68.1	Ambient Values	270	ER-M
Lead	43.2	Ambient Values	218	ER-M
Mercury	0.43	Ambient Values	0.7	ER-M
Nickel	112	Ambient Values	120	ER-M
Selenium	0.64	Ambient Values		
Silver	0.58	Ambient Values	3.7	ER-M
Zinc	158	Ambient Values	410	ER-M
Organochlorine Pesticides/PCBs (mg/kg)				
DDTS, sum	7.0	Ambient Values	46.1	ER-M
Chlordanes, sum	2.3	TEL	4.8	PEL
Dieldrin	0.72	TEL	4.3	PEL
Hexachlorocyclohexane, sum	0.78	Ambient Values		
Hexachlorobenzene	0.485	Ambient Values		
PCBs, sum	22.7	ER-L	180	ER-M
Poylycyclic Aromatic Hydrocarbons (mg/kg)				

	Wetland Surface Material		Wetland Foundation Material	
Analyte	**Concentration**	**Decision Basis**	**Concentration**	**Decision Basis**
PAHs, total	3,390	Ambient Values	44,792	ER-M
Low molecular weight PAHs, sum	434	Ambient Values	3,160	ER-M
High molecular weight PAHs, sum	3,060	Ambient Values	9,600	ER-M
1-Methylnaphthalene	12.1	Ambient Values		
1-Methylphenanthrene	31.7	Ambient Values		
2,3,5-Trimethylnaphthalene	9.8	Ambient Values		
2,6-Dimethylnaphthalene	12.1	Ambient Values		
2-Methylnaphthalene	19.4	Ambient Values	670	ER-M
2-Methylphenanthrene		Ambient Values		
3-Methylphenanthrene		Ambient Values		
Acenaphthene	26.0	Ambient Values	500	ER-M
Acenaphthylene	88.0	Ambient Values	640	ER-M
Anthracene	88.0	Ambient Values	1,100	ER-M
Benz(a)anthracene	412	Ambient Values	1,600	ER-M
Benzo(a)pyrene	371	Ambient Values	1,600	ER-M
Benzo(e)pyrene	294	Ambient Values		
Benzo(b)fluoranthene	371	Ambient Values		
Benzo(g,h,i)perylene	310	Ambient Values		
Benzo(k)fluoranthene	258	Ambient Values		
Biphenyl	12.9	Ambient Values		
Chrysene	289	Ambient Values	2,800	ER-M
Dibenz(a,h)anthracene	32.7	Ambient Values	260	ER-M
Fluoranthene	514	Ambient Values	5,100	ER-M
Fluorene	25.3	Ambient Values	540	ER-M
Indeno(1,2,3-c,d)pyrene	382	Ambient Values		
Naphthalene	55.8	Ambient Values	2,100	ER-M

	Wetland Surface Material		Wetland Foundation Material	
Analyte	**Concentration**	**Decision Basis**	**Concentration**	**Decision Basis**
Perylene	145	Ambient Values		
Phenanthrene	237	Ambient Values	1,500	ER-M
Pyrene	665	Ambient Values	2,600	ER-M

Ambient Values = Ambient or "background" concentration statistically derived by the SFBRWQCB from data collected by the Regional Monitoring Program for Trace Substances and the Bay Protection and Toxic Substances Cleanup Program Reference Study

TEL, PEL = Threshold Effects Level and Probable Effects Level - Sediment chemistry values developed by the Florida Department of Environmental Protection as those below which biological effects are unlikely (TEL), and above which biological effects are likely (PEL)

ER-L, ER-M = Effects Range-Low and Effects Range-Median – Sediment chemistry values developed by Long et al. (1995) using the sediment chemistry and toxicity database of NOAA as those below which biological effects are unlikely (ER-L) and above which biological effects are likely (ER-M)

4.12.16 Humboldt County General Plan

The Water Resources Element (updated 2011) of the County General Plan (County of Humboldt 2005) addresses water planning issues including river and stream water quality, storm water runoff, groundwater management, water needs of fish and wildlife, water consumption, conservation and re-use methods, and state and federal regulations. Specific water resource policies (WR-P) and Standards (WR-S) relevant to the Proposed Project are as follows:

WR-P1. Sustainable Management. Ensure that land use decisions conserve, enhance, and manage water resources on a sustainable basis to assure sufficient clean water for beneficial uses and future generations.

WR-P2. Protection for Existing Surface and Groundwater Uses. Impacts on existing beneficial water uses shall be considered and mitigated during discretionary review of land use permits that are not served by municipal water supplies. Compliance measures for un-permitted development not served by municipal water supplies shall include mitigations for surface or groundwater resource impacts.

WR-P5. Critical Watershed Areas. The Board of Supervisors shall designate all or portions of watersheds as "Critical Watersheds" if cumulative impacts from land uses within the area have the potential to create significant environmental impacts to threatened or endangered species, including coho salmon or steelhead habitat. Water resources within Critical Watersheds shall be protected by the application of specific standards for such areas to avoid the take of threatened or endangered species.

WR-P8. Erosion and Sediment Discharge. Ministerial and discretionary projects requiring a grading permit shall comply with performance standards adopted by ordinance and/or conditioned to minimize erosion and discharge of sediments into surface runoff, drainage systems, and water bodies consistent with BMPs, adopted TMDLs, and non-point source regulatory standards.

WR-P9. County Facilities Management. Design, construct, and maintain County buildings, roads, bridges, drainages, and other facilities to minimize erosion and the volume of sediment in storm water flows.

WR-P10. Project Design. Development should be designed to complement and not detract from the aesthetics and function of rivers, streams, ponds, wetlands, and their setback areas.

WR-P12. Groundwater Quality Protection. Commercial and industrial discretionary uses shall be evaluated for their potential to contaminate groundwater resources, and mitigated as necessary.

WR-P16. State and Federal Regulation. Encourage state and federal agencies to maintain responsibility for water resources supply and water quality management. The County shall not accept administrative responsibility for state or federal regulatory programs unless sustainable funding sources are secured.

4.12.16.1 Watershed Planning Policy

WR-P17. Watershed Planning. Use watersheds as the geographic planning framework for water resource planning and coordination with other regional, state, and federal planning, implementation, and funding efforts. Maintain relevant land use data on watershed basis to support watershed based management and decision-making processes. Encourage and support continued research, investigation, and analysis of the County's water resources by federal and state water resource agencies. Encourage compilation of data on a watershed basis.

WR-P18. Watershed and Community Based Efforts. Support the efforts of local community watershed groups to protect water resources and work with local groups to ensure decisions and programs take into account local priorities and needs.

WR-P19. Regional Water Management Planning. Work on a regional basis through the North Coast Integrated Regional Water Management Plan (NCIRWMP) to ensure coordination and adaptive management between statewide water resource planning efforts, regional priorities, and local needs. The goals and objectives of the NCIRWMP shall be considered in establishing County water resource priorities and policy positions.

WR-P20. State and Federal Watershed Initiatives. Support implementation of state and federal watershed initiatives such as the TMDLs, the NCRWQCB's Watershed Management Initiative, and the California Non-Point Source Program Plan.

4.12.16.2 Storm Water Drainage Policy

WR-P30. Natural Storm water Drainage Courses. Natural drainage courses, including ephemeral streams, shall be retained and protected from development impacts which would alter the natural drainage courses, increase erosion or sedimentation, or have a significant adverse effect on flow rates or water quality. Natural vegetation within riparian and wetland protection zones shall be maintained to preserve natural drainage characteristics consistent with the Biological Resource policies. Storm water discharges from outfalls, culverts, gutters, and other drainage control facilities that discharge into natural drainage courses shall be dissipated so that they make no contribution to additional erosion and, where feasible, are filtered and cleaned of pollutants.

WR-P33. Restoration Projects. The County shall encourage restoration projects aimed at reducing erosion and improving existing habitat values in Streamside Management Areas and wetlands.

WR-P36. Erosion and Sediment Control Measures. The following erosion and sediment control measures shall be incorporated into development design and improvements:

1. Minimize soil exposure during the rainy season by proper timing of grading and construction;
2. Retain natural vegetation where feasible;
3. Vegetate and mulch denuded areas to protect them from winter rains;
4. Divert runoff from steep denuded slopes and critical areas with barriers or ditches;
5. Minimize length and steepness of slopes by benching, terracing, or constructing diversion structures;
6. Trap sediment-laden runoff in basins to allow soil particles to settle out before flows are released to receiving waters;
7. Inspect sites frequently to ensure control measures are working properly and correct problems as needed; and
8. Allow for the construction of public roads, trails, and utilities, when properly mitigated.

WR-P39. Reduce Toxic Runoff. Minimize chemical pollutants in storm water runoff such as pesticides, household hazardous wastes, and road oil by supporting education programs, household hazardous waste and used oil collection, street and parking lot cleaning and

maintenance, use of bio-swales and other urban storm water BMPs described in the California Storm water Best Management Practices Handbooks or their equivalent.

4.12.16.3 Water Resources and Land Use Standards

WR-S7. TMDLs Implementation. Discretionary development within watersheds containing impaired water bodies as defined under Section 303(d) of the Federal CWA and governed by TMDL pollution prevention plans shall be conditioned to reduce or prevent further impairment consistent with applicable TMDLs.

WR-S8. Erosion and Sediment Discharge. Ministerial and discretionary projects shall conform to grading ordinance standards for erosion and sediment control.

WR-S10. Projects in Proximity to Wild and Scenic Rivers. Projects located within state designated wild, scenic, or recreational river basins shall be consistent with the guidelines in the State Wild and Scenic Rivers Act as amended.

4.12.17 Other Relevant Local Plans

The City of Arcata General Plan (City of Arcata 2008) and City of Eureka General Plan (City of Eureka 1997) contain further goals and policies related to water quality. These goals and policies are consistent with those contained in the County's General Plan (County of Humboldt 2005) and the Project.

4.12.18 Definition of Significance and Baseline Conditions

This section considers to what degree the Proposed Project would involve:

a. Actions that would violate federal, state, regional or local water quality standards set for water quality and for discharge of waste water;
b. Use of, or interference with, ground water such that the amount of flow of groundwater is adversely impacted;
c. Drainage changes that would alter or cause an increase in amount or flow of tidewater or surface flow that would cause or lead to a substantial increase in erosion or sedimentation either in the Management Area or elsewhere;
d. Alteration of drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site;
e. Added runoff from the Management Area that would exceed the capacity of drainage facilities;

f. The creation of polluted runoff or other general adverse water quality impacts that could affect beneficial uses or degrade higher water quality in water of the State;
g. The placement of housing or other structures within the 100-year flood plain, or other area subject to flooding;
h. Place within a 100-year flood hazard area (FHA) structures, which would impede or redirect flood flows;
i. Expose people or structures to a significant risk or loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and
j. Development in such a manner or location that it would be adversely affected by seiche, tsunami or mudflow.

4.12.19 Effects Analyses of the Proposed Project

This section evaluates possible impacts that would directly affect water quality and result in a violation of a numerical water quality standard or permit condition. Where impacts to water quality are considered potentially significant, mitigation measures to address and reduce the level of significance of potential impacts are evaluated and described.

Physical and chemical treatment methods could result in potential impacts to water quality associated with application of herbicides, remobilization of contaminated sediments, spills of petroleum products (from machinery, vehicles, and boats) or herbicides, and erosion and mobilization of marsh sediments. Treatment methods could create temporal erosion of marsh sediments and/or remobilization of contaminated sediments; bank erosion due to *Spartina* removal along tidal channels, accumulation of organic detritus from physical/mechanical control in tidal channels, with potential for inducing stagnation and causing reductions in DO levels and/or increased turbidity and suspended solids.

The Initial Study stated that the Proposed Project would not create or contribute runoff and indicated that the Proposed Project's hydrological potential effects are not significant. The Proposed Project also does not include development that would impact the quality or quantity, rate or flow, and removal, recharge or addition to groundwater supplies. Due to the known seismic activity in the Pacific Rim, a tsunami could occur in the Management Area and would have the potential to impact the Management Area, particularly along the north and south spits and the King Salmon and Fields Landing areas, which are located directly across from the Humboldt Bay entrance. However, the Proposed Project will not create significant additional risk to people or structures. Therefore threshold items (b), (d), (e), (g) (i), and (j) are determined to be less than significant or no impact, as identified in the Initial Study, and are not further discussed herein. Potential impacts associated with items (a), (c), (f), and (h), and measures to minimize potential impacts related to these items are further

described below. Potential effects due to the Proposed Project are evaluated using the significance criteria of the previous section.

The Proposed Project will result in virtually no changes in the hydrology of the tidal prism in the Management Area, and only minor (if any) changes in the hydrology of tidal or near-tidal streams, as a consequence of Proposed Project activities. These changes could occur due to mechanical control on tidal stream banks resulting in a temporary increase in erosion. The Proposed Project will result in only temporary, minor increases in erosion from marshes or tidally influenced streams; any such increase is expected to occur only over a period of one to 2 years following Proposed Project activities, the period during which vegetation will be reduced by *Spartina* control activities. Erosion impacts from mechanical treatment are reduced by mulching plant material and leaving it in place on the marsh. Erosion impacts would be further reduced to the extent that herbicide treatment is used and dead vegetation is left in place during the period of native marsh plant colonization. The magnitude of these impacts is further reduced by the phased nature of the Proposed Project; *Spartina* control will not occur throughout the entire Management region (i.e., Humboldt Bay, the Eel River estuary, and the Mad River estuary) in a given year. Water quality may be affected by spills of herbicides or other hazardous materials, such as fuel, as previously considered under Section 4.11.

IMPACT WQ-1: Degradation of Water Quality Due to Herbicide Application. Treatment methods involving the use of herbicides have the potential to degrade water quality and subsequently affect beneficial uses of waters in the Management Area. Water quality could be affected by spills of herbicides or other hazardous materials, such as fuel, as previously considered under Section 4.11. Potential impacts to water quality will be avoided or reduced to less than significant by the implementation of the mitigation measures listed below.

Note that surfactants and colorants are described in the Hazards/Hazardous Materials Section 4.11. Imazapyr is considered for use as part of the Proposed Project and is discussed further below. Using various application methods, herbicide mixtures would be applied directly onto the foliage or stems of non-native *Spartina* during low tides when the sediment is exposed. Herbicide mixtures may be directly released to surface waters when the incoming tide could wash remaining herbicide mixture off the foliage and/or from exposed sediment. During the Proposed Project application season as described in the Project Description, rainfall is unlikely to occur in the Management Area. The potential for concentrations of herbicides to be present in water will depend on canopy interception of the applied herbicide, uptake into the plants, uptake into the root zone, and aerial drift, if any. Since application of herbicides would take place during low tide and low wind conditions as designated by the Project Description, the herbicide(s) would likely be absorbed by plants for a minimum of several hours (up to several weeks in high marsh) following application, resulting in lower potential for imazapyr or surfactants to enter water. Pless (2005) evaluated the fate of the herbicide in water after

application onto *Spartina* based on the herbicide's physical/chemical characteristics and the potential concentrations in water determined from theoretical models and results from field dissipation studies. The 2007-2010 Water Quality Monitoring Report for the SFEISP reported concentrations of imazapyr, the primary herbicide utilized, in receiving waters post-treatment to be consistent with published literature that it is short lived in estuarine environments (Kerr, pers. comm., 2011).

Imazapyr. The imazapyr products that will be used are described in Section 4.11. Under typical environmental conditions, imazapyr is highly soluble in water and does not adsorb to sediment particles. In aquatic systems, it is not expected to biodegrade, and volatilization from water or plant surfaces is insignificant. Residual imazapyr on the plants that has not completely dried or did not get absorbed by the plants, and that has the potential to be inundated by the incoming tide, will presumably be solubilized.

In water, imazapyr rapidly degrades via photolysis (Patten 2003, Pless 2005). A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within 2 months (Pless 2005). In estuarine systems, dilution of imazapyr with the incoming tides contributes to its rapid dissipation (Kegley 2008, Pless 2005). Aquatic degradation studies under laboratory conditions demonstrated rapid initial photolysis of imazapyr with reported half-lives ranging from 3 to 5 days (Durkin and Follansbee 2004). The 2 primary photodegradation products were rapidly degraded with half-lives less than or equal to 3 days and eventual mineralization to carbon dioxide (Entrix Inc 2003). Degradation rates in turbid and sediment-laden waters, common in estuarine environments and in the Management Area, are expected to be lower than those determined under laboratory conditions. Kegley (2008) also supports the conclusion that tidal flushing of sites where imazapyr is applied in estuarine settings will result in rapid dilution and degradation of the herbicide. The SFEISP's NPDES water quality monitoring at treatment sites between 2009 and 2010 has found a mean reduction in imazapyr in the adjacent surface water of 95% one-week after treatment over the amount present immediately after the application (Kerr, pers. comm., 2011). There are no State or USEPA-based numeric objectives or criteria for imazapyr. Therefore, this General Permit would not have receiving water limitations for imazapyr. However, it requires dischargers who use imazapyr to monitor their applications (SWRCB 2004).

Herbicide Application. Impacts to water quality from herbicide application depend on application methods, environmental fate, degradation rates of active agents, environmental conditions and decomposition products of the herbicides being utilized. The primary route by which herbicide solution may contact water is by overspray directly onto the water surface, or by washing off from plants due to tidal inundation or precipitation. Energetic tidal cycles and tidal currents effectively disperse bound (adsorbed) imazapyr and surfactants and dilute them in microbially active suspended

sediment. Studies of the fate of surfactants applied in tidal marshes and mudflats and as presented in the SFEISP Final PEIR/S are:

> "Research in Willapa Bay, Washington, found that the highest average maximum concentrations of glyphosate and X-77 Spreader surfactant in water dispersed from sprayed estuarine mud with the 1st flooding tide were 26 g/L and 16 g/L, respectively. These conditions represent the highest expected concentrations for exposure for aquatic invertebrates or fish swimming into freshly sprayed sites. The solution of Rodeo (3.8 pts/acre) and X-77 Spreader (0.9 pts/acre) was applied aerially (Paveglio et al. 1996). This "worst case" concentration of glyphosate and surfactants is inherently short-lived in high-energy tidal environments, and would not be pertinent to potential chronic, low-level effects. The same study found that concentration of glyphosate and surfactants were below analytic detection limits (0.5 ppb) during the 1st high tide after treatment. Kroll (1991) found that glyphosate concentrations in seawater were below the detection limit of 5 ppb within 7 days after treatment by Rodeo (0.75% solution) and Arborchem Aquatic surfactant (0.5% solution) by a hand-held sprayer. "

> "Kilbride and Paveglio (2001) conducted another study in Willapa Bay to evaluate the fate of a more concentrated glyphosate mixture (5% Rodeo solution and 2% LI-700 solution) in sediments. This concentration is above that permitted for manual application to cordgrass. Both mudflat plots and cordgrass plots were treated. Sediment samples were collected at 1 and 21 days, and at one year after treatment, and geometric mean concentrations ranged from 0.090 mg/kg to 2.30 mg/kg."

Kerr (pers. comm., 2011) concluded that the imazapyr sampling immediately after treatment for the SFEISP has consistently found that concentrations detected in the receiving waters are up to 4 orders of magnitude below those reported in the toxicology literature as a concern to humans or the animals that inhabit the associated tidal marsh system, including the benthic invertebrates at the foundation of the food web. The 4-year mean imazapyr concentration from the treatment event sampling was 60.64 ppb, with the annual means from 2007-2010 all within the relatively narrow range from 49.51 ppb to 71.17 ppb. The one-week post-treatment sampling results are also consistent with the published literature that imazapyr is short-lived in an estuarine environment. Over the 4 years covered in this report, the mean reduction in the imazapyr concentration after one week was 95.8% no matter what concentration was previously measured from the treatment event. Further, for 2 of the years (2009 and 2010) the mean reduction for that year was even higher at 99% (99.1% and 98.8%, respectively). With rapid degradation of this herbicide in the tidal marsh, as measured by the concentration in the water at the study site one week after treatment, it is anticipated that sites that still had measurable concentrations at that time would likely be below detectable levels within a few days after this 3rd

sample event. Additionally, monitoring of conventional water quality parameters (water temperature, DO, pH, conductivity, turbidity and salinity) verified that there is no indication that the herbicide application to invasive *Spartina* resulted in impacts on estuary surface water quality. These water quality results were anticipated, because there is not a relevant pathway for the treatment of an emergent plant to alter these parameters in an open system with twice-daily tidal exchange (Kerr, pers. comm., 2011).

This information documents for the SFEISP that imazapyr is not persistent in the estuarine environment and unlikely to degrade the water quality of the Management Area under normal application, and this potential impact would remain less than significant. There are no water quality objectives for imazapyr in California; therefore, the water quality considerations for imazapyr are associated with toxicity, which is addressed in Section 4.11.

Imazapyr will not result in degradation of water quality when used by the Proposed Project in accordance with the mitigation measures specified below. Using the various application methods, herbicide mixtures will be applied directly onto the foliage or stems of *Spartina* during low tides when the sediment is exposed, according to application requirements in the herbicide registrations. Herbicide mixtures may be directly released to surface waters when the incoming tide washes the remaining herbicide mixture off the foliage and the exposed sediment.

These independent lines of research in the fate of surfactants and imazapyr in tidal (and other) habitats suggest that potential impacts to water quality and beneficial uses of waters of the State caused by spraying imazapyr mixtures in intertidal environments are likely to be small and temporary. Therefore, controlled applications (i.e., following label instructions) of registered herbicides are not expected to degrade water quality, except for to a very limited temporal and spatial extent. With implementation of the following mitigation measure, this impact is less than significant.

MITIGATION WQ-1: Managed Herbicide Control. Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper dry times before tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label. The Control Program shall obtain coverage under the statewide General NPDES Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States (SWRCB 2004). The specific measures that will be required are not known at this time.

IMPACT WQ-2: Herbicide Spills. Large volumes of herbicide or surfactant if spilled or misapplied could degrade water quality and cause temporary toxicity. As described for Impact WQ-1, above, controlled applications of registered herbicides (i.e., following label instructions) are not expected to

degrade water quality because these materials degrade rapidly in the environment and do not represent high potentials for toxicity or bioaccumulation in marine or terrestrial organisms. However, if large volumes of herbicide or surfactant are spilled near the treatment site in an undiluted (neat) form, or misapplied, these events could degrade water quality and cause temporary toxicity. Thus, impacts to water quality associated with large volume spills would be potentially significant. Implementation of Mitigation Measures WQ-2 and HMM-2 will reduce this potential impact to less than significant.

MITIGATION WQ-2: Minimize Herbicide Spill Risks. Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and surfactants on or near project sites shall be allowed only in accordance with a spill prevention and containment plan approved by the NCRWQCD; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters. This mitigation is intended to be carried out in conjunction with Mitigation HMM-2.

IMPACT WQ-3: Fuel or Petroleum Spills. Spills of gasoline or other petroleum products, required for operation of motorized equipment, into or near open water could degrade water quality, with potential for toxicity or contaminant bioaccumulation. Gasoline or other petroleum products, such as oil and hydraulic fluids, required for operation of motorized equipment, could spill into or near open water. Large spill volumes could degrade water quality, with potentials for toxicity and contaminant bioaccumulation in marsh organisms. Water quality impacts also may occur if ignition fluids such as gasoline used for burning were inadvertently sprayed or spilled to surface waters. Gasoline, diesel, and other distilled petroleum products are more water-soluble than crude oils and heavier distillate fractions. However, they are also more volatile and therefore lost rapidly from water to the atmosphere. The lower molecular weight aromatic hydrocarbon compounds in petroleum products can be toxic to marine organisms at low exposure concentrations. Consequently, some toxicity to marine organisms could occur in the immediate vicinity of a spill, whereas environmental weathering processes reduce the toxicity of the spill with time. This impact to water quality is potentially significant, but would be localized to the general vicinity of the spill and temporary. Impacts related to spills generally can be reduced to less-than-significant levels by implementing specific mitigation measures and BMPs. With implementation of the following mitigation measure, this impact is less than significant.

MITIGATION WQ-3: Minimize Fuel and Petroleum Spill Risks. Fueling operations or storage of petroleum products shall be maintained off-site, and a spill prevention and management plan shall be developed and implemented to contain and clean up spills. Transport vessels and vehicles, and other equipment (e.g., mowers) shall not be serviced or fueled in the field except under emergency

conditions; hand-held gas-powered equipment shall be fueled in the field using precautions to minimize or avoid fuel spills within the marsh. For example, gas cans will be placed on an oil drip pan with a PIG® Oil-Only Mat Pad placed on top to prevent oil/gas contamination. Only vegetable oil-based hydraulic fluid will be used in heavy equipment and vehicles during *Spartina* control efforts. When feasible, biodiesel will be used instead of petroleum diesel in heavy equipment and vehicles during *Spartina* control efforts. Other, specific BMPs shall be specified as appropriate to comply with the Basin Plan and the other applicable Water Quality Certifications and/or NPDES requirements. This mitigation is intended to be carried out in conjunction with Mitigation HMM-2 in order to reduce potential impacts to less than significant level.

IMPACT WQ-4: Pollutant/Contaminant Remobilization and Synergistic Effects of Imazapyr. Treatment methods that include ground disturbance have the potential to expose sediments with higher levels of constituents, or more biologically available forms, including heavy metals and other contaminants such as PCBs and dioxin/furans. Treatment methods that include ground disturbance have the potential to expose and/or mobilize contaminated sediments which could result in a potential increased risk to water quality. If ground disturbance is conducted in areas with high concentrations of metals or pollutants, there is the potential to degrade water quality and contribute to exposure of marsh organisms to some level of constituents. Project-induced remobilization of contaminated sediments would not likely occur from treatment methods that do not directly disturb sediments. However, imazapyr application is not preferred, because if imazapyr is applied in areas with relatively high levels of contaminants then there is an increased potential for synergistic effects of the chemicals. This impact will be reduced to less-than-significant by implementing specific mitigation measures and BMPs as recommended in Mitigation Measure HHM-6/WQ-4.

MITIGATION HHM-6/WQ-4: Assess Existing Contamination. For projects where ground disturbance methods (such as digging or excavation) or imazapyr application are considered, a preliminary assessment shall be performed to determine the potential for contamination in sediments prior to initiating treatment. The preliminary assessment shall include (1) review of existing site data and (2) evaluation of historical site use and/or proximity to possible contaminant sources. If the preliminary assessment finds a potential for historic sediment contamination, an appropriate sediment sampling and analysis guide shall be followed and implemented, or soil contamination shall be assumed to be present. If contaminants with a known potential for synergistic effects with imazapyr are present or assumed to be present at levels higher than background levels, that would result in synergistic effects, an alternative treatment method (that shall not disturb sediment or apply imazapyr) will be implemented, such as repeated top-mowing, or the specific project shall apply to the Regional Water Board for site-specific WDR. If contaminants are present or assumed to be present at levels higher than background levels (but below levels that might trigger site cleanup), and these

contaminants raise concerns for potential impacts from ground disturbance but not from synergistic effects due to imazapyr application, treatment methods that shall not disturb sediment (e.g., top mowing or imazapyr application) shall be used, or the specific project shall apply to the Regional Water Board for site-specific WDR. If significant contamination that warrants site cleanup is identified, sampling information shall be provided to the U.S. EPA or other appropriate authority.

IMPACT WQ-5: (See Impact GS-1 Potentially Significant Loss of Soil from Mechanical Methods (Section 4.10.3)). This potential impact is mitigated to less than significant with implementation of the following mitigation measure.

MITIGATION GS-1/WQ-5: Erosion Control. (See Section 4.10.3)

IMPACT WQ-6: Erosion/Sediment Control at Staging and Access Areas. Temporary ground disturbance associated with site ingress/egress, staging, stockpiling and equipment storage areas could occur in areas outside and adjoining the treatment areas. These temporarily disturbed areas have the potential to impact water quality resulting from erosion and sediment mobilization. Rain and wind-induced erosion from these temporary disturbed areas could carry soil contaminants (e.g., nutrients or other pollutants) into waterways adjacent to the treatment areas, degrade water quality, and potentially violate water quality standards for specific chemicals, DO, suspended sediment, or nutrients. Impacts can be reduced to less-than-significant by implementing the following mitigation measure.

MITIGATION WQ-6: Designate Ingress/Egress Routes. Designated ingress/egress routes shall be established at control sites to minimize temporarily disturbed areas. Where areas adjacent to staging and stockpile areas are erosion prone, the extent of staging and stockpile areas shall be minimized by flagging their boundaries. An erosion/sediment control plan (ESCP) shall be developed for erosion prone areas outside the treatment area where greater than ¼ acre of ground disturbance may occur as a result of ingress/egress, access roads, staging and stockpile areas. The ESCP shall be developed by a qualified professional and identify BMPs for controlling soil erosion and discharge of treatment-related contaminants. The ESCP shall be prepared prior to any treatment activities, and implemented during construction.

IMPACT WQ-7: Decreased Dissolved Oxygen (DO) in Receiving Waters. Treatment techniques that increase and leave in place above ground biomass (wrack) could potentially result in decreased DO in receiving waters during the decay period, depending on where and how the wrack is deposited. Tidal currents and wind-induced waves could transport the wrack and debris into adjacent waters with low DO. In areas of poor tidal circulation, wrack and debris may accumulate, and further impede

tidal exchange, further degrading DO. This impact is potentially significant but mitigated to less than significant by the following mitigation measure.

MITIGATION WQ-7: Removal of Wrack. During site specific planning, tidal circulation will be visually assessed. In areas with relatively low tidal circulation, it will either be assumed that DO levels are depressed or monitoring will be conducted to determine if DO levels are depressed. In treatment areas located within or adjacent to waters known or expected to have depressed DO, if wrack is generated during the treatment process, the wrack shall be removed from the treatment area subject to tidal inundation or mulched finely and left in place.

IMPACT WQ-8: Placement of Temporary Structures in a FEMA Flood Zone. Portions of the Management Area are located with the FEMA flood zone. The specific regulatory considerations related to hydrology and geomorphology are those arising from local jurisdiction such as Humboldt County and FEMA obligations relative to minimizing flood hazards within flood hazard zones. Regulations pertinent to the Proposed Project are covered in policies stipulated by the local jurisdiction. While the Proposed Project does not propose placement of housing in the 100-year floodplain or Special FHA, placement of temporary dikes or structures to impound water to create prolonged inundation could displace and reduce floodplain/floodway carrying capacity within a special flood hazard zone. Impacts can be reduced to less-than-significant with implementation of the following mitigation measure.

MITIGATION WQ-8: Approval of Structures in Floodplains. Temporary structures used to impound water for submerging *Spartina* including but not limited to earthen dikes, cofferdams, inflatable dams, geotextile tubes or concrete ecology blocks that are proposed for placement in a regulatory FEMA flood zone shall be reviewed and approved by the local floodplain administrator prior to placement.

IMPACT WQ-9: Alteration of Drainage Patterns due to Placement of Temporary Dikes or Structures to Impound Water. Water impoundments could potentially have a significant effect on drainage patterns and erosion processes. For example, impoundments could result in scouring of tidal channels. However, because flooding will be limited in spatial extent (<5 acres experimentally initially, and <20 ac generally) and duration (<4 months) and will be monitored weekly, and because impoundments will include a simple mechanism for releasing the impounded water if necessary to prevent any permanent changes to tidal channels or other features, this effect is temporary and less than significant.

4.12.20 Effects Analyses of Alternative 1, Mechanical Treatment Only

Impacts to water quality from individual treatment methods and combinations of methods generally would be the same as those described for the Proposed Project, with the exception that potential impacts associated with herbicide application and spills would not occur. Alternative 1 has the potential to have higher water quality impacts relative to the Proposed Project due to the likelihood of remobilization of contaminated sediments during ground disturbing treatments, although this would depend on actual acres of ground disturbance as well as actual amount of contaminated sediment within the Management Area. Overall, impacts to water quality are considered less than significant with implementation of the Proposed Project's mitigation measures.

4.12.21 Effects Analyses of Alternative 2, No Project

Under this alternative, all types of control methods could continue to be used as needed by individual landowners, without benefit of training and standardization provided by the *Spartina* control plan. Water quality impacts from herbicide application and re-suspension of contaminants would occur. Water quality impacts from herbicide and fuel spills might occur with disproportional frequency as a result of a lack of training and application standards.

4.13 Land Use

4.13.1 Summary of Present and Possible Future Conditions

Zoning and land use maps were consulted to determine the present designations of areas that exhibit *Spartina* infestations greater than 26% (Table 4-19), because these will be the areas with the most intensive *Spartina* control activities and the areas where significant effects may have the potential to occur. The primary zoning and land use designations of these areas are AE (Agricultural Exclusive) and NR (Natural Resources).

Table 4-19. The Primary Zoning and Land Use Designations of Areas with *Spartina* Infestations Greater than 26% are AE and NR

Area with Infestation >26%	Primary Zoning or Land Use Designation(s)	Description of Designation	Source
Arcata Bay, vicinity McDaniel Slough	AE; NR	Agricultural Exclusive; Natural Resource	City of Arcata 2008
Arcata Bay, vicinity Gannon Slough and Jacoby Creek	AE; NR/W	Agricultural Exclusive; Natural Resource combined with Coastal Wetland	City of Arcata 2008

Area with Infestation >26%	Primary Zoning or Land Use Designation(s)	Description of Designation	Source
Arcata Bay, vicinity of Manila	NR/W; NR/F,W; AE-60/F,T	Natural Resource combined with Coastal Wetlands, FHAs; Agricultural Exclusive combined with FHAs and Transitional Agricultural Lands	CHPBD 2011
North Bay, vicinity of SR 255 and Samoa	NR; NR/W; RE	Natural Resource; Natural Resource combined with Coastal Wetlands; Residential Estates	County of Humboldt 2008
Indian and Woodley islands, vicinity of Eureka Slough	NR; CS; GI; AE	Natural Resource; Service Commercial; General Industrial; Agricultural Exclusive	City of Eureka 2011
Entrance Bay, vicinity of Elk River and Martin Slough	NR; AE; AC	Natural Resources; Agricultural Exclusive; Coastal Agricultural	County of Humboldt 2008; City of Eureka 2011
South Bay, vicinity of Hookton Slough	NR/A,W, D, B, F, T; AE	Natural Resources combined with Archaeological Resources, Coastal Wetlands; Design Review; Beach and Dune Areas, FHAs, Transitional Agricultural Areas; Agricultural Exclusive	CHPBD 2011; County of Humboldt 2008
Eel River estuary	AE	Agricultural Exclusive	CHPBD 2011
Mad River estuary	NR/R	Natural Resources combined with Streams and Riparian Corridor Protection	CHPBD 2011

From the Coastal Zoning Act, Section 163.1.9.9 defines permitted uses in Agricultural Exclusive zones:

> 163.1.9.9 Agricultural Exclusive. The Agricultural Exclusive Principally Permitted Use includes the following uses: Single Family Residential (on lots 60 acres or larger in size, 2 single detached dwellings are permitted), General Agriculture, Timber Production, Cottage Industry; subject to the Cottage Industry Regulations, and Minor Utilities to serve these uses. Single Family Residential, 2nd Agriculture or Commercial Timber Production Residence (on a lot 60 acres or larger in size), and Cottage Industry use types do not require a conditional use permit, but are not considered the principal permitted use for purposes of appeal to CalCC pursuant to Section 312-13.12.3 of the Coastal Zoning Ordinance and Section 30603(a)(4) of the CalCA. (Added by Ord. 2367A, 7/25/06, Amended by Ord. 2383, 2/27/07)

Uses that are not permitted may still be allowed, as long as they are conditionally permitted (County of Humboldt 2005). From Humboldt County zoning regulations (Section 313-5.4), the principally permitted use of land zoned NR is for fish and wildlife habitat management. CPUs include:

- Caretaker's residence, only within Humboldt Bay coastal sand dune areas
- Minor utilities
- Major electrical distribution lines
- Minor generation and distribution facilities
- Aquaculture, subject to coastal-dependent industrial regulations
- Surface mining, subject to surface mining regulations
- Watershed management
- Boating facilities improvements
- Resource-related recreation
- Coastal access facilities
- Similar compatible uses

All of the areas with *Spartina* coverage greater than 26% are within the coastal zone. The CalCA defines lands within the coastal zone as follows:

- An environmentally sensitive area is "any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments."
- Wetlands are defined as "lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens."
- ESHAs are areas that "shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas"; further development adjacent to ESHAs and parks and recreation areas "shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas".

Public lands are mapped by Humboldt County and can be viewed through the County's Web GIS website. Within Humboldt Bay, lands with *Spartina* coverage greater than 26% are generally within, adjacent to, or in the vicinity of public lands. In the Eel River estuary, public lands overlay those infested areas along North Bay, Hawks Slough and McNulty Slough, but not infested areas in the southern part of the estuary, including the Salt River estuary. However, Riverside Ranch, located at the mouth of the Salt River estuary, is expected to be transferred to CDFW ownership in 2012. In the Mad River estuary, infested areas are not within or adjacent to public lands, but public land is found to the south of School Road.

The agencies that have jurisdiction over *Spartina* treatments are numerous, but specific to land use, the agencies are the Humboldt County Department of Community Development Services, CalCC, and the planning departments of the cities of Eureka, Ferndale, and Arcata. The general plans and land use codes of the County and cities were reviewed to determine zoning and land uses of the *Spartina* infested areas.

Although the updated County General Plan has not yet been adopted and certified, primary zoning and land use designations of *Spartina* infested areas are unlikely to change. The *Spartina* infested areas are all within the coastal zone and are closely regulated.

4.13.2 Definition of Significance and Baseline Conditions

Definitions of significance are available from the CEQA checklist. Significance criteria are based on whether the Proposed Project would:

- Physically divide an established community
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Proposed Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect
- Conflict with any applicable HCP or NCCP

Baseline conditions of the Proposed Project are defined as those occurring at the time the NOP was circulated. Although the County General Plan has not been adopted yet, *Spartina* infested areas are within the coastal zone, where land use designations are closely regulated and unlikely to change.

4.13.3 Effects Analyses of the Proposed Project

Potential conflicts with surrounding or nearby land uses are determined generally for the overall program area. For specific sites requiring treatment, conflicts will need to be reviewed and appropriate measures will need to be identified, to mitigate any potential adverse land use impacts.

In comments on the Proposed Project's NOP and Initial Study, CalCC primarily commented on 2 issues: 1) siting the Proposed Project and preventing degradation of ESHAs, and 2) preventing degradation of parks and recreation areas adjacent to ESHAs. ESHAs are areas that "shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas"; also, further development adjacent to ESHAs and parks and recreation areas "shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas." The Proposed

Project is sited where *Spartina* has been found, therefore, Proposed Project siting is not discretionary. However, the Proposed Project has been designed to prevent degradation of ESHAs, as described in the impacts and mitigation measures sections of this PEIR. These sections describe how potentially significant impacts can be avoided, minimized, or mitigated, so that degradation of ESHAs is prevented.

The CSLC concerns on the NOP were similar to CalCC's. The CSLC asked for an evaluation of temporary loss of access, recreation and other public trust uses (fishing, bird watching, boating, etc.) during treatment; inclusion of mitigation measures for residents and tourists affected was also requested. The potential loss of access and other public trust uses is less than significant with mitigation measures summarized above.

Potentially significant Proposed Project effects and related mitigation measures are described below.

IMPACT LU-1: Potential Significant Impact of Herbicide Overuse or Overspray. Herbicide overuse and overspray, or inaccurate spray, could occur on agricultural lands in the Management Area vicinity. This impact will be less than significant with implementation of the following mitigation measures.

MITIGATION LU-1: Use Certified Herbicide Applicators. Herbicides will only be applied by certified applicators.

MITIGATION LU-2: Compliance Monitors. Applicators shall be assigned a compliance monitor who observes that spray does not reach agricultural fields.

MITIGATION LU-3. Mechanical Methods near Agriculture. If crops (including aquaculture crops such as oysters and clams) are growing in the vicinity of spraying, such that these crops would be more difficult to sell even if herbicides are undetectable, mechanical methods of treatment shall be selected.

MITIGATION LU-4. Posting Notices and Limiting Access. Public safety shall be ensured by posting notices and limiting access during treatment periods. Public notice shall be posted at the entrances of public lands, at trailheads, and on the websites of agencies responsible for the public lands, such as HBNWR. If members of the public access lands during treatment, the field supervisor shall have the authority to ask them to leave for their safety.

IMPACT LU-2: Potentially Significant Impacts to Public Access. Mechanical or chemical treatments can be unsafe to the general public, thus affecting public access. Most treatment areas are in tidal marshes that are not accessed by the general public. However, some treatment areas, such as PALCO Marsh and Bracut Marsh, may have trails or upland areas adjacent to them where public

access could be affected. This impact will be less than significant with implementation of Mitigation Measures LU-1, LU-2, LU-3, LU-4 (see above) and LU-5 below.

MITIGATION LU-5: Do not treat Spartina during peak public use periods: Although public use is minimal in the salt marshes where *Spartina* primarily occurs, there is some use, particularly by waterfowl hunters. *Spartina* treatment will not occur in waterfowl hunting areas during periods of time when hunters are active. If other peak periods of public use are identified in *Spartina* infested areas then control efforts will also avoid these time periods.

4.13.4 Effects Analyses of Alternative 1, Mechanical Treatment Only

Limiting treatments to mechanical means will pose fewer potential impacts than the Proposed Project because potential effects on agricultural land use from herbicide overspray will not occur under Alternative 1. However, potential impacts on public safety and access are similar to those of the Proposed Project, because mechanical treatments requiring brushcutters or heavy equipment will still require temporary and short-term closure of public access for safety reasons. Mitigation LU-4 will reduce the public safety and access impacts to less than significant with mitigation.

4.13.5 Effects Analyses of Alternative 2, No Project

Similar to the land use effects due to either the Proposed Project or Alternative 1, the No Project Alternative will not cause changes in land use. Currently, *Spartina* treatment projects continue and are not causing land use changes. Public access is not significantly decreasing as eradication projects continue. Chemical treatments have not yet occurred, or have occurred on a small enough scale that agencies have not required public scoping or notice.

4.14 Noise

4.14.1 Summary of Present and Possible Future Conditions

Noise is defined as a sound that is "unpleasant, unexpected, or undesired" (AHD 2009). Noise is experienced by receptors; therefore, an analysis of noise requires an assessment of the character and quality of sound produced by the Proposed Project, and of the receptors that may experience the sound.

The potential receptors of sound and noise in the Management Area vary, primarily according to the land uses and activities in the vicinity. Land uses and activities within approximately ¼ mile of areas with *Spartina* cover greater than 26% were determined by inspection of aerial photos (Table 4-20), because these are the areas with the most intensive *Spartina* treatment and resulting noise. Because *Spartina* treatment methods can create noise, present and future *Spartina* treatments were also

considered an activity. The most sensitive receptors are likely to be those who live and recreate in the vicinity of infested areas.

Table 4-20. Land Uses and Activities within Approximately ¼ Mile of Areas with *Spartina* Cover Greater than 26%

Location of Infestation with 26%+ Cover	Land Use and Activities within Approximately ¼ Mile	*Spartina* Removal in 2011 (Present Conditions)	*Spartina* Removal Currently Planned (Future Conditions)
Northeastern portion of Arcata Bay	Highway 101, wastewater treatment, open space, agriculture and grazing, public recreation	Yes	Yes
Northwestern portion of Arcata Bay	Samoa Boulevard, timber products manufacturing, agriculture and grazing, residential, open space, Lanphere Dunes	Yes	Yes
Western portion of North Bay	Samoa Boulevard, residential, open space	No	Yes
Indian Island, Woodley Island, Eureka Slough	Highway 255, urban, residential, Highway 101, marina	No	Yes
Western portion of Entrance Bay, Martin Slough	Commercial, Highway 101, wastewater treatment, open space	No	Yes
South Bay, Hookton Slough	Agriculture and grazing, residential	Yes	No
Northern portion of Eel River estuary	Agriculture and grazing, residential, open space	No	Yes
Southern portion of Eel River estuary	Agriculture and grazing, residential, open space	No	Yes
Mad River estuary	Open space, recreation, residential	No	Yes

Of the land uses and activities that occur within ¼ mile of *Spartina* infestations, highway traffic creates the most sound, as measured and described by the Community Noise Equivalent Level (CNEL). The CNEL is "a measure that describes average noise exposure over a period of time" (County of Humboldt 2008a). The CNEL is a measure that considers that communities are more sensitive to noise at night. In 2002, a noise survey was conducted that identified primary sources of noise within Humboldt County communities; within the Management Area, the primary sources are roads, one airport, and shipping operations in Fields Landing (see Table 13-A of the County General Plan's Noise Element):

- In Arcata: US Highway 101, State Route 255
- In Eureka: US 101, Myrtle Avenue, Harris Street, Henderson and H Streets; Murray Field Airport
- In Fields Landing: US 101, shipping operations

- In Ferndale: State Route 211

Traffic noise levels from 2002 are also provided in the County General Plan's Noise Element (see the plan's Tables 13-B and 13-C) (Table 4-21). Distance to 65 or 60 dB CNEL is also a measurement of noise; the greater the distance, the higher the source's CNEL level.

Table 4-21. Traffic Noise Levels as Measured Directly (dB CNEL) or Indirectly (Distance from Source until a Specified CNEL is Reached in ft), in 2002 (County of Humboldt 2008a)

Source Location	Mile Post or On/Off Ramps	Measurement Distance (ft)	CNEL (dB)	Distance to 65 dB CNEL (ft)	Distance to 60 dB CNEL (ft)
Highway 101	School Rd to Murray Rd	--	--	185	400
School Road	MP 91.4 on Highway 101	23	77	147	318
Highway 101	SR 299 to School Rd	--	--	185	400
Highway 101	Bayside Rd to Samoa Blvd	--	--	361	778
Indianola Cutoff	82.6 on Highway 101	19	80	179	385
Highway 101	5th Street to Murray Field	--	--	141	305
Highway 101	Harris Street to Wabash Ave	--	--	125	270

Spartina treatment has occurred and is on-going; noise created by this activity varies depending on the treatment method used. Use of non-powered hand tools will not create noise that could be discerned from ambient noise, but treatments requiring power tools, vehicles, and heavy equipment may create noise greater than ambient (Table 4-22). Direct sound measurements have not been collected during *Spartina* treatment in the Management Area, but sound generated by equipment used during treatment (or by similar equipment) has been measured in the literature (Table 4-22).

Table 4-22. Sound Generated by Equipment Similar to that Used for *Spartina* Treatment

Equipment	Sound Generated	Source
Kawasaki brushcutter (Model KBL23)	90 dB, measurement distance unknown	Titan Pro Ltd undated
Backhoe, assumed similar to amphibious vehicle such as the Marsh Master	85 dB as experienced by operator	Neitzel 2005
Scraper, assumed similar to amphibious vehicle such as the Marsh Master	80 dB at 50 ft	Neitzel 2005
Airboat, used to transport the Marsh Master	107 dB at 100 ft	Florida Senate 2011
Outboard motor on vessel	Range 104 to 111 dBA at cruise speed, as experienced by operator	Popular Mechanics 2000
	100 dBA at 50 ft	Lanpheer 2000

Possible future noise conditions will likely be similar to present conditions but could increase under a few specific conditions. Traffic volume and intensity could increase if the Highway 101 widening project at Richardson's Grove were to be constructed; more and larger trucks could increase noise within the Management Area. This increase would be long-term and permanent. Another increase in noise could occur if *Spartina* treatment were to be fully funded such that all infested areas could be treated simultaneously. Under these conditions, noise would not automatically increase (for example, if all areas received treatment using non-powered hand tools, little additional noise would occur) but if using motorized tools and/or heavy equipment, noise may increase over present levels. Unlike increased highway noise, noise associated with fully funded and extensive *Spartina* removal would be short-term and temporary.

4.14.2 Definition of Significance and Baseline Conditions

Definitions of significance are available from 3 sources: 1) CEQA and the CEQA checklist, 2) the noise ordinances of the cities of Eureka and Arcata, and 3) the County General Plan Noise Element. These sources use varying noise measurement units, but the measurements are broadly comparable.[1] The County General Plan's Noise Element specifies short-term noise standards based on the Maximum Noise Level (Lmax); the standards are based on zoning designations and distinguish between day and night maximum noise (Table 4-23).

Table 4-23. Short-Term Noise Performance Standards Maximum Noise Level (County of Humboldt 2008a)

Zoning Designation	Day (Lmax) 6am to 10pm, dBA	Night (Lmax) 10pm to 6am, dBA
CG, MG, MC, AE, TPZ, TC	85	75
CN, MB, ML	80	70
RM	70	60
RS, R2, RA	65	60

A standard wood construction house will attenuate sound by 15 dB (County of Humboldt 2008a), which will protect residents inside at a level of 45 dB if outside noise is at 60 dB.

The City of Eureka's adopted General Plan (City of Eureka 1997) specifies standards for non-transportation and transportation noise sources. The noise exposure goal of Eureka's General Plan is to protect Eureka residents from the harmful and annoying effects of exposure to excessive noise. For

[1] The frequently used noise units in these sources are dB (decibels), dBA ("A-weighted" decibels that express relative loudness of sounds as perceived by the human ear), Lmax (the short-term maximum noise level), the CNEL (the Community Noise Equivalent Level), and the Ldn (the Day-Night Average Level).

non-transportation related noise, the maximum allowable noise at the property line of lands designated for noise-sensitive uses cannot exceed 65 dB (night) to 70 dB (day).

The City of Arcata's existing General Plan (City of Arcata 2008) Noise Element establishes 2 sets of criteria for evaluating noise impacts. The EPA's land use compatibility table is used as a guide for establishing acceptable and unacceptable noise environments for various types of land uses. The City of Arcata Noise Element establishes a "Normally Acceptable" exterior noise level standard of 55 dBA day-night average sound level (Ldn[2]) for residential uses. A "Conditionally Acceptable" exterior noise level standard of 70 dBA Ldn is allowed for new construction only after detailed analyses of the noise reduction requirements are made and required noise insulation features are included in the design.

The CEQA checklist specifies that a noise impact is significant if the project results in:

1. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
2. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

4.14.3 Effects Analyses of the Proposed Project

Noise attenuation depends on site conditions and noise sources; further, whether the attenuation is sufficient depends on the receptors and character of the noise. Methods for evaluating noise impacts range from sophisticated data analyses and modeling, to inspection and application of a "general rule of thumb," to observation and measurement. One commonly used general rule is that sound will be reduced by 6 dB when the distance from a point source is doubled in free field conditions. Free field conditions exist when a site is flat and free of obstructions that could either propagate, reflect, or attenuate sound waves. For example, if a scraper is operating on a flat field, its noise would be 80 dB at 50 ft, decreasing to 74 dB at 100 ft, to 68 dB at 200 ft, etc.

Multiple sources of sound can also be estimated using "rule of thumb". If one source of noise is joined by another identical source (that is, a doubling of sound energy), the total increase is 3 dBA. For example, if the noise from a single source is 50 dBA, and it is joined by a 2nd identical source, the noise

[2] Ldn values are calculated from hourly equivalent sound level (Leq) values, with the Leq values for the nighttime period (10 PM-7 AM) increased by 10 dB to reflect the greater disturbance potential from nighttime noise.

from the 2 sources will be 53 dBA. It the 2 are joined by a 3rd identical source, the total noise will be 56 dBA.

Receptors are considered to be people in the Management Area vicinity. How people perceive increases in noise level is generally accepted as (Marriot 1997):

- Changes in noise levels of 3 dBA or less: less than or barely perceptible
- Change of 5 dBA: clearly perceptible
- Change of 10 dBA: noise perceived as being twice as loud

This assessment is based on 2 approaches. The 1st is a single source analysis, assuming that a Marsh Master is used in the eradication. We further assume that Marsh Master noise would be as loud as a backhoe or scraper, which is about 85 dBA at 50 ft. Treatments that might use a Marsh Master include chemical treatment, mowing, and potentially crushing and rototilling. For a Marsh Master that emits 85 dBA at 50 ft, calculations indicate that noise could attenuate as follows (Table 4-24). Applying the attenuation rule to the Marsh Master, we find that noise will be less than ambient highway noise by 200 ft (Table 4-24).

Table 4-24. Applying the Attenuation Rule to the Marsh Master, Assuming its Noise is Comparable to a Backhoe or Scraper at 50 ft

Distance from Marsh Master Source of 50 dBA, at X ft	Estimated Noise, dBA	Comments
50	85	Source: Lanpheer 2000
100	79	Below day Lmax for areas zoned AE, which is 85 dB
200	73	Below the ambient noise measured at Indianola cutoff and School Road
400	67	
800	61	Below the County General Plan's day Lmax for residentially zoned areas, which is 65 dB
1600	55	

Another noise potentially created by *Spartina* treatment is noise generated from the airboat that could be used to tow the Marsh Master. During *Spartina* control Marsh Master trials in Humboldt Bay in August 2011, an airboat was used to help the Marsh Master into locations where it could begin mowing. It was also used to transport workers and their equipment. Airboat use was not constant throughout the day, and was likely limited to 1 h periods of use. Lmax for short-term noise is 85 dB for areas zoned commercial and agricultural exclusive. Using the attenuation rule and assuming airboat noise is 107 dB at 100 ft, the distance to 86 dB is 1200 ft, and to 83 dB is 1600 ft. Receptors

within 1200 ft of an airboat may experience noise greater than the County's short-term Lmax standard, depending on site conditions that could attenuate noise.

The 2nd noise evaluation approach is to estimate the noise from multiple sources, such as from numerous brushcutters operating simultaneously in close proximity. Multiple sources of similar sound energy can increase noise by 3 dBA. If a single brushcutter emits 90 dBA, then 2 would create 93 dBA, 4 would create 99 dBA, etc. The total sound would attenuate as estimated in the above examples. Therefore, the sound from 4 brushcutters of 99 dBA at 50 ft would attenuate to Highway 101 sound levels (75 dBA) within 800 ft. To attenuate to outdoor residential levels (65 dBA), the distance between 4 brushcutters and the receptors should be 3200 ft.

These "rule of thumb" attenuation and estimation methods are very coarse and simplistic. Many other factors can either attenuate or accentuate sound; these factors include topography, presence of vegetation, air temperature and humidity, cloud cover, presence of structures, and wind speed and direction. Most of these factors would tend to attenuate, rather than accentuate, sound. In the multiple source scenario, another simplification is that the sources are assumed to be in very close proximity. In practice, the brushcutter operators are separated by 50 ft, so modeling the sound as if the operators were in line may be more representative of field conditions.

Evaluating the significance of potential noise from the Proposed Project can be accomplished by applying the criteria in the CEQA checklist (see above).

Five mitigation measures are proposed that will decrease effects to less than significant. The 1st measure (MM-N-1) is to require that all brushcutters will be new and quieter models with sound levels less than 90 dB. The 2nd measure is to avoid using the Marsh Master and the air boat used to tow it, if residential receptors are within 800 ft. Limiting the hours of operation to those when residents will be least disturbed is the 3rd mitigation. Limiting the noise generated by selecting alternative treatments is the 4th mitigation; the quietest treatments are performed with non-powered hand tools or backpack spraying. The last measure is to recognize that "rule of thumb" estimates should be refined by collecting site specific data, and by performing less general rule of thumb estimates.

IMPACT N-1: Noise Impacts to Residential Areas. If homes are within 3,200 ft. of the Proposed Project's use of multiple brushcutters, the Lmax for residentially zoned areas could be exceeded. However, attenuation is likely through topography, vegetation, and structures. Attenuated sound may not be perceived above ambient noise. Noise from the Marsh Master could exceed noise standards, if residential receptors are within 800 ft. Sound would likely be masked by Highway 101 within 200 ft. This impact will be less than significant with implementation of the following mitigation measures.

MITIGATION N-1: Use Relatively Quiet Brushcutters. All brushcutters shall be new and quieter models, with noise not exceeding 90 dB.

MITIGATION N-2: Selective Use of the Marsh Master. Avoid treatment that uses the Marsh Master, if residential receptors are within 800 ft.

MITIGATION N-3. Limit Hours of Operation. Within 3,200 ft of homes, hours of operation shall be within times that residents would be the least disturbed, as in during work and school hours, and avoiding early morning or early evening.

4.14.4 Effects Analyses of Alternative 1, Mechanical Treatment Only

The noise impact assessments under Alternative 1 are identical to that of the Proposed Project because treatment using brushcutters, a Marsh Master, and/or an airboat, is also possible when limited to mechanical treatment methods. One of the quieter treatment methods, backpack spraying, is not allowed in Alternative 1. Use of non-powered hand tools is still allowed in Alternative 1. Therefore, similar to the Proposed Project's, noise impacts under Alternative 1 are potentially significant, but with implementation of mitigation measures N-1 through N-3 impacts are less than significant.

4.14.5 Effects Analyses of Alternative 2, No Project

Under the No Project Alternative, numerous treatment projects have already occurred and are on-going. Noise associated with these projects was generated by an airboat, small vessel motors, brushcutters, and a Marsh Master amphibious mowing machine. These treatment projects were performed under existing plans approved by, or permits obtained by, HBNWR and the City of Arcata; noise associated with those projects may have been addressed by those plans and permits.

Without the regional coordination aspects of the Proposed Project and the adoption of this PEIR and its mitigations, noise from future treatment methods could become significant.

Section 5.0 Evaluation of the Proposed Project and Alternatives

Alternative 1 will reduce potential impacts due to herbicides, but would require increased use of mechanical methods and may thus have increased impacts associated with mechanical methods. The No Project Alternative would include all methods, but would lack the coordination gained through either the Project or Alternative 1. The Proposed Project is an environmental restoration project with short-term environmental impacts and long-term environmental benefits. More rapid *Spartina* eradication resulting from the Proposed Project will result in a shorter duration of impacts and a sooner realization of the Proposed Project's benefits. There is current uncertainty regarding the effectiveness of the various *Spartina* control methods and some project effects, however the Proposed Project's adaptive management approach will allow for continual improvements in implementation as control effectiveness and impacts become better understood. By including "all" potential methods as options that will be continually prioritized based on the best available information (as opposed to Alternative 1, which would not consider use of chemicals) and by allowing for improved coordination over the No Project Alternative, the Proposed Project will allow for the most effective removal of *Spartina* while also minimizing environmental impacts. The Proposed Project is therefore considered the preferred and environmentally superior alternative.

Section 6.0 Cumulative and Growth Inducing Impacts of Proposed Project

The areas considered subject to cumulative impacts are the *Spartina* infested shoreline areas of Humboldt Bay, and the Eel and Mad river estuaries. An exception is the area of cumulative air quality impact; that area is considered the North Coast Air Basin (Table 6-1).

Table 6-1. Assessment of Potential Cumulative impacts

Resource	Determination of Cumulative Impacts
Aesthetic and Visual Resources	Bare, brown, or wrack/mulch covered areas will be created by mechanical or chemical treatments. However, within 2 years, the treated areas will be revegetated with native plant species. This short-term impact will not incrementally add to visual or aesthetic effects that could occur due to other projects, and so the Proposed Project's short-term aesthetic effects are not cumulatively considerable.
Air Quality	Because NCAB has not attained PM10 standards, the Proposed Project's contributions of dust or particulates will be a significant cumulative effect. The Proposed Project's emissions of PM10 particulates will be in compliance with the NCUAQMD's 1995 Particulate Matter (PM10) Attainment Plan. This Plan describes and evaluates regional conditions contributing to PM10 cumulative impact. Because the Proposed Project's incremental contribution will comply with a previously approved plan, the contribution is determined to be not cumulatively considerable.
Biological Resources	Short term impacts will occur for native and special status species. However, the Proposed Project will result in a substantial increase in native species diversity and native habitats. Due to the short term nature of impacts and long term biological benefits the Proposed Project's biological effects are not cumulatively considerable.
Cultural Resources	Disturbance of artifacts or human remains is a potentially significant impact that can be mitigated to less than significant. However, given the continuing development of the Humboldt Bay shoreline and the historical impacts on cultural resources, even a less than significant impact could be determined to be cumulatively considerable. The County General Plan, and the programs implemented by the State Historical Preservation Office and the North Coast Information Center, are approved plans; the Proposed Project's conformance with those plans allow a determination of not cumulatively considerable.
Geologic/Soils	Any soil loss or erosion that may occur is likely to be cumulatively less than significant because 1) treatment methods such as top mowing, crushing or herbicides can be used to avoid erosion, and 2) bay tides bring in more sediment and may increase marsh elevation to pre-grinding elevations. Therefore, although other developments in the Bay or shorelines of the Eel and Mad river estuaries could cumulatively increase erosion and sediment, the Proposed Project's contribution to these increases would be short term and not cumulatively considerable.
Hazards and Hazardous Materials	Imazapyr is not persistent and the effects are local, as are the effects of other hazards and hazardous materials. Therefore, the Proposed Project's effects are not cumulatively considerable.

Resource	Determination of Cumulative Impacts
Hydrology and Water Quality	The Proposed Project's releases of hydrocarbons associated with fuels and oils are impacts that are less than significant with mitigations MM-WQ-3 and MM-HMM-2. Hydrocarbons are also released during operation of vehicles along Highway 101, so any Proposed Project releases could be considered cumulative. However, because a project's contribution is less than cumulatively considerable if the project implements or funds its fair share of mitigation measures that alleviate the cumulative impact, the Proposed Project's hydrocarbon release is less than cumulatively considerable.
Land Use	The Proposed Project's treatment activities will not affect land uses in the vicinity of the treated areas. The Proposed Project will not cause a conversion of land uses, and will not curtail or limit existing uses of land in or in the vicinity of the Management Area. The Proposed Project presents no cumulative land use impacts.
Noise	The treatment creating the highest level of noise is eradication by numerous brushcutters. Other sources of noise in the Management Area are highway traffic, wind, and private plane noise that would occur near Murray Field. A cumulative noise impact is therefore possible but the Proposed Project's contribution will be short term and limited to daylight hours. The Proposed Project's noise contribution is less than cumulatively considerable because the Proposed Project's noise impacts will be subject to the noise limitations provided in the County General Plan's Noise Element, and in the City of Eureka's and Arcata's General Plans; all 3 plans have been adopted and certified.

Section 7.0 Greenhouse Gas Emissions, Global Climate Change and Sea Level Rise

Analysis of potential impact due to the Proposed Project, and on the Proposed Project, from greenhouse gas (GHG) emissions is now a required section of CEQA EIRs. Three actions, 2 by the State of California and the other by the US Supreme Court, support the need to include GHG emissions and global climate change in environmental impact analyses (Held et al. 2007). They are:

- California Assembly Bill 32 (AB 32). This AB's title is "The Global Warming Solutions Act of 2006," and it is credited with ending the debate (in California) that global warming is scientific speculation. The legislation also requires the State to reduce carbon emissions by 25% by 2020. In 2005, Govenor Schwarznegger issued EO S-3-05, which proclaimed GHG emission target reductions to 1990 levels by year 2020, and 80% below 1990 levels by 2050.
- The 2007 US Supreme Court decision in Massachusetts vs. EPA. This decision supported the principle that GHG emissions are defined as pollutants and that the EPA must therefore regulate them under the Clean Air Act.
- California Senate Bill 97 (SB 97). In 2007, the California legislature passed SB 97, which amended CEQA to specifically establish that GHG emissions and their impacts are required subjects for CEQA analysis. The Governor's Office of Planning and Research (GOPR) then released guidelines for CEQA analysis and mitigation of GHG emissions or the effects of GHG emissions on April 13, 2009.

7.1 Present GHG, Global Climate Change, and Sea Level Conditions

Policies, regulations, and plans for GHG reduction are either recently adopted or in draft form. Particularly relevant to GHG reduction in the Management Area are these documents:

- Air Quality Element of the draft County General Plan, September 2011 (County of Humboldt 2008). This County General Plan Element cites AB 32 as requiring a decrease of approximately 30% from "business as usual" GHG emissions levels projected for 2020, or approximately 10% of today's levels. The Air Quality Element recognizes that the County has significant resources for carbon storage and sequestration on timber and agricultural lands. It specifies a successful mitigation of the GHG emissions as reaching levels on "non-significance" as established by AB 32 and subsequent legislation.

- "Fact Sheet on Reducing Pollution from Small Engines" by CARB (1998). This fact sheet describes CARB's Tier I and II standards and their deadlines for small off-road engines, which includes weed trimmers or brush cutters.
- NCUAQMD's Proposed Revisions to Regulation I, Rule 111. These revisions address emissions of 6 GHGs (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride), and define levels of significance for GHG emissions (in tons per year, CO2 equivalents). However, these regulations only apply to stationary sources.

On December 17, 2010, CARB passed amendments to the off-road regulation, which delays compliance with the regulations to January 1, 2014. Owners of regulated diesel vehicles must retrofit with CARB-approved emissions control devices; the regulations encourage owners to "turn over" their fleets to newer and cleaner engines (CARB 2012). According to CARB:

> "The regulation imposes limits on idling, buying older off-road diesel vehicles, and selling vehicles beginning in 2008; requires all vehicles to be reported to CARB and labeled in 2009; and then in 2014 begins gradual requirements for fleets to clean up their fleet by getting rid of older engines, using newer engines, and installing exhaust retrofits."

Owners comply with the regulation by either reducing their fleet-averaged emissions rate so it reaches a target rate, or by applying the highest level verified emission control system(s) to 20% of the fleet. The compliance dates depend on the size (in horsepower) of the fleet, with categories of small, medium, and large fleets. For any size fleet, the fleet-average emissions rate may also be decreased by using alternative fuels instead of diesel. Use of an alternative fuel would also decrease a fleet's GHG emissions. These regulations apply to fleets that are owned or rented.

When AB 32 was passed in June 2006, the Legislature required CARB to publish "early action GHG emission reduction measures" by June 2007. Board staff identified 44 early action measures (CARB 2007). Three of the early action measures are:

- Truck retrofitting to reduce aerodynamic drag and rolling resistance
- Tire inflation program
- Anti-idling enforcement

Carbon would be released and sequestered during the Proposed Project. Carbon released from the Proposed Project can be in the form of GHG or as carbon dioxide from burning (see Section 4.7). Sources of GHG due to the Proposed Project are gas-powered brush cutters, mowers, tractors, bobcats, amphibious vehicles, and transportation vehicles. Carbon dioxide would be produced if

mowed wrack is burned, although wrack is more frequently mulched into smaller pieces and left to decompose. Its decomposition could increase the carbon sequestered in the tidal marsh. Tidal marshes are very productive, with one study reporting up to 8,000 metric tons of plant material per year (Mitch and Gosselink 2007, as cited in Trulio et al. 2007). Tidal marshes release negligible amounts of methane, which adds to the marsh's carbon sequestration potential. Due to higher rates of carbon sequestration and lower rates of methane emissions, tidal marshes are extremely valuable as carbon sinks.

Lagarde (2012) compared net primary productivity in *Spartina* dominated vs. native tidal marshes in Humboldt Bay, and found that net primary productivity is higher in native marshes. He attributed the decrease in benthic macroalgal growth due to shading by *Spartina*. This study indicates that *Spartina* eradication will lead to a long-term increase in carbon sequestration. After eradication, the period of time during which the ground will be bare is relatively short because micro and macroalgae colonize bare mud fairly rapidly; macrophytes, microalgae, and phytoplankton are 3 primary contributors to carbon fixation. Also, when mulched wrack decomposes, that carbon is released. By the end of 2 years post eradication, the recovering native plant community should come close to or surpass its pre-treatment productivity and sequestration. Any increases in native plant populations should increase carbon sequestration in the marsh (Lagarde 2012).

7.2 Possible Future GHG, Global Climate Change, and Sea Level Conditions

State-wide and regionally, GHG emission rates should decrease in the future if plans and policies regulating GHG sources and activities are enforced. Locally, GHG levels may decrease due to 1) new regulations, and 2) increased carbon sequestration in forest, agricultural, and marsh lands. The Air Quality Element of the County General Plan recognizes that the County has significant resources for carbon storage and sequestration on timber and agricultural lands, and others have noted the potential for carbon sequestration in tidal marshes.

Sea level rise was briefly discussed in the hydrology section of this PEIR. Estimates of the rate and degree of rise vary, but most agree that sea levels will rise (Table 7-1, adapted from GEC et al. 2011).

Table 7-1. Estimates of Sea Level Rise (Adapted from GEC et al. 2011)

Rate of Sea Level Rise	Source	Comments
4.73 mm per year (mm/yr) sea level rise (equivalent to 1.55 ft in 100 years) at the Humboldt Bay North Spit gage	NOAA National Ocean Survey	Based on historic measurements from 1977 to 2006

Rate of Sea Level Rise	Source	Comments
-0.65-mm/yr sea level decline (equivalent to a change of -0.21 ft in 100 years) at the Crescent City gage	NOAA National Ocean Survey	Monthly sea level data from 1933 to 2006
1.0 to 1.4 m (3.28 to 4.6 ft) by 2100	Pacific Institute	Mean sea level along the coast of California
20 and 59 in (1.7 to 4.9 ft) by 2100	USACE	

7.2.1 Definitions of Significance and Baseline Conditions

Baseline conditions are those at the time the NOP was published. Definitions of significance are available from the CEQA checklist, based on whether the Proposed Project would:

1. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

In the context of GHG and global climate change, the GOPR recognizes that statewide thresholds of significance for GHG emissions have not been set (GOPR 2008). The GOPR recommends that lead agencies should consider significance in the context of direct, indirect, long and short term, and cumulative impacts. However, "although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment" (GOPR 2008).

7.2.2 Effects Analyses of the Proposed Project

Spartina eradication can be accomplished through mechanical or chemical means. Mechanical methods include the uses of hand-held, gas-powered equipment. Chemical methods would not require hand-held gas-powered equipment, but would still require boats and/or land transportation. Therefore, sources of GHG due to the Proposed Project are gas-powered brush cutters, mowers, tractors, bobcats, boats, amphibious vehicles, and transportation vehicles. Given that numerical threshold levels of GHG emissions are unavailable for mobile sources, whether these sources will emit significant levels of GHG is considered qualitatively by evaluating their direct, indirect, long and short term, and cumulative impacts. The spatial context of the Management Area will also be considered.

Direct effects of the emissions from small gas-powered engines will be limited to the operators of the brush cutters, mowers, and any other hand-held equipment used in eradication. Similarly, direct effects of emissions from the larger engines of tractors, amphibious vehicles, and trucks and cars will be limited primarily to the drivers and passengers. The effects will be mitigated by BMPs and

enforcement of new regulations that will minimize and decrease the emissions from small and larger engines, by requiring and encouraging new technology, alternative fuels, and replacement of old engines (see below).

Indirect effects of GHG emissions include global climate change and sea level rise. In the short-term, the Proposed Project will increase GHG levels by treating *Spartina* (especially if the treatment is burning, but also by using gasoline powered engines), but in the long-term the Proposed Project may sequester carbon or be carbon neutral. However, given the limited and short-term nature of the Proposed Project, and the Proposed Project's use of smaller and fewer engines relative to their uses in the Management Area vicinity (for example, Highway 101), the indirect effects of the Proposed Project's GHG emissions from gasoline-powered engines are likely to be very small. The Proposed Project's contribution to carbon sequestration has not been definitely proved or disproved, but the sequestration differences between native plants and *Spartina* is likely low, especially in the context of Humboldt County's contribution to carbon sequestration within its forests, agricultural lands, and other tidal and freshwater marshes. The cumulative impacts of the Proposed Project's GHG emissions are also likely to be small, for the same reasons.

The significance of GHG emissions from the Proposed Project is evaluated using the criteria of the CEQA checklist (see above).

BMPs to reduce GHG emissions during construction have been published by the Sacramento Metropolitan Air Quality Management District (SMAQMD 2010). The following are steps that can be taken during construction, which will reduce GHG emissions:

- Improve fuel efficiency of construction equipment
- Minimize idling time to no longer than 3 min
- Maintain equipment in proper working conditions
- Train operators in proper use of equipment
- Use existing equipment with new technologies
- Use alternative fuels for generators, such as propane or solar or electrical power
- Use CARB approved low carbon fuel
- Provide carpools, shuttle vans, and/or secure bicycle parking for construction workers
- Recycle or salvage non-hazardous debris (specifically, mulch wrack on site and minimize transport)

GHG emissions, global climate change, and sea level rise will also affect the Proposed Project. Climate change in California will be characterized by a number of processes, including (CEPA 2006):

- Decrease in summer flows due to decreased precipitation as rain and snow
- Increase in variability of storms, in magnitude and frequency
- Increase in forest mortality, due to heat stress, decreased precipitation, and increase in forest macroinvertebrate pests
- Increase in forest fires
- Shift in species ranges as habitat adjusts to varying climate regimes
- Higher demand for potable and irrigation water

These changes will be site specific; for example, decreases in summer flows of the Mad River may or may not occur, depending on releases from Matthews Dam. However, in general, these changes will affect resources in the Management Area. Direct effects could occur if/when species habitat ranges shift as they adapt to newer conditions. This could affect the species that are currently present during all or parts of the year, and could introduce new species that are usually absent. Species now present that cannot adapt quickly enough will become either extirpated or extinct. Indirect effects could occur due to changes in hydrology, through changes in natural flow or through increases in potable water demand. Changes in freshwater inflow will change the fresh and saltwater interface's location, thus affecting the zone between fresh, brackish, and saltwater marshes. Climate changes' effects on forests will also be indirect changes on Management Area marshes, and may be difficult to identify given all other effects. Changes in the forests due to fire or tree mortality could increase sediment and turbidity, which would affect hydrologic and biological conditions in the marshes.

7.2.3 Effects Analyses of Alternative 1, Mechanical Treatment Only

The GHG emission effects of Alternative 1 would be similar to those of the Proposed Project, but emissions may be higher because of increased use of hand-held, small engine tools when herbicides are not an option.

This GHG emission difference may be exacerbated by the potential differences in carbon sequestration between the Proposed Project and Alternative 1. Mechanical methods, particularly the grinding methods, could disturb and decrease some of the carbon sequestration potential of the salt marshes because up to 3 in of marsh sediments are disturbed and possibly removed during the grind method. Loss of marsh soil potentially represents a carbon sequestration loss, but the loss has not been quantified.

Emissions of GHG are likely greater in Alternative 1 compared to the Proposed Project, but Alternative 1 emission rates are likely to remain less than significant, for similar reasons as stated under the Proposed Project. These reasons include:

- Recently adopted regulations on small and large mobile engines will limit and minimize GHG emitted
- BMPs for GHG emissions during construction will be followed

7.2.4 Effects Analyses of Alternative 2, No Project

Under the No Project Alternative, eradication efforts are likely to continue but they would not be coordinated to take advantage of adaptive management, updated maps, shared monitoring, and shared costs. Inefficiencies in eradication may cause a slight increase in GHG emissions, and the overall eradication would require a longer time. However, for the reasons listed in Alternative 1 above, GHG emissions under the No Project Alternative is also likely to be less than significant.

Section 8.0 Public Involvement

The Conservancy and its collaborators, including the Harbor District and HBNWR, have facilitated numerous workshops, public meetings, tours, and volunteer days to solicit public input and assure public involvement in this project. The Conservancy has met with a number of community groups and government agencies to solicit input on the eradication plan, including the Humboldt County Farm Bureau, Humboldt Bay Shellfish Growers, the Wiyot Tribe, Cities of Eureka and Arcata, Humboldt County Board of Supervisors, Humboldt County Weed Management Area, and USACE. In addition, the Conservancy and its partners hosted symposia in 2010, 2011 and 2012 on *Spartina* control with practitioners and scientists from Humboldt Bay, San Francisco Bay, Oregon, Washington, Spain, and Argentina. HBNWR has held a number of volunteer *Spartina* control days.

An NOP and accompanying Initial Study was issued on January 7, 2011. The NOP and IS were posted on the Conservancy website, and distributed to the following agencies and organizations:

Federal

USFWS Humboldt Bay National Wildlife Refuge

USFWS Arcata Fish and Wildlife Office

National Marine Fisheries Service

National Park Service: Redwood National and State Parks

US Coast Guard Humboldt Bay Station

US Army Corps of Engineers

Natural Resources Conservation Service

Bureau of Land Management

County

County of Humboldt Community Development Department

County of Humboldt Agricultural Commissioner

County of Humboldt Parks Department

State

California Coastal Commission

Department of Transportation

Department of Fish and Wildlife

Department of Food and Agriculture

Department of Public Health

State Lands Commission

North Coast Regional Water Quality Control Board

North Coast Unified Air Quality Management District

California Conservation Corps

California Sea Grant- Eureka Office

UC Cooperative Extension- Eureka Office

Tribal

Wiyot Tribe

Bear River Band of Rohnerville Rancheria

Blue Lake Rancheria

Cities Local/Special Districts

Humboldt Bay Harbor, Recreation and Conservation District

Humboldt County Resource Conservation District

Humboldt County Weed Management Area

Humboldt Bay Municipal Water District

Humboldt Community Services District

Manila Community Services District

North Coast Railroad Authority

South Bay Union School District

Jacoby Creek Elementary School District

Arcata Elementary School District

Pacific Union Elementary School District

Freshwater Elementary School District

Humboldt County Office of Education School District

Eureka City Unified School District

Peninsula Union School District

City of Arcata

City of Blue Lake

City of Eureka

City of Ferndale

Others

Explore North Coast

Friends of Humboldt Bay National Wildlife Refuge

Freshwater Farms

Humboldt County Farm Bureau

Humboldt Baykeeper

North Coast Chapter of the California Native Plant Society

Redwood Region Audubon Society

Sierra Club Redwood Chapter, North Group

Environmental Protection Information Center

Redwood Community Action Agency

Coastal Ecosystems Institute of Northern California

Friends of the Arcata Marsh

Friends of the Dunes

Californians for Alternatives to Toxics

Northcoast Environmental Center

Coast Seafood

Humboldt Bay Oyster Company

Kuiper Mariculture

Aqua-Rodeo Farms

North Bay Shellfish

Pacific Gas and Electric

On January 19, 2011 a public scoping meeting to discuss the NOP for this PEIR was held at the Arcata D Street Community Center and public comment was received. The Conservancy accepted comments on the NOP until February 20, 2011. In addition to the verbal comments received at the scoping meeting, comment letters were received from the CSLC, CalCC, NOAA Fisheries, BLM, CNAHC, and Caltrans. The Conservancy intends to present the Plan and Draft PEIR to local agencies and organizations in fall 2012.

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H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Programmatic Environmental Impact Report for the Humboldt Bay Regional *Spartina* Eradication Plan

Volume 2

Response to Public Comments
And
Mitigation Monitoring and Reporting Plan

Prepared for:

California State Coastal Conservancy
1330 Broadway
Oakland, CA 94612
p (510) 286-1015

Prepared by:

H. T. Harvey & Associates

and

GHD

21 March 2013 Project No. 3192-02

Introduction

The Draft Programmatic Environmental Impact (PEIR) for the Humboldt Bay Regional Spartina Eradication Plan was circulated for public review from November 30, 2012 – January 15, 2013. Following are the public's comments in their entirety, responses to comments and the PEIR's Mitigation Monitoring and Reporting Plan. This document (Volume 2) is organized as follows:

- Section 1 (Pages 2-41) contains comments from public agencies and non-governmental agencies and related responses
- Section 2 (Pages 42-72) contains comments from individuals and related responses
- Section 3 (Pages 73-75) contains Master Responses, which pertain to both agency and individual comments
- Section 4 (Pages 76-77) lists the references cited in this volume
- Section 5 (Pages 78-89) is the Mitigation Monitoring and Reporting Plan

Volume 1 contains the Final PEIR, which includes the CEQA-required information and analysis in nine chapters and an executive summary, and into which the changes to the Draft PEIR (described below) have been incorporated.

Section 1: Comments from Public Agencies and Non-Governmental Agencies and Responses

STATE OF CALIFORNIA EDMUND G. BROWN JR., *Governor*

CALIFORNIA STATE LANDS COMMISSION
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JENNIFER LUCCHESI, *Executive Officer*
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January 15, 2013

File Ref: SCH #2011012015

Joel Gerwein
California Coastal Conservancy
1330 Broadway, 13th Floor
Oakland, CA 94612
jgerwein@scc.ca.gov

Subject: Draft Programmatic Environmental Impact Report (PEIR) for the Humboldt Bay Regional Invasive *Spartina* Eradication and Native Salt Marsh Restoration, Humboldt County

Dear Mr. Gerwein:

The California State Lands Commission (CSLC) staff has reviewed the subject Draft PEIR for the Humboldt Bay Regional Invasive *Spartina* Eradication and Native Salt Marsh Restoration (Project), which is being prepared by the California Coastal Conservancy (Conservancy). The Conservancy is the lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). The CSLC is a trustee agency because of its trust responsibility for projects that could directly or indirectly affect sovereign lands, their accompanying Public Trust resources or uses, and the public easement in navigable waters. Additionally, because the Project involves work on sovereign lands, the CSLC will act as a responsible agency.

CSLC Jurisdiction and Public Trust Lands

The CSLC has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The CSLC also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6301, 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust.

As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion or where

the boundary has been fixed by agreement or a court. On navigable non-tidal waterways, including lakes, the State holds fee ownership of the bed of the waterway landward to the ordinary low water mark and a Public Trust easement landward to the ordinary high water mark, except where the boundary has been fixed by agreement or a court. Such boundaries may not be readily apparent from present day site inspections.

As noted in CSLC staff's comment letter on the Notice of Preparation, portions of the Eel River Delta and the Mad River Estuary, over which the proposed Project will extend, include State-owned sovereign land. State sovereign land in the Eel River Delta includes the Eel and Salt Rivers and Cutoff, Hawk, Hogpen, McNulty, Morgan, Mosley, Quill, and Sevenmile Sloughs. In the Mad River Estuary, sovereign land includes the Mad and Little Rivers. A lease and formal authorization for the use of sovereign land will be required from the CSLC for the portion of the Project encroaching on State-owned land. Please contact Beverly Terry, Public Land Management Specialist, at the contact information listed at the end of this letter for further information on jurisdiction and leasing.

The part of the proposed Project in the Humboldt Bay Management Area is located on lands granted to the Humboldt Bay Harbor, Recreation and Conservation District (District) and the cities of Eureka and Arcata. Therefore, authorization from the CSLC for the Project on these lands is not required. The District and the cities of Eureka and Arcata should be contacted to address any lease/permit requirements for this portion of the Project.

Project Description

A coalition of local, state and federal agencies and non-governmental organizations proposes to adopt and implement the Humboldt Bay Regional *Spartina* Eradication Plan (Regional Plan) to meet the proponents' objectives and needs as follows:

- Objective 1: By 2013, a regional program will be in place to coordinate efforts to eradicate the invasive cordgrass species *Spartina*, and *Spartina densiflora* in particular, from all lands within the Management Area in collaboration with the larger West Coast invasive *Spartina* eradication program.
- Objective 2: By 2018, tidal marshes in the Management Area will be dominated by native tidal marsh plant species.
- Objective 3: Tidal marshes in the Management Area will be protected against future *Spartina* invasions by prevention, early detection, and rapid response.

Based on the Project Description in the Draft PEIR, CSLC staff understands that the Project would involve the following components:

- Designation of a regional coordinating agency that will help ensure comprehensive and coordinated implementation of the Plan;
- Establishment of criteria for prioritizing sites for *Spartina* control and a general timeline for *Spartina* control;

- Development of site-specific *Spartina* control plans, designed for multiple *Spartina* treatment stages (i.e., primary treatment, resprout treatment, seedling treatment, maintenance treatment, revegetation and seed suppression);
- *Spartina* and salt marsh monitoring; and
- *Spartina* control related outreach activities.

The Draft PEIR identifies the proposed Project, Use of Chemical and Mechanical *Spartina* Control Methods, as the Environmentally Superior Alternative.

Environmental Review

CSLC staff requests that the Conservancy consider the following comments on the Project's Draft PEIR.

Programmatic Document

1. Site-Specific Plans and Mitigation. Because the Project is being proposed under a "Programmatic" rather than a "Project-level" EIR, certain site-specific impact evaluations, such as those related to presence of special-status species, cultural resources and soil contamination, are, understandably, beyond the scope of the PEIR. To account for site-specific unknowns, a number of mitigation measures identified in the Draft PEIR require site-specific assessments to determine the need for particular changes to control activities for that area; however, several of these mitigation measures do not specify the criteria that these assessments would need to meet or the thresholds that would trigger further mitigation. Pursuant to the State CEQA Guidelines,[1] mitigation should either be presented as *specific*, feasible, enforceable obligations, or should be presented as formulas containing "performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way" (emphasis added) (State CEQA Guidelines, § 15126.4, subd. (b)). CSLC - 1

   Documenting the particular procedures that the Regional Coordinator and other proponents will follow in determining and minimizing impacts not only provides trustee and responsible agencies the information necessary to comment on the adequacy of the PEIR's mitigation measures, but would also later improve consistency among the site-specific control plans. Although the Regional Coordinator's lead role in preparing these control plans will help standardize these plans and any supporting surveys and assessments, formalizing this information in either the Final PEIR or the Final Regional Plan would act as an added assurance that individual control efforts are consistent with the Regional Plan and avoid significant environmental impacts. Mitigation measures that would benefit from identification of specific criteria or formulas include the following:

[1] The State "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

a. Mitigation BIO-4: The measure identifies actions to be taken in areas with the potential for eelgrass, but does not specify the procedure for identifying areas with this potential (e.g., historical records, site characteristics, site survey, etc.). Please clarify in the mitigation measure how the initial determination for eelgrass potential will be made at a given site.

b. Mitigation CR-2: The measure prohibits soil disturbing control methods in areas where, "during site specific planning there are indications that artifacts are likely to be found (e.g., literature describing the nearby presence of artifacts)". The Regional Plan goes into more detail on the resources available for such planning, such as the Native American Heritage Commission (NAHC), the State Office of Historical Preservation's North Coastal Information Center (NCIC), and the U.S. Fish and Wildlife Service's (USFWS) Regional Cultural Resources Office, and adds that "the Regional Coordinator will work with the [Wiyot] Tribe to ensure that cultural resources are protected throughout the *Spartina* eradication process" (Regional Plan, p. 81).

CSLC - 1 (Cont.)

Neither the PEIR nor the Regional Plan, however, spells out the minimum that will be required, in terms of surveys or literature searches, for site-specific planning where soil disturbing control methods are proposed. Will the Regional Coordinator consult the Wiyot Tribe, the NAHC and the NCIC for every control effort? For areas that have not been previously surveyed, or for which no information is available, will pre-activity surveys be performed before soil disturbance? In particular instances? As a programmatic document, the PEIR need not analyze all of the sites in depth, but does need to provide more specific information on the "formula" to be used in determining whether or not mitigation is necessary for a given control effort and, if necessary, what level of mitigation. Without this level of detail, staff cannot comment on the adequacy of the mitigation measure in reducing potential impacts to unknown cultural resources from soil disturbing control methods, particularly for efforts using large equipment or amphibious vehicles.

c. Mitigation WQ-4: The measure prohibits soil disturbing control methods where "contaminants are present or assumed to be present at levels of concern (but below levels that might trigger site cleanup)" (Draft PEIR, p. 124). Please clarify in the mitigation measure how "levels of concern" will be determined (e.g., North Coast Regional Water Quality Control Board-defined thresholds, etc.).

d. Mitigation WQ-7: The measure requires that wrack be removed or mulched in "treatment areas located within or adjacent to waters known or expected to have depressed dissolved oxygen (DO)" (Draft PEIR, p. 125); however, neither the measure nor the Regional Plan describes what resources or surveys will be relied on to identify waters known or expected to have depressed DO. Please add an explanation of the process for determining depressed DO to either the Regional Plan or the PEIR.

Biological Resources

2. Impacts to Nesting Birds: In its analysis of Impact BIO-5, the Draft PEIR finds that the temporary and limited loss of nesting and foraging habitat for the northern harrier (*Circus cyaneus*) and the short-eared owl (*Asio flammeus*), both California Species of Special Concern, constitutes a less than significant impact; however, the PEIR does not address or dismiss potential, direct impacts to these birds' active nests, as both species are ground-nesting. To adequately characterize the Project's potential impacts to special-status species, please add a discussion of potential disturbance, if any, to active northern harrier and short-eared owl nests in treatment areas. CSLC - 2

3. Construction Buffers: To avoid disturbance of nesting special-status birds, Mitigation BIO-2 establishes a buffer of 50 meters (m) or 100 m between brushcutters or airboats, respectively, and special status bird species. To support the PEIR's analysis that the buffers are conservatively protective, please add an explanation of how those particular distances were selected. CSLC - 3

Thank you for the opportunity to comment on the Draft PEIR for the Project. As a responsible and trustee Agency, the CSLC will need to rely on the Final PEIR for subsequent tiered CEQA documents and issuance of any lease as specified above and, therefore, we request that you consider our comments prior to certification of the PEIR.

Please send copies of future Project-related documents, including electronic copies of the Final PEIR, Mitigation Monitoring and Reporting Program (MMRP), Notice of Determination (NOD), CEQA Findings and, if applicable, Statement of Overriding Considerations when they become available, and refer questions concerning environmental review to Sarah Sugar, Environmental Scientist, at (916) 574-2274 or via e-mail at Sarah.Sugar@slc.ca.gov. For questions concerning archaeological or historic resources under CSLC jurisdiction, please contact Senior Staff Counsel Pam Griggs at (916) 574-1854 or via email at Pamela.Griggs@slc.ca.gov. For questions concerning CSLC leasing jurisdiction, please contact Beverly Terry, Public Land Management Specialist, at (916) 574-0343, or via email at Beverly.Terry@slc.ca.gov.

Sincerely,

Cy R. Oggins, Chief
Division of Environmental Planning
and Management

cc: Office of Planning and Research
Beverly Terry, LMD, CSLC
Sarah Sugar, DEPM, CSLC
Eric Milstein, Legal, CSLC
Pam Griggs, Legal, CSLC

Joel Gerwein, Project Manager
California Coastal Conservancy
1330 Broadway, 13th Floor
Oakland, CA 94612
jgerwein@scc.ca.gov

Re: Comments on the Draft Programmatic Environmental Impact Report for the Humboldt Bay Regional *Spartina* Eradication Plan

Dear Mr. Gerwein,

On behalf of the board, staff and supporting members of Humboldt Baykeeper, Californians for Alternatives to Toxics, and Friends of the Eel River, these comments are submitted regarding the Draft Programmatic Environmental Impact Report ("PEIR" or "Project") for the Humboldt Bay Regional *Spartina* Eradication Plan ("Regional Plan"), which covers 1007 acres in Humboldt Bay, 656 acres in the Eel River estuary, and 7.4 acres in the Mad River estuary for a total of 1671 acres.

Humboldt Baykeeper, Californians for Alternatives to Toxics, and Friends of the Eel River appreciate the effort that has been expended by the California Coastal Conservancy ("Conservancy") to develop this Regional Plan and the environmental review that has been conducted. We appreciate the opportunity to present you with our concerns regarding this PEIR.

HBK - 1

We support the goals of the Regional Plan, but strongly oppose the use of herbicides in Humboldt Bay and the Eel and Mad River estuaries. The Regional Plan would allow spraying the aquatic herbicide "imazapyr" on hundreds of acres of salt marshes, despite the fact that non-chemical methods like mowing and weedwhacking have proven to be highly effective.

We urge the Conservancy to adopt Alternative 1, Mechanical Methods Only, for the *Spartina* Eradication Programmatic EIR, or at the very least, to adopt a policy of last resort for herbicides within the plan's Management Area.

Alternative 1 is the least environmentally damaging alternative, and is clearly feasible to achieve the goals of the Regional Plan. Effective mechanical methods for eradicating and controlling *Spartina densiflora* were developed after many years of on-the-ground research. These mechanical methods have proven quite successful, and *Spartina* has been effectively controlled on most of the salt marshes within the Humboldt Bay National Wildlife Refuge using these methods.

Effective mechanical methods were developed by local experts who accepted the community's overwhelming opposition to herbicides and pesticides, particularly on or near public lands and waterways. We support and applaud these efforts, and we are deeply concerned that attempts to use herbicides will be strongly opposed by the community and could jeopardize overall eradication efforts.

HBK - 1 (Cont.)

The Regional Plan fails to disclose the number of acres that could be treated with herbicides in any given year, only stating that "the specific number of acres to be treated each year will depend on a number of factors, including acquisition of all relevant permits and the availability of sufficient funding and other resources" (Regional Plan at 45).

HBK - 2

Nor does the Draft PEIR include site-specific analysis of herbicide use, which precludes site-specific impacts analysis. This omission also precludes appropriate public notification and the opportunity for review and comment on site-specific concerns.

HBK - 3

Both the cities of Arcata and Eureka—the largest cities in the project area as well as in Humboldt County—only allow herbicides and pesticides as a last resort, according to policies adopted in 2004 and 2011 respectively (Draft PEIR at 58). Arcata's pest control ordinance (Ordinance # 1300 is available at http://www.alternatives2toxics.org/arcata_pesticide_ordinance_no_1300.htm) prohibits the use of pesticides on City owned or managed property except what is allowed by the Pest Control Management Plan as approved by the City Council after public hearing. The Plan currently allows only least toxic "natural" pesticides such as corn gluten. Eureka's Plan allows the use of several common pesticides and has followed the policy with very little pesticide use since implementation. The proposed plan should respect and comply with the Cities' pesticide policies, and we believe the policy of last resort for herbicide use should be extended throughout the project area.

HBK - 4

Risks to human health and the environment should not be taken when there are safe, effective alternatives to achieve the stated goal of the Regional Plan to eradicate *Spartina densiflora* from the Management Area.

HBK - 5

General Concerns with the Aquatic Use of Imazapyr

- Imazapyr is highly mobile and quite persistent in the environment, two factors that contribute to the ability of this herbicide to cause long-term impacts on non-target plants near treated sites.[1]

HBK - 6

- **Drift:** Because imazapyr is a non-selective, broad-spectrum herbicide, drift and/or runoff to non-target plants will cause damage near application sites. U.S. EPA's risk assessment for imazapyr indicates that non-crop uses of imazapyr by ground

HBK - 7

[1] Dr. Susan Kegley, PhD, Senior Scientist /Program Coordinator, Pesticide Action Network, on behalf of Californians for Alternatives to Toxics for the Humboldt County Superior Court, Feb. 2008.

spray are likely to exceed EPA's Levels of Concern ("LOC") for non-target plants as a result of runoff and spray drift.[2] The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish. Drift would be particularly difficult to control in areas subject to tidal action, such as marshes occupied by *Spartina*.

HBK - 7 Cont.

- **Long-Term Impacts:** Habitat® (the aquatic formulation of imazapyr) was first registered in California in August of 2005. Insufficient time has elapsed to assess any long-term impacts of repeated use of imazapyr in aquatic environments with any certainty.

HBK - 8

- **Bioaccumulation:** According to a 2009 risk assessment,[3] relatively few studies have been conducted examining biological uptake (bioaccumulation) and persistence of imazapyr in tissues. Of two studies cited in this reference one studied clams for 28 days, while the other measured imazapyr concentrations after 3 hours and "thereafter" – hardly the depth of knowledge one would hope to rely on for risk assessments.

HBK - 9

- **Synergistic Effects:** Combinations of chemicals that mix in uncontrolled settings can have synergistic effects that are not examined in the pesticide registration process. These potential effects have not been analyzed in the PEIR or in the laboratory.

HBK - 10

- **Lack of Field Studies:** Like most pesticides, the chemicals proposed for use have been tested in controlled experiments in laboratories, with little to no research on the short-term, long-term, or cumulative effects of its use in the field. This is of particular concern in wildland and aquatic settings, where numerous variables exist that have not been examined in controlled laboratory settings.

HBK - 11

A poignant example of the type of unknown risks that are not examined in laboratory studies is a recent study on the effects of an oil spill in San Francisco Bay[4]. Unexpectedly high mortality of Pacific herring embryos spawned several months following the spill occurred in oiled sites, but mortality was absent in sites that were not oiled. This high mortality at very low oil concentrations was attributed to the dramatic increase in toxicity of bunker fuel oil when oil-exposed embryos were also exposed to sunlight. This phenomenon, called "phototoxicity," is caused by activation of oil-associated chemicals in the transparent herring embryos by natural ultraviolet radiation. Similar unforeseen impacts could occur with the use of imazapyr.

HBK - 12

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[2] Dr. Susan Kegley, PhD, Senior Scientist /Program Coordinator, Pesticide Action Network, on behalf of Californians for Alternatives to Toxics for the Humboldt County Superior Court, Feb. 2008.
[3] AMEC Geomatrix, Inc. for the Washington State Department of Agriculture. 2009. Human Health And Ecological Effects Risk Assessment: Imazapyr Risk Assessment, Washington State.
[4] Incardona, J.P. et al. 2012. Unexpectedly high mortality in Pacific herring embryos exposed to the 2007 Cosco Busan oil spill in San Francisco Bay. Proceedings of the National Academy of Sciences: 109 (2) E51–E58.

Potential Impacts to Native Plants

- **Potential Reproductive Effects:** Imazapyr has the same mode of action as sulfonylurea herbicides, which pose high risks to non-target vegetation due to their unusual ability to impact plant reproduction even when obvious harm is not evident. Negative effects to plant reproduction can reduce the long-term survival of sensitive plants, and can also harm animals that rely on fruits and seeds as food sources. EPA researchers have shown that:

  > "…chlorsulfuron and perhaps other sulfonylurea herbicides appear to have influences on plant reproductions which are not characteristic of many common herbicides. This property would have gone unnoticed during the registration process since registrants are not required to submit any test data collected on mature and/or reproducing plants...It is accepted that chlorsulfuron and other sulfonylurea herbicides are 100 times more toxic to the vegetative growth of plants than older, commonly used herbicides such as atrazine and 2,4-D. Our data indicate that sulfonylurea herbicides are even more toxic to plant reproduction ...Analysis of spray-drift data collected under field conditions have been reported by Bird (1992) to range, depending upon meteorological conditions, from 0.02 to 2% of the application rate at distances as great as 1/4 mile from the application zone."[5]

HBK - 13

- **Potential to Inhibit Native Plant Recolonization:** It is not known whether imazapyr is likely to discourage colonization by native salt marsh plants. According to the Regional Plan, *Spartina* is known to exhibit tolerance to chemical pollution and other environmental stressors (p. B-16). These traits may allow *Spartina* a competitive advantage over native salt marsh plants. Since colonization by the desired native species is essential to the success of the Regional Plan, research to examine the impacts of imazapyr on colonization by native plants should be conducted before concluding that this impact would be less than significant.

- **Inadequate Mitigation to Protect Sensitive Plants:** The proposed mitigation of covering sensitive plant populations with barriers (MITIGATION BIO-3, Draft PEIR at 62) is not likely to be an effective mitigation for herbicide impacts. Areas occupied by sensitive plants such as Humboldt Bay owl's clover and Pt. Reyes bird's beak should be completely avoided and site-specific buffer zones should be established to protect them from drift caused by wind, waves, and tidal action.

[5] Fletcher, J.S., et al. 1996. Potential impact of low levels of chlorsulfuron and other herbicides on growth and yield of nontarget plants. *Environmental Toxicology and Chemistry*. 15(7):1189-1196.

Potential Impacts to Fish and Shellfish

- The use of soybean oil or vegetable oil as surfactants is certainly preferable to nonylphenol. However, the statement that such oils are not toxic to aquatic organisms because the oils float on the water surface (Draft PEIR at 84) is inadequate and fails to provide an analysis of potential impacts. Oils can block oxygen diffusion and can collect in shallow habitat areas that are essential for the growth and development of aquatic organisms, including federally listed species for which Humboldt Bay is designated Critical Habitat (including Coho and Chinook salmon, steelhead trout, tidewater goby, green sturgeon).

HBK - 14

Potential for Weed Resistance

- Imazapyr is an imidazolinone herbicide that belongs to a group of herbicides that act by inhibiting acetolactate synthase (ALS), an enzyme necessary for the production of essential amino acids within plants. At least 51 different herbicides currently in use are ALS inhibitors, including imidazolinones, pyrimidinylthiobenzoates, sulfonylureas, sulfonylaminocarbonyltriazolinone, and triazolopyrimidines. According to Kegley (2008), "In 2000, there were 73 weed species worldwide that had developed resistance to ALS-inhibitor herbicides. By 2008, this number had increased to 95 resistant species worldwide. Cross-resistance between different ALS-inhibitor herbicides is a well-known phenomenon; thus for example, a plant that is resistant to a sulfonylurea herbicide is likely to also be resistant to an imidazolinone herbicide because the mechanisms of action of the two herbicides are similar. The result is widespread and increasing weed resistance to ALS inhibitors, with overall herbicide resistance increasing exponentially[6].”

HBK - 15

Human Health Effects

- **Fish and Shellfish Consumption:** The plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks (Draft PEIR at 86).

HBK - 16

- **Worker Exposure Effects** The Draft PEIR (at 84-85) fails to consider exposure of volunteers participating in weed workdays. This is particularly of concern with regard to youth and school groups who often participate in such events sponsored by local non-profit organizations and governmental agencies. Fear of exposure to harmful chemicals could discourage volunteers from participating in weed workdays to help eradicate *Spartina*, which could be a detriment to the overall goals of the proposed project**.** Given the permanent reproductive damage to plants that was unknown until long after the chemicals had been approved for use, care

HBK - 17

[6] Dr. Susan Kegley, PhD, Senior Scientist /Program Coordinator, Pesticide Action Network, on behalf of Californians for Alternatives to Toxics for the Humboldt County Superior Court, Feb. 2008.

should be taken in the event that currently unknown long-term impacts on human health become evident in the future.

HBK - 17 (Cont.)

Water Quality Impacts

- Although water quality monitoring is required for dischargers of imazapyr (Draft PEIR at 120), the PEIR fails to include water quality monitoring plans to determine whether degradation of water quality is occurring as a result of herbicide application. Omission of specific monitoring provisions eliminates the ability to adequately assess impacts to water quality.

HBK - 18

- The presence of existing contaminants in sediments should not necessarily preclude the use of mechanical methods of *Spartina* eradication. Based on the measures prescribed in the mitigation measure WQ-4, herbicides should only be used as a measure of last resort. Concerns regarding bioaccumulation and synergistic effects of chemicals are more prevalent in areas of known or suspected contamination.

HBK - 19

Conclusion

We appreciate the opportunity to present these comments for your consideration. Based upon the reasons discussed above, we urge the adoption of Alternative 1, Mechanical Methods Only, for the Humboldt Bay Regional *Spartina* Eradication Plan.

Respectfully,

_____s/_____
Jennifer Kalt
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In Reply Refer To:

January 15, 2013

Joel Gerwein
Project Manager
State Coastal Conservancy
1330 Broadway, 13th Floor
Oakland, CA 94612

Mr. Gerwein,

The Humboldt Bay National Wildlife Refuge is an enthusiastic supporter of the effort to eradicate invasive Spartina densiflora from the marshes within Humboldt Bay and surrounding delta areas. We are grateful for the efforts put forth by the State Coastal Conservancy in developing this EIR and for taking a leading role in this region wide project to control this invasive plant.

FWS - 1

Invasive dense-flowered Spartina has infested over 90% of salt marshes in the three adjacent estuaries of Humboldt Bay, the Eel River Delta, and the Mad River Estuary. It is known to displace native vegetation, reducing the biodiversity of the salt marsh dramatically, reduce marsh productivity, and alter the benthic community. It is also beginning to colonize mudflats in the Bay. Mudflats provide critical foraging areas for migratory birds and are utilized for oyster culture, which is important to Humboldt Bay's economy. In light of the historical loss of 90% of the wetlands in Humboldt Bay, it is critical that we eradicate invasive Spartina and restore our remaining marshes and the biodiversity they support.

Due to the level of infestation, the Refuge feels that all available control methods should be options for treatment. Therefore we are recommending the adoption of the Proposed Project which includes both mechanical and chemical control methods. While the use of herbicide is potentially controversial and may face increased public scrutiny, their use would likely be limited to specific areas. Not having them as an available tool could negatively impact the potential for region wide eradication.

The Refuge looks forward to the implementation of the eradication project and will serve as a willing partner in these endeavors.

Sincerely,

Acting for
Eric Nelson
Refuge Manager
Humboldt Bay NWR Complex
Loleta, CA 95551

STATE OF CALIFORNIA -- NATURAL RESOURCES AGENCY Edmund G. Brown, Jr., Governor

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January 15, 2013

Mr. Joel Gerwein
California State Coastal Conservancy
1330 Broadway, 13th Floor
Oakland, CA 94612

RE: Draft Programmatic Environmental Impact Report for the Humboldt Bay Regional Invasive *Spartina* Eradication and Native Salt Marsh Restoration project (SCH No. 2011012015)

Dear Joel:

Thank you for the opportunity to comment on the draft programmatic environmental impact report (DPEIR) for the above-referenced coastal development project. We received the notice of completion and availability of the DPEIR in our North Coast District office on December 5, 2012. Please note that the following are comments of the Coastal Commission staff; the Commission itself has not reviewed the environmental document.

Summary

In general we are very supportive of the proposed project described in the "Humboldt Bay Regional *Spartina* Eradication Plan" (hereinafter "plan," H.T. Harvey & Assoc. 11/14/12) and applaud the plan's overarching goal of tidal marsh enhancement through invasive *Spartina* eradication from Humboldt Bay and the Mad and Eel River estuaries. This goal is consistent with major goals of the Coastal Act, which, as you know, contains policies to protect, enhance, and, where feasible, restore marine resources and the biological productivity of coastal waters and estuaries appropriate to maintain optimum populations of marine organisms and for the protection of human health (Sections 30230 and 30231).

As we stated in our February 1, 2011 comment letter on the Notice of Preparation for the DPEIR, the project site ("management area" described in the DPEIR), including private lands and local, state, and federal public lands, is located within the California Coastal Zone, mostly, if not entirely, within the Coastal Commission's original jurisdiction comprised of tidelands, submerged lands, and public trust lands. Thus, implementation of development (including "major vegetation removal") associated with the proposed plan will require the Commission's approval, either through the coastal development permit (CDP) process and/or the federal consistency process. The standard of review that the Commission must apply to development proposed under the plan within its jurisdiction is the Chapter 3 policies of the Coastal Act. If portions of the project site are located within the CDP jurisdictions of Humboldt County and/or the Cities of Eureka and/or Arcata, if requested by the applicant and the applicable local government and agreed to by the Commission's Executive Director, the Commission has the authority (pursuant to Section

30601.3 of the Coastal Act) to process a single consolidated CDP application for the project, using the Coastal Act as the standard of review. If the applicant, the local government, and the Commission's Executive Director do not agree to the CDP consolidation process, the applicant must obtain separate CDPs for proposed development in the Commission's jurisdiction and proposed development in the local government's jurisdiction. The local government's approval of the CDP would be appealable to the Coastal Commission pursuant to Section 30603(a) of the Coastal Act, since the project is located between the sea and the first public road paralleling the sea, and/or within 300 feet of the mean high tide line and within 100 feet of a wetland and/or estuary. It may be possible for the Commission to process a CDP (and if necessary concurrent federal consistency action) for proposed development region-wide over multiple years as we did in 2010, for example, for the Department of Fish and Game's regional dwarf eelgrass (*Zostera japonica*) eradication program in Humboldt Bay and the Eel River estuary. Please let me know if you would like additional information on permit streamlining options.

Our specific comments in the following section include recommendations for clarification or additional analysis in certain sections of the environmental document and the inclusion of additional mitigation to further minimize the potential for project impacts on visual resources, biological resources, water quality, and public access. In short, we recommend the following:

- Additional mitigation to minimize the project's potential significant visual impacts such as active replanting in denuded treatment areas that exceed a certain minimum size and limiting the size of areas that could be subject to plastic covering and perhaps minimizing the use of this treatment in any given area at a given time. SCC - 1
- Adding a significance criterion to Section 4.8.9 of the DPEIR related to the project's potential substantial adverse effects on coastal wetlands (similar to #3 for federal wetlands). SCC - 2
- Including, or elaborating on, an analysis of the maximum proposed application rate of imazapyr across the maximum acreage that potentially could be treated in the management area during a given timeframe to understand the project's potential to cumulatively result in aquatic concentrations and terrestrial doses of the herbicide that could be toxic to aquatic and terrestrial fauna. SCC - 3
- Potentially adding a mitigation measure that would restrict herbicide application temporally and spatially at the programmatic level (e.g., specifying a maximum acreage across the management area to be chemically treated in any given time period) to further minimize the potential faunal toxicity impacts. SCC - 4
- Analyzing whether imazapyr can be expected to "rapidly" degrade during cloudy and/or foggy conditions and potentially adding a mitigation measure limiting herbicide treatment to periods of sunny and/or fogless skies only. SCC - 5
- Including additional information and discussion on the potential impacts of the herbicide's surfactants and other adjuvants on aquatic and terrestrial fauna, including, but not limited to, the potential impacts to pelicans and other oil-sensitive species. SCC - 6
- Clarifying and revising Mitigation BIO-4 to explicitly state that no herbicide, brush cutting, or flaming treatments shall be used in proximity to native eelgrass plants and specifying appropriate buffer distances that must be applied between each treatment method and native eelgrass. SCC - 7
- Reevaluating the significance of hydrology/water quality threshold item (d) (related to whether the proposed project would alter existing drainage patterns or substantially increase the rate or amount of surface runoff that could result in flooding impacts) and proposing, as necessary, appropriate mitigation to mitigate any significant impact. SCC - 8

- Modifying Mitigation WQ-1 to specify that herbicide application shall not occur during periods of precipitation or high chance of precipitation to avoid the potential for rainwater to mobilize herbicide solution in contact with coastal waters. SCC - 9
- Potentially modifying Mitigation WQ-1 to restrict herbicide application temporally and spatially at the programmatic level to further minimize the potential water quality impacts. SCC - 10
- Potentially modifying Mitigation WQ-1 to include minimum buffer distances that must be applied between herbicide treatment areas and coastal waters. SCC - 11
- Supplementing Mitigation WQ-3 to require that only vegetable oil-based hydraulic fluids be used in heavy equipment and vehicles during *Spartina* eradication efforts, especially if the equipment is operated in the estuarine environment for a week or more at a time. SCC - 12
- Including additional mitigation requiring that biodiesel be used, where available, instead of petroleum diesel in heavy equipment and vehicles, especially if the equipment is to be operated in the estuarine environment for a week or more at a time. SCC - 13
- Supplementing the discussion of impacts associated with the placement of temporary structures for impoundment purposes in the context of the relevant Coastal Act policies and including appropriate mitigation as necessary to ensure project consistency with coastal regulations. SCC - 14
- Additional analysis on the potential maximum closure periods that could be applied to public trails and other public areas as a result of the proposed project and additional mitigation to further minimize public access impacts, such as ensuring that popular public access areas that may be affected by the proposed project remain open and accessible in full to the public during peak usage periods. SCC - 15

We believe that thoroughly addressing all relevant Coastal Act issues during the CEQA process will enhance the environmental document and facilitate the forthcoming coastal development permitting process for the proposed project. The comments below elaborate on the above bulleted list of recommendations.

Specific Comments

Aesthetic and Visual Resources. The DPEIR lists (pages 26-27) various policies and goals that as stated in the document "will affect and determine future visual resource conditions" of various types of scenic areas. The cited policies are contained in the County's draft General Plan update, and the DPEIR states that all will be supported by the proposed project. As the County's 2012 General Plan update is still in draft form and has not yet been certified by the Coastal Commission (for the portions of the document applicable to the coastal zone), the DPEIR should examine the project's consistency with the visual resource protection policies currently in effect in the management area, which include the certified Local Coastal Programs (LCPs) of the County, Arcata, and Eureka. In reviewing CDP applications for any development proposed under the plan within local government jurisdictions, each local government must make findings that the proposed development is consistent with its certified LCP. As discussed above, the standard of review that the Commission applies to proposed development within its jurisdiction is the Chapter 3 policies of the Coastal Act, including Section 30251, which states, in applicable part: SCC - 16

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas…*

The DPEIR proposes Mitigation AV-1 to mitigate the proposed project's potentially significant effects on scenic vistas, visual continuity, and visual clearing. This mitigation involves the posting of educational signs "in areas where public use is high" to aid in increased public understanding of the project with the expectation of improving "the public's reaction to the temporary adverse change to the scenic marsh vista." With this mitigation, the DPEIR asserts that the visual impacts will be mitigated to a less than significant level. Assuming, as shown in Figure 4-1 of the plan, that hundreds of acres of marsh are undergoing intensive chemical and mechanical treatment activities every year over a 5-year period, the result will be potentially hundreds of acres of brown, bare, and plastic-covered areas around the bay and estuaries visible for potentially five years, potentially from numerous public vantage points, including roads, highways, public lands, and other areas of high and low public usage. Although these visual impacts are expected to be temporary, they nonetheless would be incompatible with the character of surrounding areas, and, in our opinion, still significant, especially with respect to extensive and prolonged plastic-covered and denuded areas. Therefore, please consider including additional mitigation to minimize the project's potential significant visual impacts, such as requiring active replanting in denuded treatment areas that exceed a certain minimum size and limiting the size of areas that could be subject to plastic covering and perhaps minimizing the use of this treatment in any given area at a given time.

SCC - 16 (Cont.)

Biological Resources. Section 4.8.6 of the DPEIR lists various plans and documents that contain policies and standards for the protection of biological resources in the management area, including the LCPs of the County, Arcata, and Eureka. The section briefly discusses the policies in the context of the proposed project, though it does not mention or include a discussion of the Coastal Act policies that protect biological resources. As previously mentioned, the majority if not all of the management area is within the Commission's area of retained permitting jurisdiction requiring either a CDP or federal consistency approval, using the Coastal Act, rather than the LCPs, as the standard of review. As we stated in our February 1, 2011 comment letter on the NOP for the DPEIR, the Coastal Act contains several policies to protect marine resources, coastal waters, estuaries, wetlands, water quality, and environmentally sensitive habitats, including Sections 30230, 30231, 30232, 30233, and 30240:

SCC - 17

Section 30230:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30232:

> *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective*

containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

Section 30233 (in applicable part):

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

…

(6) Restoration purposes

…

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary…

SCC - 17 (Cont.)

Section 30240:

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Section 30107.5 of the Coastal Act defines ESHA as follows (in applicable part):

…any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments."

As mentioned earlier in this letter, the proposed plan's overarching goal of tidal marsh enhancement through invasive *Spartina* eradication is generally consistent with a major intent of the Coastal Act to protect marine resources, water quality, and sensitive habitats through the policies shown above (among others). However, we recommend additional mitigation (discussed below) to further protect marine resources, sensitive species, and environmentally sensitive habitats in and around the project area.

Sections 4.8.7 and 4.8.9 of the DPEIR refer to wetlands defined under Section 404 of the Clean Water Act. The document notes that all *Spartina*-infested areas are likely to be federal jurisdictional wetlands. The document also should note that wetlands in the coastal zone, as defined in the Coastal Act and the various LCPs, are defined differently than federal wetlands. The most specific definition of LCP and Coastal Act wetlands is found in Section 13577 of the California Code of Regulations, which defines wetland[1] as *"…land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent…."* Therefore, in order to qualify as a wetland in the coastal zone, land must be at least periodically inundated or saturated for sufficient duration to result in a predominance of hydrophytes or a predominance of hydric soils.

[1] The definition in the Regulations was adapted from Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRue. 1979. *Classification of wetlands and deepwater habitats of the United States.* Office of Biological Services, U.S. Fish and Wildlife Service, Washington, D.C. The definitions of upland limits are identical to those of the Service.

There is no specific periodicity or duration of inundation or saturation required. The primacy of hydrology is implicit in the definition but is presumed adequate if either hydrophytic cover or hydric soils are predominant. Since all *Spartina*-infested areas are likely to be federal jurisdictional wetlands, those areas also qualify as coastal wetlands. But access routes, staging and stockpiling areas, and other areas appurtenant to the treatment areas may delineate as coastal wetlands but not federal wetlands. Section 4.8.9 of the DPEIR should add a significance criterion related to substantial adverse effects on coastal wetlands similar to #3 for wetlands as defined under federal law.

Impact BIO-4 discusses the potential effects of chemical control methods on special-status animal species that may inhabit the project area. The document notes that acute exposure could occur when herbicides are present in relatively high concentrations during and immediately following application. It also notes that herbicide solutions have the potential to affect organisms that live in the water column, including algae, non-target plants, fish and aquatic invertebrates. It goes on to state (page 63):

SCC - 17 (Cont.)

> *While some other receptors such as mammals and birds may spend a considerable portion of their time in the water, they are generally more likely to be affected by other exposure routes, primarily dermal contact during application and incidental ingestion of contaminated sediment during foraging (Kerr 2010). The period during which acute exposure could occur is short, because imazapyr rapidly degrades via photolysis.*

The document should be revised to include or elaborate on an analysis of the maximum proposed application rate of imazapyr across the maximum acreage that potentially could be treated in the management area during a given timeframe to understand the project's potential to cumulatively result in aquatic concentrations and terrestrial doses of the herbicide that could be toxic to aquatic and terrestrial fauna. Consideration should be given to adding a mitigation measure that would restrict herbicide application temporally and spatially at the programmatic level (e.g., specifying a maximum acreage across the management area to be chemically treated in any given time period) to further minimize the potential faunal toxicity impact. The document also should contemplate whether the imazapyr can be expected to "rapidly" degrade during cloudy and/or foggy conditions and consider adding a mitigation measure limiting herbicide treatment to periods of sunny and/or fogless skies only. Additional information and discussion should be included in Impact BIO-4 on the potential impacts of the herbicide's surfactants and other adjuvants on aquatic and terrestrial fauna, including, but not limited to, the potential impacts to pelicans and other oil-sensitive species.

Finally, Mitigation BIO-4 states:

> *Workers removing* Spartina *in areas with the potential for eelgrass shall be trained to recognize eelgrass. Only methods that avoid physical disturbance to eelgrass plants shall be used such as top mowing and excavation. With this mitigation measure, there will be no impact to eelgrass.*

For the sake of clarity, this mitigation measure should be revised to explicitly state that no herbicide, brush cutting, or flaming treatments shall be used in proximity to native eelgrass plants, and the mitigation should specify appropriate buffer distances that must be applied between each treatment method and native eelgrass (e.g., at least 250 feet between herbicide treatment areas and native eelgrass beds to account for potential drift of chemical spray).

Hydrology/Water Quality. The DPEIR lists (pages 114-117) various policies relevant to the proposed project, yet the cited policies are contained in the County's draft General Plan update, which, as discussed above, is still in draft form. The DPEIR also should include the water

SCC - 18

resources planning policies and standards currently in effect in the management area. As cited above, Sections 30231 and 30232 of the Coastal Act require the water quality protection of coastal waters, wetlands, streams, estuaries, and other waters.

The DPEIR states (on page 119) that threshold item (d) (as identified in the Initial Study), among others, is determined to be a less than significant impact and is therefore not discussed further in the environmental document. This threshold item relates to whether the proposed project would "*alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site*." One of the *Spartina* eradication treatment methods proposed in the plan, as described on page 18 of the DPEIR and 66 of the plan, is flooding. This technique would involve manipulating hydrology, as via a tidegate or by blocking a levee breach with an inflatable dam, to drown mature *Spartina* plants or inhibit *Spartina* seedling emergence. Since implementation of this treatment method would result in at least temporarily altering drainage patterns and potentially result in a substantial increase in surface runoff upon drainage of the temporarily flooded area, it may be appropriate to reevaluate the significance of threshold item (d) and propose appropriate mitigation to mitigate any significant impact.

SCC - 18 (Cont.)

Impact WQ-1 discusses the degradation of water quality due to herbicide application. The document notes (pages 119-121):

> *Using various application methods, herbicide mixtures would be applied directly onto the foliage or stems of non-native* Spartina *during low tides when the sediment is exposed. Herbicide mixtures may be directly released to surface waters when the incoming tide could wash remaining herbicide mixture off the foliage and/or from exposed sediment. During the Proposed Project application season as described in the Project Description, rainfall is unlikely to occur in the Management Area. The potential for concentrations of herbicides to be present in water will depend on canopy interception of the applied herbicide, uptake into the plants, uptake into the root zone, and aerial drift, if any. Since application of herbicides would take place during low tide and low wind conditions as designated by the Project Description, the herbicide(s) would likely be absorbed by plants for a minimum of several hours (up to several weeks in high marsh) following application, resulting in lower potential for imazapyr or surfactants to enter water…*
>
> …
>
> *…In water, imazapyr rapidly degrades via photolysis (Patten 2003, Pless 2005). A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within 2 months (Pless 2005)…*
>
> …
>
> *… Impacts to water quality from herbicide application depend on application methods, environmental fate, degradation rates of active agents, environmental conditions and decomposition products of the herbicides being utilized. The primary route by which herbicide solution may contact water is by overspray directly onto the water surface, or by washing off from plants due to tidal inundation or precipitation…*

Mitigation WQ-1 states in part that "*Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper dry times before tidal inundation…*" Mitigation WQ-1 should be modified to also specify that herbicide application shall not occur during periods of precipitation or high chance of precipitation to avoid the potential for rainwater to mobilize herbicide solution in contact with coastal waters. The mitigation measure also could, depending on the above-

recommended analysis of the maximum proposed application rate of imazapyr across the maximum acreage that potentially could be treated in the management area during a given timeframe, restrict herbicide application temporally and spatially at the programmatic level to reduce potential water quality impacts to less than significant levels. As discussed above for biological resources, Impact WQ-1 should also contemplate whether the imazapyr can be expected to "rapidly" degrade during cloudy and/or foggy conditions and consider adding mitigation or modifying Mitigation WQ-1 to limit herbicide treatment to periods of sunny and/or fogless skies only. Finally, it may also be appropriate for the mitigation to include minimum buffer distances that must be applied between herbicide treatment areas and coastal waters.

Impact WQ-3 discusses fuel and petroleum spills. As proposed, the plan involves the use of various mechanical control methods (e.g., mowing, grinding, rototilling, disking, crushing, etc.), some of which may use an amphibious tracked vehicle or standard heavy equipment. Leaks or spills of hydraulic fluids and fuel into the estuarine environment from the operation of amphibious vehicles and heavy equipment during *Spartina* eradication efforts pose a risk of adverse environmental impacts. Mitigation WQ- 3 is intended to minimize fuel and petroleum spill risks by requiring that fueling operations and storage of petroleum products be maintained off-site and requiring the development and implementation of a spill prevention and management plan to contain and clean up spills. The mitigation also prohibits the (non-emergency) servicing and fueling of transport vessels, vehicles, and other equipment in the field, among other specific BMPs "…*as appropriate to comply with the Basin Plan and the other applicable Water Quality Certifications and/or NPDES requirements*…"

SCC - 18 (Cont.)

We recommend supplementing Mitigation WQ-3 to include additional feasible mitigation measures to protect water quality and estuarine habitats from accidental spill impacts. For example, breaks in hydraulic lines are a relatively common occurrence in heavy equipment. Standard hydraulic fluids are based on petroleum products, such as mineral oils, which have high aquatic toxicity, a potential for bioaccumulation, and are not readily biodegradable. There are alternative non-petroleum hydraulic fluids available that have low aquatic toxicity, including vegetable oil-based hydraulic fluids or synthetic hydraulic fluids (e.g., polyglycols or synthetic esters). Vegetable oil-based hydraulic fluids are the best choice for use in heavy equipment and vehicles used in or near the estuarine environment, as they are formulated for low aquatic toxicity, do not bioaccumulate in aquatic organisms, and have rapid biodegradability. Synthetic hydraulic fluids also have low aquatic toxicity and do not bioaccumulate; however, synthetic esters are less biodegradable than vegetable oil-based hydraulic fluids, and only some polyglycols are biodegradable. Thus, although the synthetic hydraulic fluids are a better choice than petroleum-based hydraulic fluids, vegetable oil-based hydraulic fluids are the best choice for this situation. Vegetable oil-based hydraulic fluids are usually compatible with the seals and other components of engines used with petroleum-based fluids. In general, they function well, with good viscosity and lubricity. Most tend to oxidize more quickly than petroleum-based products, leading to formation of sludge; therefore, proper maintenance is important. Vegetable-oil based hydraulic fluids cost two to three times more than petroleum-based fluids; however, the cost of spill cleanup is much less compared to that of petroleum-based hydraulic fluids. We therefore recommend that additional mitigation requiring that only vegetable oil-based hydraulic fluids be used in heavy equipment and vehicles during *Spartina* eradication efforts, especially if the equipment is to be operated in the estuarine environment for a week or more at a time (i.e., such mitigation may not be appropriate for cases where the equipment may be rented for only a limited time for a smaller target area).

We also recommend including additional mitigation requiring that biodiesel be used, where available, instead of petroleum diesel in heavy equipment and vehicles during *Spartina* eradication efforts in the management area, especially if the equipment is operated in the estuarine environment for a week or more at a time. Biodiesel is a non-petroleum fuel that has considerably lower acute aquatic toxicity than petroleum diesel,[2] does not bioaccumulate in aquatic organisms, and biodegrades about twice as fast as petroleum diesel in soil.[3] Biodiesel will also naturally disperse more easily in the aquatic environment than petroleum diesel.[4]

Impact WQ-8 discusses the placement of temporary structures within a FEMA flood zone and states (in part):

> *…The specific regulatory considerations related to hydrology and geomorphology are those arising from local jurisdiction such as Humboldt County and FEMA obligations relative to minimizing flood hazards within flood hazard zones. Regulations pertinent to the Proposed Project are covered in policies stipulated by the local jurisdiction. While the Proposed Project does not propose placement of housing in the 100-year floodplain or Special FHA, placement of temporary dikes or structures to impound water to create prolonged inundation could displace and reduce floodplain/floodway carrying capacity within a special flood hazard zone. Impacts can be reduced to less-than-significant with implementation of the following mitigation measure.*

Mitigation WQ-8 states:

> *Temporary structures used to impound water for submerging* Spartina *including but not limited to earthen dikes, cofferdams, inflatable dams, geotextile tubes or concrete ecology blocks that are proposed for placement in a regulatory FEMA flood zone shall be reviewed and approved by the local floodplain administrator prior to placement.*

SCC - 18 (Cont.)

In addition to federal and local flood hazard regulations, the proposed development, including the construction or placement of temporary structures to impound water for submerging *Spartina,* will be subject to CDP and potentially federal consistency regulations. Section 30253 of the Coastal Act requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazards. It also requires that new development "*…assure stability and structural integrity and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area…*" Section 30233(a)(6) of the Coastal Act allows for diking, dredging, and filling of coastal wetlands and waters for restoration purposes, but only in cases where there is no feasible less environmentally damaging alternative, where feasible mitigation measures have been provided to minimize adverse environmental effects, and where the biological productivity and functional capacity of the habitat will be maintained and enhanced. The DPEIR should supplement the discussion of impacts associated with the placement of temporary structures for impoundment purposes in the context of these Coastal Act policies and include appropriate mitigation as necessary to ensure project consistency with coastal regulations.

Land Use. The Land Use section of the document briefly discusses the project's potential impacts on public access. Since some of the proposed mechanical and chemical treatments could be unsafe for the public, and since some of the proposed treatment areas are located near or

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[2] Khan, N., M. Warith, and G. Luk. 2007. *A Comparison of Acute Toxicity of Biodiesel, Biodiesel Blends, and Diesel on Aquatic Organisms.* J. Air & Waste Manage. Assoc. 57:286–296.

[3] von Wedel, R. 1999. *Technical Handbook for Marine Biodiesel in Recreational Boats*. Marine Biodiesel and Education Project for San Francisco Bay and Northern California. Prepared for the National Renewable Energy Laboratory, U.S. Department of Energy.

[4] Hollebone, B. 2009. *Biofuels in the Environment: A Review of Behaviors, Fates and Effects & Remediation Techniques*. Environment Canada. Freshwater Spills Symposium. St. Louis, MO.

adjacent to public trails and waterways, the project could impact public access. The project proposes Mitigations LU-1 through LU-4 (pages 130-131 of the DPEIR) to mitigate public access impacts to a less than significant level. We recommend including additional analysis on the potential maximum closure periods that could be applied to public trails and other public areas as a result of the proposed project. We recommend including additional mitigation to further minimize public access impacts, such as ensuring that popular public access areas that may be affected by the proposed project remain open and accessible in full to the public during peak usage periods.

SCC - 19 (Cont.)

Conclusion

Thank you again for the opportunity to provide comments as part of the preparation of the environmental analysis. We look forward to future discussions with the Conservancy and other project stakeholders about the proposed plan in the months to come. If you have any questions or would like to discuss the project or these comments, please feel free to contact me.

Sincerely,

Melissa B. Kraemer
Coastal Planner

Cc: State Clearinghouse, Office of Planning & Research, P.O. Box 3044, Sacramento, 95812-3044

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City of ARCATA

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736 F Street
Arcata, CA 95521

January 15, 2013

Joel Gerwein, Project Manager
California Coastal Conservancy
1330 Broadway, 13th Floor
Oakland CA 94612

RE: Comments; Draft Programmatic Environmental Impact Report for the Humboldt Bay Regional *Spartina* Eradication Plan

Dear Mr. Gerwein:

The City has reviewed the Draft Programmatic Environmental Impact Report for the Humboldt Bay Regional *Spartina* Eradication Plan. While the City is supportive of a region wide plan to eradicate *Spartina*, the City has concerns regarding the use of herbicides.

The City's *General Plan 2020* Policy RC-1i recognizes the detrimental impacts of herbicides and pesticides and promotes safer alternatives. The City of Arcata *Pesticide Reduction Plan* does not include the use of Imazapry on its list of minimum risk active ingredients for City use and requires the use of all non-herbicidal management tactics first. Therefore the City of Arcata supports Alternative 1 - mechanical treatment only. The DPEIR states on pages 65 and 81 that the effectiveness of using the herbicides Imazapry on *Spartina* is uncertain and that its use does not provide proven additional benefit. ARC - 1

While there is documentation that Imazapry breaks down relatively quickly and is undetectable after two months, the short term impacts on the oyster industry, water fowl and other water associated wildlife that might encounter the herbicide should be better addressed in the PDEIR since the document also states that the surfactants will result on the herbicide floating on the water surface. On page 85 the PEIR states that pesticide drift can occur up to 250 feet, the PEIR should also provide more detail on how the wind restrictions will be enforced.

Thank you for the opportunity to provide comments.

Sincerely,

Mark André

MARK S. ANDRÉ
Director
Environmental Services Department

Response to Comment CSLC-1

Section 4.8.11 of the PEIR has been modified as follows:

MITIGATION BIO-5: Avoid Impacts to Eelgrass. Workers removing *Spartina* in areas with the potential for eelgrass shall be trained to recognize eelgrass and the mudflats that are habitat for eelgrass. Training shall be conducted by a qualified biologist. Only methods that avoid physical disturbance to eelgrass plants shall be used in close proximity to eelgrass, such as top mowing and excavation. With this mitigation measure, there will be no impact to eelgrass.

MITIGATION CR-2: Site Specific Planning for Artifacts. Site specific planning will include a consultation with the Wiyot Tribe to determine the likelihood that artifacts are present. If ~~during site specific planning~~ there are indications that artifacts are likely to be found ~~(e.g., literature describing the nearby presence of artifacts)~~, soil disturbing methods shall be avoided.

MITIGATION WQ-4: Assess Existing Contamination. For projects where ground disturbance methods (such as digging or excavation) or imazapyr application are considered, a preliminary assessment shall be performed to determine the potential for contamination in sediments prior to initiating treatment. The preliminary assessment shall include (1) review of existing site data and (2) evaluation of historical site use and/or proximity to possible contaminant sources. If the preliminary assessment finds a potential for historic sediment contamination, an appropriate sediment sampling and analysis guide shall be followed and implemented, or soil contamination shall be assumed to be present. If contaminants with a known potential for synergistic effects with imazapyr are present or assumed to be present at levels higher than background levels, that would result in synergistic effects ~~(but below levels that might trigger site cleanup)~~, an alternative treatment method (that shall not disturb sediment or apply imazapyr) will be implemented, such as repeated top-mowing ~~or herbicide application~~, or the specific project shall apply to the Regional Water Board for site-specific WDR. If contaminants are present or assumed to be present at levels higher than background levels (but below levels that might trigger site cleanup), and these contaminants raise concerns for potential impacts from ground disturbance but not from synergistic effects due to imazapyr application, treatment methods that shall not disturb sediment (e.g., top mowing or imazapyr application) shall be used, or the specific project shall apply to the Regional Water Board for site-specific WDR. If significant contamination that warrants site cleanup is identified, sampling information shall be provided to the U.S. EPA or other appropriate authority.

MITIGATION WQ-7: Removal of Wrack. During site specific planning, tidal circulation will be visually assessed. In areas with relatively low tidal circulation, it will either be assumed that DO levels are depressed or monitoring will be conducted to determine if DO levels are depressed. In treatment areas located within or adjacent to waters known or expected to have depressed DO, if wrack is generated during the treatment process, the wrack shall be removed from the treatment area subject to tidal inundation or mulched finely and left in place.

Response to Comment CSLC-2

The Draft PEIR did discuss potential impacts to special status birds and incorporated surveys to determine whether potential nesting habitat or actual nesting was present in areas that could be disturbed by *Spartina* removal. The PEIR also included establishment of a buffer around special status bird species nests. However, it did not specifically discuss northern harriers and short-eared owls. Section 4.8.11 of the PEIR has been modified as follows:

IMPACT BIO-2: Effects on Special Status Birds. Breeding special status birds may be temporarily affected by noise caused by *Spartina* control equipment and vehicles. Disturbance due to noise will depend on many factors such as proximity to the noise, the levels of ambient noise, the nature of ambient noise, and the ability of birds to habituate to new noise. Control methods that create a potentially significant high level of noise are brushcutters, and methods that require airboats (e.g., amphibious vehicles). Without mitigation, noise impacts to birds could be potentially significant. In addition, northern harriers and short-eared owls may nest in the uplands adjacent to *Spartina* control areas, and their nests, which are located on the ground, could be directly impacted by *Spartina* control workers and equipment crossing these areas to reach *Spartina*. However, with implementation of the following mitigation measures impacts are less than significant.

MITIGATION BIO-3: Avoid Northern Harrier and Short-Eared Owl Nests.
The breeding season is March-August for northern harriers (Loughman and McLandress 1994) and March-July for short-eared owls (Gill 1977). If *Spartina* control activities are planned to occur during these periods (i.e., between March-August) then a qualified biologist will assess whether there is potential nesting habitat for northern harrier or short-eared owls. If there is potential habitat, it will be avoided or a qualified biologist will survey the potential habitat immediately prior to *Spartina* control work and if nests are found then a minimum 300 ft buffer zone will be delineated. The buffer zone will be avoided by *Spartina* control workers and equipment.

The following references have been added to Section 10 (Literature Cited) of the PEIR:

Gill, R.E. 1977. Breeding avifauna of the south San Francisco Bay estuary. Western Birds 8:1-12.

Loughman, D.L. and McLanders, M.R. 1994. Reproductive success and nesting habitats of northern harriers in California. California Waterfowl Association. 4630 Northgate Blvd. Sacramento, CA 95831.

Response to Comment CSLC-3

Section 4.8.11 of the PEIR has been modified as follows:

MITIGATION BIO-2: Minimize Noise Effects. Breeding special status birds could be present based on habitat and time of year. The breeding season is generally October through mid-August. On a project specific basis, a habitat analysis shall be done to determine if special status bird species have the potential to occur. If the habitat would support special status birds, and if eradication is planned to occur when these birds may be breeding, then surveys will be done to establish that these species are absent, using protocols approved by USFWS. If such surveys are not conducted, then the species will be assumed present. ~~Further research is required to determine actual sound levels generated by different control methods and to establish required buffer distances between brush cutters or airboats and special status bird species.~~ . Response of birds to noise varies by species as well as site specific factors including ambient noise levels, topography and vegetation. A limit of 60 dB reaching breeding songbirds has recently been advocated for the by the California Department of Fish and Wildlife (see ICF Jones and Stokes 2009). ~~However, for~~ For the purpose of this PEIR, if breeding birds are known or assumed present within close proximity to *Spartina* control activities than actions will be taken to ensure that $\leq$60 dB reaches the breeding area. Actions may include the use of sound measuring devices to determine the range of noise production and limit *Spartina* control methods accordingly (i.e., use quieter methods near breeding special-status birds). ~~a conservative distance of 50 m (for brushcutters) and 100 m (for airboats) is considered adequate to reduce the noise impacts on breeding special status bird species. Another mitigation measure that can be applied is to use quieter control methods (e.g., backpack herbicide sprayers, flooding, covering and flaming) near special status bird species.~~

The following reference has been added to Section 10 (Literature Cited) of the PEIR:

ICF Jones and Stokes. 2009. Technical Noise Supplement. Prepared for California Department of Transportation. Division of Environmental Analysis. 1120 N Street, Room 4301. Sacramento, CA 94274.

Response to Comment HBK-1

Comment noted.

Response to Comment HBK-2

(See Master Response 1)

Response to Comment HBK-3

The commenter is correct that the PEIR does not include site specific analysis of herbicide use. However, as described in the Humboldt Bay Regional *Spartina* Eradication Plan (Page 47), which is incorporated by reference into the PEIR, site specific plans will be developed prior to *Spartina* control efforts. If environmental effects are identified during site specific planning that were not adequately addressed in the PEIR, then additional CEQA documentation will be required, which may involve further public notification, review and input.

Response to Comment HBK-4

(See Master Response 1)

Response to Comment HBK-5

As described in the PEIR and Humboldt Bay Regional *Spartina* Eradication Plan, both mechanical and chemical methods have been used to successfully control *Spartina* and both have potential environmental effects. Having more methods available for treatment is expected to allow for more successful control of *Spartina* while minimizing environmental effects. For example, in some situations such as those where special status birds may be nesting nearby, repeated access by mechanical control crews and noise disturbance from mechanical control, while less than significant with mitigation, may still constitute a greater environmental impact than less frequent access by a smaller crew implementing chemical controls. Another circumstance in which chemical control may have less of an impact than mechanical control is an area at risk of erosion that also provides habitat for species that may be disturbed by noise and human disturbance. In these circumstances, utilizing a method that does not require ground disturbance, and that does not require frequent access by a mechanical control crew may have less of an environmental impact.

Response to HBK-6

The commenter references an expert declaration made by Dr. Susan Kegley on behalf of the Californians for Alternatives to Toxins (Feb. 2008). Dr. Kegley's declaration is related to potential effects of imazapyr when it is used to control purple loosestrife (*Lythrum salicaria*) along the Eel River, California. However, as noted by Dr. Kegley, the fate of imazapyr is not the same in a riverside environment as in tidelands where *Spartina* will be treated. Specifically, in the expert declaration, Dr. Kegley states that "When tidal marshlands are treated with an herbicide, the fate of the herbicide is quite different than that observed in a riverside setting. Studies tracking the fate and transport of imazapyr in tidal marshlands show that imazapyr concentrations are highest when the tide first comes in as the water initially washes over the treated area. The half-life of imazapyr in the treated part of the estuary of 1.6 days. **In short, the incoming tide washes away the water-soluble imazapyr**." (emphasis added). Sections 4.11 and 4.12 of the Draft PEIR summarize other relevant literature pertaining to persistence and mobility of imazapyr.

Response to HBK-7

(See Master Response 2)

Response to HBK-8

The State Coastal Conservancy believes there is adequate information available to support the conclusions made in the PEIR. Imazapyr was first registered in the United States in 1984, and first registered for aquatic use in 2003. The United States Environmental Protection Agency (USEPA) completed a reregistration review for this herbicide in 2006 which reviewed data for over 20 years of use of this herbicide. No significant environmental impacts from large scale use of imazapyr for *Spartina* control in an estuarine setting have been noted after ten years of use in Washington State or 8 years of use in San Francisco Bay. A 13 year study of the effects of imazapyr on salamander populations in a forest setting, where dissipation and breakdown is expected to occur much more slowly than in an estuary, found no effect (Homyack and Cass 2009). Salamanders are generally considered to be quite sensitive to contaminants, making the fact that imazapyr had no long term effects on salamander populations particularly notable. A seven year study found no long term effect of a broadcast imazapyr treatment in a loblolly pine plantation on herbaceous or woody plant composition, as indicated by overstory and understory plant species richness and diversity (Boyd et al 1995).

Imazapyr has a number of characteristics that make it highly unlikely to have long term impacts when used in a tidal environment like the project area. The herbicide is water soluble and breaks down

rapidly by photolysis, targets a metabolic pathway that is not present in animals, and does not have a potential to bioaccumulate because it remains in solution in water rather than concentrating in lipids. The herbicide's low potential to bioaccumulate is supported by bioconcentration studies with bluegill sunfish, eastern oyster, and grass shrimp (USEPA 2006). The low potential for imazapyr to impact animals is supported by the USEPA's decision not to place any restrictions on the use of water in imazapyr treatment areas for recreational purposes, including swimming and fishing, and not to place restrictions on livestock consumption of water from treatment areas (USEPA 2006). USEPA's reregistration review states that long-term aggregate risks from imazapyr related to people through food, drinking water, and residential exposure are below levels of concern. The reregistration review also states that there are no risks of concern to terrestrial birds, mammals, and bees, or to aquatic invertebrates and fish (USEPA 2006). The USEPA does cite imazapyr's potential for non-target plant impacts, and the potential for large scale use on aquatic plants to indirectly reduce dissolved oxygen levels by generating a large amount of dead plant tissue, with concomitant impacts on animals. The potential to lower dissolved oxygen levels in this manner is mitigated by tidal flows in the project area, by the fact that *Spartina* is a marsh plant rather than an aquatic plant, and that *Spartina* releases standing dead tissue to the Bay gradually, as well as by Mitigation Measure WQ-7.

Note also that the Project will utilize an adapative management approach, selecting the most effective and least environmentally damaging control methods based on information about specific sites and control methods that becomes available. Therefore, any new information about imazapyr impacts will be taken into account in the selection of control methods, allowing this method to be curtailed or discontinued if new findings warrant.

Response to HBK-9

The studies referenced by the commenter indicate a very low potential for bioaccumulation of imazapyr. In general, the potential for bioaccumulation is low because imazapyr is highly soluble in water, but has low solubility in lipids.

Response to HBK-10

The commenter does not indicate which chemical(s) that occur in the management area would be a concern with regards to mixing with imazapyr. To the State Coastal Conservancy's knowledge, there is not a chemical which occurs at a high enough level in the management area that it would have a synergistic effect with imazapyr.

Response to HBK-11

The Conservancy believes there is adequate information available to support the conclusions made in the PEIR. Notably, Patten's (2003) study of imazapyr's use in tidal environments support the PEIR's conclusions, as does the monitoring reports for 2007-2011 produced by the San Francisco Invasive Spartina Project. The conclusions of these studies and their citations follow.

Patten, K., 2003. Persistence and non-target impact of imazapyr associated with smooth cordgrass control in an estuary. J. Aquatic Plant Management 41:1-6.

Patten (2003) studied the persistence of imazapyr when used to control cordgrass in an estuary. Imazapyr was applied at 1.68 kg ae/acre (1.5 lbs ae/ acre) with 1% v/v Agri-Dex adjuvant. The persistence of imazapyr in water and sediment followed an exponential decay. The geometric mean of imazapyr concentration over 76 hours in the 0.6 to 20 m zone outside the spray area was 0.1 mg/L (or 100 µ g/L) in water and 3.2 µ g/g in fresh weight sediment. It was stated that these concentrations were 5 to 6 orders of magnitude lower than levels needed to affect aquatic invertebrates and fish. The imazapyr levels in water and sediment approached non-detect levels at 40 and 400 hrs, respectively, and the corresponding half-lives were reported in the range of <0.5 and 1.6 days, respectively.

Kerr, D. 2012. San Francisco Estuary Invasive Spartina Project Water Quality Monitoring Report for 2011. Prepared for the California State Coastal Conservancy. Available: www.spartina.org/project_documents/2011_WQMonRpt_Final-All.pdf.

The California State Coastal Conservancy's San Francisco Estuary Invasive Spartina Project (ISP) implemented their 2011 Water Quality Monitoring Plan in conjunction with the Bay-wide treatment of non-native *Spartina* (cordgrasses). Water samples and data on conventional water quality parameters were collected pre-treatment, immediately after the herbicide application, and one week after treatment at 13 sites (10% of the infestation sites where herbicide was utilized) in compliance with the Statewide General National Pollutant Dis-charge Elimination System (NPDES) Permit. This document reports on the results from 2011 and compares them to the overall trends from ISP water quality monitoring from 2007- 2010.

Water sampling immediately after *Spartina* treatment has consistently found that any imazapyr concentrations detected in the receiving waters are two to four orders of magnitude below those reported in the toxicology literature as a concern to humans or the animals that inhabit the associated tidal marsh system, including the benthic invertebrates at the foundation of the food web. The mean imazapyr concentration from the 2011 treatment event sampling was 89.63 ppb, which is very consistent with the four-year mean of 99.49 ppb from 2007-2010.

In addition, the one-week post-treatment sampling results are also consistent with the published literature that imazapyr is short-lived in an estuarine environment. In 2011, the mean reduction in the imazapyr concentration measured one week after treatment was 92.2%, no matter what concentration was previously measured from the treatment event, while the four-year mean reduction was 95.8% from 2007-2010. With the rapid degradation of this herbicide in the tidal marsh, as measured by the concentration in the water at the site one week after treatment, it is anticipated that all sites that still had measurable concentrations at that time would likely be below detectable levels within a few more days after the third sample.

The monitoring of conventional water quality parameters (water temperature, dissolved oxygen, pH, conductivity and salinity) verified that there is no indication that the herbicides application to invasive *Spartina* have had any impact on estuary surface water quality; this result was entirely anticipated because there is no relevant pathway for the treatment of an emergent plant to alter these parameters in this open system with twice-daily tidal exchange.

Response to HBK-12

There is some uncertainty regarding the potential effects of any *Spartina* control method. However, the Conservancy believes there is adequate information available to support the conclusions made in the PEIR. The information provided by the commenter does not relate to any known effects of imazapyr and the comment is speculative.

Response to HBK-13

As described in Draft PEIR Impact Bio-3, some temporary effects to native vegetation are expected. Eradication of *Spartina* is not feasible without allowing for these temporary effects. However, given the overall net benefit for special status plant species of removing invasive *Spartina*, and with implementation of the PEIR's mitigation measures, these effects are considered less than significant.

Response to HBK-14

The draft PEIR does not state that "oils are not toxic to aquatic organisms because the oils float on the water surface" as stated by the commenter. Rather, in reference to the proposed surfactants, the draft PEIR states "It is anticipated that these products would not present a hazard to aquatic life as they float on the water surface, are non-toxic, and are expected to disperse rapidly with tidal and wind action". Further information regarding the potential environmental effects and fate of surfactants is provided in the draft PEIR. For example, page 21 of the draft PEIR describes studies which found that surfactants are short lived in high-energy tidal environments such as those in the project area.

Response to HBK-15

Comment noted.

Response to HBK-16

The commenter is correct. The draft PEIR summarizes relevant information related to the potential environmental effects of imazapyr and surfactants and finds that they have a low and not significant potential to cause adverse human health effects.

Section 4.13.3 of the PEIR has been modified as follows:

> *MITIGATION LU-3. Mechanical Methods near Agriculture.* If crops (including aquaculture crops such as oysters and clams) are growing in the vicinity of spraying, such that these crops would be more difficult to sell even if herbicides are undetectable, mechanical methods of treatment shall be selected.

Response to HBK-17

As described in the draft PEIR, there is low potential for imazapyr and surfactants to cause adverse human health effects, including to volunteers. Volunteers would not typically work in areas that have been recently treated with imazapyr and imazapyr and the surfactants are expected to rapidly disperse.

Response to HBK-18

The draft PEIR and commenter are referring to a requirement of the State Water Resources Control Board's General Permit NO. CAG99005 that a discharger must comply with monitoring and reporting requirements. The details of these monitoring plans vary and if imazapyr is used, then these details will be determined and documented through the State Water Resources Control Board's regulatory permitting process. The draft PEIR does not include water quality monitoring as mitigation and does not rely on water quality monitoring to make any determination regarding the significance of potential environmental effects.

Response to HBK-19

Section 4.12.19 of the PEIR has been modified as follows:

> **IMPACT WQ-4: Pollutant/Contaminant Remobilization and Synergistic Effects of Imazapyr.** Treatment methods that include ground disturbance have the potential to expose

sediments with higher levels of constituents, or more biologically available forms, including heavy metals and other contaminants such as PCBs and dioxin/furans. Treatment methods that include ground disturbance have the potential to expose and/or mobilize contaminated sediments which could result in a potential increased risk to water quality. If ground disturbance is conducted in areas with high concentrations of metals or pollutants, there is the potential to degrade water quality and contribute to exposure of marsh organisms to some level of constituents. Project-induced remobilization of contaminated sediments would not likely occur from treatment methods that do not directly disturb sediments. However, imazapyr application is not preferred, because if imazapyr is applied in areas with relatively high levels of contaminants then there is an increased potential for synergistic effects of the chemicals. ~~Impacts related to remobilization of contaminated sediments~~ This impact will be reduced to less-than-significant ~~levels~~ by implementing specific mitigation measures and BMPs as recommended in Mitigation Measure WQ-4.

MITIGATION WQ-4: Assess Existing Contamination. For projects where ground disturbance methods (such as digging or excavation) or imazapyr application are considered, a preliminary assessment shall be performed to determine the potential for contamination in sediments prior to initiating treatment. The preliminary assessment shall include (1) review of existing site data and (2) evaluation of historical site use and/or proximity to possible contaminant sources. If the preliminary assessment finds a potential for historic sediment contamination, an appropriate sediment sampling and analysis guide shall be followed and implemented, or soil contamination shall be assumed to be present. If contaminants with a known potential for synergistic effects with imazapyr are present or assumed to be present at levels higher than background levels, that would result in synergistic effects ~~(but below levels that might trigger site cleanup)~~, an alternative treatment method (that shall not disturb sediment or apply imazapyr) will be implemented, such as repeated top-mowing ~~or herbicide application~~, or the specific project shall apply to the Regional Water Board for site-specific WDR. If contaminants are present or assumed to be present at levels higher than background levels (but below levels that might trigger site cleanup), and these contaminants raise concerns for potential impacts from ground disturbance but not from synergistic effects due to imazapyr application, treatment methods that shall not disturb sediment (e.g., top mowing or imazapyr application) shall be used, or the specific project shall apply to the Regional Water Board for site-specific WDR. If significant contamination that warrants site cleanup is identified, sampling information shall be provided to the U.S. EPA or other appropriate authority.

Response to Comment FWS-1

Comment noted.

Response to Comment SCC-1

It would take approximately two years before replanting would have a considerable aesthetic benefit and hence it isn't considered a feasible mitigation measure for visual impacts.

Section 4.6.3 of the PEIR has been modified as follows:

> *MITIGATION AV-2: Limit covering*. In any given area that is visible from a public vantage point, including roads, highways and other areas of relatively high public use, covering shall be limited to 0.5 acres.

Response to Comment SCC-2

The following significance criterion has been added to Section 4.8.9 of the PEIR. Addition of this criterion does not change the conclusions made regarding the project's potential environmental effects.

> 4. Have a substantial adverse effect on coastal wetlands as defined by the California Coastal Act.

Response to Comment SCC-3

(See Master Response 1)

Response to Comment SCC-4

(See Master Response 1)

Response to Comment SCC-5

Imazapyr may breakdown slower if applied during cloudy or foggy days. However, it is still expected to break down rapidly. Especially with the spatial and temporal limits for imazapyr application that have been added to the PEIR (see Master Response 1), it is not expected that fog or clouds would result in persistence of imazapyr or create conditions that would result in a significant environmental effect.

Response to Comment SCC-6

As described in the draft PEIR (for example, see page 21), surfactants are short lived in high-energy tidal environments such as those in the project area. As such, it is highly unlikely that the surfactants would accumulate in a manner that would pose a risk to pelicans or other species that can be affected by oils.

Response to Comment SCC-7

A buffer is not necessary to protect eelgrass. Mechanical methods can physically avoid eelgrass plants. Imazapyr application is very unlikely to result in high enough concentrations of this herbicide at the tidal elevations where eelgrass is located to injure or kill eelgrass. Imazapyr will be applied at very low tides directly to *Spartina* plants, such that overspray would occur to a small extent and with a low frequency. If overspray did occur in the vicinity of eelgrass, the concentration of imazapyr near eelgrass would be further reduced by dilution in tidal waters, as eelgrass grows at elevations that are frequently inundated and imazapyr is water soluble. Furthermore, imazapyr would be expected to break down rapidly at the elevations where eelgrass grows because imazapyr breaks down by photolysis, and sufficient light must be available at eelgrass sites to support the plant. Patten (2003) found that "Applications of imazapyr to native eelgrass (*Zostera marina* L.) and Japanese eelgrass covered by a thin film of tidal water had no effect." Hence, it is unlikely that imazapyr would remain in contact with eelgrass plants long enough at high enough concentrations to have any considerable effect.

Response to Comment SCC-8

Section 2.3.9 of the PEIR has been modified as follows:

> Flooding has not been tested as a primary treatment, but the method could be worth investigation at locations where conditions are suitable. If hydrology can be easily manipulated, as via a tidegate or by blocking a levee breach with an inflatable dam, it may be possible to drown the plants by flooding the site. Studies have shown that flooding *Spartina* plants for two months results in significant mortality of aboveground tissue, though belowground biomass may remain alive (Mateos Naranjo et al. 2007); flooding would likely have to be maintained for 3-4 months to be effective. *Spartina* does not typically occur in marshes or portions of marshes with insufficient drainage or prolonged inundation. This measure would be best applied in high density stands of *Spartina* where few other plants occur, as other plant species and animals could also be killed by the treatment. Additionally, at suitable locations, flooding may be useful as a means of inhibiting *Spartina* seedling emergence. In light of the experimental nature of this treatment and its limited applicability, flooding would initially be used experimentally on a small scale (<5 acres) and would not be used in areas greater than 20 acres. Flooding would not be prolonged for longer than four months, and flooded areas would be monitored weekly to ensure that hydrologic changes due to temporary flooding are not having unforeseen impacts in adjacent areas, such as through scouring of tidal channels. All impoundments will include a simple mechanism for releasing the impounded water if necessary to prevent any permanent changes to the tidal channels.

Section 4.12.19 of the PEIR has been modified as follows:

> **IMPACT WQ-9: Alteration of Drainage Patterns due to Placement of Temporary Dikes or Structures to Impound Water.** Water impoundments could potentially have a significant effect on drainage patterns and erosion processes. For example, impoundments could result in scouring of tidal channels. However, because flooding will be limited in spatial extent (<5 acres experimentally initially, and <20 ac generally) and duration (<4 months) and will be monitored weekly, and because impoundments will include a simple mechanism for releasing the impounded water if necessary to prevent any permanent changes to tidal channels or other features, this effect is temporary and less than significant.

The following reference has been added to Section 10 (Literature Cited) of the PEIR:

> Mateos-Naranjo, E., S. Redondo-Gómez, J. Silva, R. Santos, and M. E. Figueroa. 2007. Effect of Prolonged Flooding on the Invader *Spartina densiflora* Brong. J. Aquatic Plant Management 45:121-123.

Response to Comment SCC-9

It is expected that imazapyr will contact coastal waters. As described in Sections 4.11 and 4.12 of the PEIR, imazapyr is water soluble and not persistent in high energy tidal environments such as those found in the project area.

Response to Comment SCC-10

(See Master Response 1)

Response to Comment SCC-11

It is expected that imazapyr will contact coastal waters and no buffer between imazapyr treatment areas and coastal waters is proposed. As described in Sections 4.11 and 4.12 of the PEIR, imazapyr is water soluble and not persistent in high energy tidal environments such as those found in the project area.

Response to Comment SCC-12 and SCC-13

Section 4.12.19 of the PEIR has been modified as follows:

MITIGATION WQ-3: Minimize Fuel and Petroleum Spill Risks. Fueling operations or storage of petroleum products shall be maintained off-site, and a spill prevention and management plan shall be developed and implemented to contain and clean up spills. Transport vessels and vehicles, and other equipment (e.g., mowers) shall not be serviced or fueled in the field except under emergency conditions; hand-held gas-powered equipment shall be fueled in the field using precautions to minimize or avoid fuel spills within the marsh. For example, gas cans will be placed on an oil drip pan with a PIG® Oil-Only Mat Pad placed on top to prevent oil/gas contamination. Only vegetable oil-based hydraulic fluid will be used in heavy equipment and vehicles during *Spartina* control efforts. When feasible, biodiesel will be used instead of petroleum diesel in heavy equipment and vehicles during *Spartina* control efforts. Other, specific BMPs shall be specified as appropriate to comply with the Basin Plan and the other applicable Water Quality Certifications and/or NPDES requirements. This mitigation is intended to be carried out in conjunction with Mitigation HMM-2 in order to reduce potential impacts to less than significant level.

Response to Comment SCC-14

(See response to comment SCC-8)

Response to Comment SCC-15

Section 4.13.3 of the PEIR has been modified as follows:

MITIGATION LU-5: Do not treat Spartina during peak public use periods: Although public use is minimal in the salt marshes where *Spartina* primarily occurs, there is some use, particularly by waterfowl hunters. *Spartina* treatment will not occur in waterfowl hunting areas during periods of time when hunters are active. If other peak periods of public use are identified in *Spartina* infested areas then control efforts will also avoid these time periods.

Response to Comment SCC-16

See response to Comment SCC-1. Additionally, Section 4.61 of the PEIR has been modified as follows:

Future conditions will be affected by 2 types of effects from the Proposed Project, 1) short-term and temporary effects, and 2) long-term and permanent effects. All of the above County General Plan goals and policies will be supported by the Proposed Project. Additionally, the proposed project is consistent with the goals and policies described in the City of Arcata General Plan (City of Arcata 2008), City of Eureka General Plan (City of Eureka 1997), existing

County of Humboldt General Plan (County of Humboldt 2005), Humboldt Bay Management Plan (HBHRCD 2007) and the California Coastal Act. Long-term and permanent visual effects from the Proposed Project will be the conversion of vegetation from *Spartina* to other native plants, which will likely have a lower and sparser form, but with more diversity in colors and plant types. While *Spartina* can be bushier, native vegetation, such as pickleweed and saltgrass, has less brown, standing dead material during the growing season when most visitors are viewing the marsh. Casual observers may associate fuller vegetation with healthier and "prettier" coastal conditions. Therefore, the enjoyment of Humboldt County's beauty and abundant natural resources may be decreased for some observers, but increased for others who appreciate the diversity of the native plants.

Response to Comment SCC-17

See Response to Comment SCC-2, SCC-5, SCC-6, and SCC-7, and Master Response 1. Additionally, Section 4.8 of the PEIR has been modified as follows:

4.8.8 Coastal Act

Areas where *Spartina* control will occur are primarily within the California Coastal Commission's area of retained permitting jurisdiction and the project will require either a Coastal Development Permit or federal consistency determination under the Coastal Act. The Coastal Act contains policies to protect marine resources, coastal waters, estuaries, wetlands, water quality, and environmentally sensitive habitat areas.

Response to Comment SCC-18

See Response to Comment SCC-5, SCC-7, SCC-8, SCC-12, and SCC-13, and Master Response 1. Additionally, Section 4.12 has been modified as follows:

4.12.4 The Coastal Act

The Coastal Act requires water quality protection of certain areas, including areas where *Spartina* control efforts are being considered. The following sections of the Coastal Act are particularly relevant.

Section 30321 states "The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial

interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams."

Section 30232 states "Protection against the spillage of crude oil, gas, petroleum prodcuts, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."

and

4.12.16 Other Relevant Local Plans
The City of Arcata General Plan (City of Arcata 2008) and City of Eureka General Plan (City of Eureka 1997) contain further goals and policies related to water quality. These goals and policies are consistent with those contained in the County's General Plan (County of Humboldt 2005) and the Project.

Response to Comment SCC-19

See Response to Comment SCC-15

Response to Comment ARC-1

Although the surfactants may float on the water surface, they are expected to rapidly disperse with the high tidal energy in the project area and not create a significant effect.

Regarding enforcement of wind restrictions and other mitigation measures, as is customary, the public agencies that implement the Humboldt Bay Regional *Spartina* Eradication Plan are entrusted with CEQA compliance.

See also Master Responses 1 and 2.

Section 2: Comments from Individuals and Responses

From: Trisha Lee
To: jgerwein@scc.ca.gov
Subject: Asking Coastal Conservancy to Adopt Alternative one, Mechanical Methods only for Spartina Eradication
Date: Tuesday, January 15, 2013 8:22:24 PM

It is imperative that you support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries. Please adopt **Alternative 1, Mechanical Methods Only,** for the Spartina Eradication Programmatic EIR!

The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. **The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay.**

If this eradication herbicide is applied, the incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

TL - 1

Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

Thank you for your consideration of my attempts to protect our environment from severe harm, thus harming the people who depend on clean air, clean water, and clean environment in order to survive.

Best Regards,

Trisha Lotus

2425 C Street, Eureka, CA 95501

Eureka, CA

From: Bruce Campbell
To: jgerwein@scc.ca.gov
Subject: Comments on Draft PEIR for the Hum. Bay Reg"l Spartina Erad.n Plan
Date: Tuesday, January 15, 2013 11:52:37 PM

January 15th, 2013

Bruce Campbell
3520 Overland Ave. # A 149
Los Angeles, CA 90034

Joel Gerwein, Project Manager
California Coastal Conservancy
1330 Broadway, 13th floor
Oakland, CA 94612

Re: Comments on Draft PEIR for the Humboldt Bay Regional Spartina Eradication Plan

Dear Mr. Gerwein:

I strongly urge that you choose Alternative 1 which would allow a plethora of mechanical methods to be employed to control and eradicate the invasive plant from South America called spartina, but not toxic herbicides.

BC - 1

I disagree with the assertion in the document that the Preferred Alternative is "environmentally superior." I noticed in one of the backup documents that there was talk of spartina seeds blowing in the wind to expand its reach. Clearly, if there are complaints about spartina seeds, I bet that pesticide drift can travel at least as far as spartina seeds.

Even ground-spraying of Imazapyr has been noted to exceed the EPA's Level of Concern for non-target vegetation due to the combination of runoff and drift. Tides (including King Tides) can transport toxic herbicide residue and breakdown products to some sensitive species such as eelgrass, shellfish, and fish. Careful evaluate how much of the food chain (specify predator / prey relationships) of these estuaries will be impacted by the spraying of Imazapyr. Please prove how it would be only minimal risks to marine species, bird species, and to human consumers of fish and shellfish impacted by Imazapyr as well as its inert ingredients and breakdown products.

BC - 2

Seeing that the state-endangered Marbled Murrelet is known to use Humboldt and Arcata Bays and the nearby Pacific Ocean (as well as the Eel River Delta and further upstream on the Eel River), there must be careful evaluation in regards to how various methods would impact marbled murrelet feeding and social activity habitat, as well as its prey.

BC - 3

There is no info as to the 47% of the Imazapyr product which is "inert ingredients." In the case of the glyphosate broad-spectrum herbicide, the POEA inert ingredients in some formulations are more toxic than glyphosate itself. We are feeling our way in the dark when we have no clue what the inert ingredients are in Imazapyr.

BC - 4

Also, there is a lot of "desorption" with Imazapyr, plus over half the residue seems to sink to the (bay or estuary) bottom negatively impacting other species there. BC - 5

The PEIR does not provide sufficient information on various topics. One, about how many acres would be treated per year between the Mad River estuary and the Eel River Delta in this spartina eradication program? (I am being geographically inclusive here so of course Arcata and Humboldt Bays are in between these northern and southern points earlier mentioned). Two, about how many acres of such estimated total (in a given month, season, or year) would use Imazapyr, and about how many would use alternative methods for spartina control? BC - 6

The PEIR should have evaluated the success of various spartina eradication / control methods which have been used pretty successfully in the Humboldt Bay National Wildlife Refuge. BC - 7

There should have been site-specific evaluation of the eradication / control program in the HBMWR -- which could then be compared to what is proposed in the estuaries of Humboldt County. And, without knowledge of specific areas which are planned to be treated, how then can we determine the threat to rare native plants and other "collateral damage" from herbicide spraying? BC - 8

Lastly, I want to mention the growing resistance to herbicides that has been occurring lately including to a number of ALS herbicides. Why promote an aquatic formulation little used and studied in California whose chemical family relatives are having a rash of resistance / tolerance to those herbicides (with often get vegetation management folks concluding that they have to move to even more toxic herbicides)? BC - 9

Once again, please choose Alternative I and be more thorough in regards to what is in the pesticide formulation, how many acres will be treated per year and with what methods, and get site-specific so we can relate those areas to possible nearby rare plants and other sensitive species. Thank you very much. BC - 10

Sincerely yours,

Bruce Campbell

From: beverly prosser
To: jgerwein@scc.ca.gov
Subject: eradication plan for invasive weeds in salt marshes in Ho. Bay area
Date: Sunday, January 13, 2013 3:18:08 PM

Dear Coastal Conservancy,

Please select Alternative 1 regarding eradication of invasive weeds in Ho. Bay areas and Mad River and Eel River estuaries.

I want to thank you personally for all the support you have provided in the past for Manila CSD bay and beach areas - both for acquisition and beach grass eradication. Earlier the Coastal Conservancy provided funding for a study of the bay area in Manila Park, which resulted in the acquisition of almost 300 acres of bay property. Thus the District has a stake in eradication of invasive weeds in the bay area, since the District owns acreage out into the middle of Humboldt Bay. As a community member, I would sincerely like to see eradication of invasive weeds continue, however, again I support manual methods - certainly over herbicides. Alternative 1 would also give support for manual labor as provided by the California Conservation Corps or other DFG.programs.

BP - 1

Again, I thank you for your continued support for weed eradication in the Humboldt area.

Sincerely,

Beverly Prosser
1859 Park Street
Arcata (Manila), CA 95521
(707) 445-0964
binky95521@gmail.com

From: Craig Benson
To: Joel Gerwein; Adam Wagschal
Subject: FW: Action Alert! Say No to Herbicides in Humboldt Bay Salt Marshes!
Date: Friday, January 11, 2013 3:05:15 PM

FYI.

Craig

From: Humboldt Baykeeper [mailto:volunteer@humboldtbaykeeper.org]
Sent: Friday, January 11, 2013 2:22 PM
To: craig@nrsrcaa.org
Subject: Action Alert! Say No to Herbicides in Humboldt Bay Salt Marshes!

Action Alert! Say No to Herbicides in Humboldt Bay Salt Marshes!

The California Coastal Conservancy's draft plan to eradicate the invasive cordgrass (Spartina densiflora) would allow spraying the aquatic herbicide "imazapyr" on Humboldt Bay salt marshes, despite the fact that non-chemical methods like mowing and weedwhacking are highly effective. **Tell the Coastal Conservancy you support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries.** Ask them to adopt **Alternative 1, Mechanical Methods Only,** for the Spartina Eradication Programmatic EIR!

The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. **The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay.** Heres why:

HBK2 - 1

The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

Tell the Coastal Conservancy to adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

Comments are due Tuesday, January 15th.

Send comments by email or U.S. mail to:

Joel Gerwein, Project Manager California Coastal Conservancy

jgerwein@scc.ca.gov

1330 Broadway, 13th floor

Oakland, CA 94612

Your donation makes it possible for us to protect our environment, thank you!

Donate Now

From: Sara Griffin
To: jgerwein@scc.ca.gov
Subject: Herbicides for Humboldt Bay
Date: Friday, January 11, 2013 5:39:08 PM

I just learned that the Coastal Conservancy is thinking of using chemicals to eradicate cordgrass from the water ways here. These risks should not be taken when there are safe, effective alternatives that do not call for chemical, but mechanical methods to keep this grass down. Please consider adopting Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

SG - 1

jgerwein@scc.ca.gov

Thank you for your time,
Sara Griffin
2388 Golf Course Rd.
Bayside, CA

From: Bob Morris
To: jgerwein@scc.ca.gov
Cc: Jen Kalt
Subject: Herbicides
Date: Saturday, January 12, 2013 9:22:51 AM

To: Joel Gerwein, California Coastal Conservancy I support the attempted eradication of non-native invasive chordgrass in California's estuaries, but emphatically oppose the use of herbicides to accomplish it. I support Alternative 1, as mechanical methods appear to be affective. Thank you for this opportunity for input. Bob Morris, Vice-President of the Northcoast Environmental Center, Arcata, California

BM - 1

From: Bob Morris
To: jgerwein@scc.ca.gov
Cc: Larry Glass; Ginny Rice
Subject: Herbicides
Date: Monday, January 14, 2013 10:31:45 AM

To: Joel Gerwein, California Coastal Conservancy I support the attempted eradication of non-native invasive chordgrass in California's estuaries, but emphatically oppose the use of herbicides to accomplish it. I support Alternative 1, as mechanical methods appear to be affective. Thank you for this opportunity for input. Bob Morris, Vice-President of Safe Alternatives for our Forest Environment (S.A.F.E.), Weaverville, California

BM2 - 1

From: Meighan O"Brien
To: jgerwein@scc.ca.gov
Subject: Humboldt Bay and surrounding river marshes
Date: Sunday, January 13, 2013 10:44:49 AM

Dear Mr. Gerwein,

I support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries. Please adopt **Alternative 1, Mechanical Methods Only,** for the Spartina Eradication Programmatic EIR! The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. **The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay.** The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

MO - 1

On a local note, neighbors and I have been collecting petitions here in the small burg of McKinleyville to stop the application of herbicides and pesticides to the fields here. These fields are farmed for alfalfa and utilize the excess water from the sewage treatment plant as irrigation. Not only would these pesticides and herbicides run off into the adjacent Mad River but would also contaminate our dogs, and possibly our children who might get in under the flimsy fence.

In one day, talking to folks who mostly are not involved in politics or are conservative if they do, I collected 59 signatures. People do not want their local waters and fields contaminated with cancer causing pesticides and herbicides.We all realize the cumulative impacts from years of spraying, dumping, and applying dangerous pesticides and do not wish to add to that volume. The Community Services District Board is now proposing that we adopt a similar policy to those of Arcata and Eureka which would regulate the use of any of these chemicals on our lands.

I realize we are north of your proposed Spartina eradication area, but I am sending this to you as argument against any further introduction of cancer causing chemicals into our waters.

Please!The Coastal Conservancy should adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

Many thanks for your consideration.

Sincerely,

Meighan O'Brien
1862 Bird Avenue
McKinleyville, CA 95519
707-839-2876

From: Monica Durant
To: jgerwein@scc.ca.gov
Subject: Humboldt Bay safety
Date: Friday, January 11, 2013 2:50:26 PM

Dear Mr. Gerwein,

Please don't allow the use of chemical herbicides in Humboldt Bay. I understand they may be needed as a last reort, but it's my understnading that physical removal is highly effective. I encourage you to work towards adopting Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR instead.

MD - 1

Thank you for listening,
Monica

From: Michael Evenson
To: jgerwein@scc.ca.gov
Subject: Humboldt Bay Spartina grass
Date: Friday, January 11, 2013 6:56:38 PM

Please do not permit the use of herbicides on invasive species around Humboldt Bay! There are other methods of eradication with far fewer impacts. Herbicide use will impact aquatic resources that are under your public trust responsibilities.

ME - 1

Michael Evenson

Michael Evenson, owner
OldGrowthTimbers.com
Samoa and V Streets
Arcata, CA
(707) 834-5340 mobile

From: Eugene Perricelli
To: jgerwein@scc.ca.gov
Subject: Humboldt Bay Spartina Removal
Date: Friday, January 11, 2013 4:29:21 PM

Please do NOT allow the use of herbicides in the effort to eradicate Spartina in the Humboldt Bay Area. Mechanical methods work and are much more environmentally sound.

CP-1

Thank you for your consideration,
Claire Perricelli
Eureka

From: erowe
To: jgerwein@scc.ca.gov
Subject: Humboldt Bay
Date: Friday, January 11, 2013 10:05:07 PM

Dear Mr. Gerwin
I support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries. Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!
The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay. Heres why:
The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.
Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!
Thank you,
Erin Rowe

ER - 1

From: jessica doremus
To: jgerwein@scc.ca.gov
Subject: Mechanical Methods Only
Date: Saturday, January 12, 2013 11:56:15 PM

Dear Project Manager,
Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!
Although I understand the need for the removal of the invasive cordgrass (Spartina densiflora), I DO NOT support the use of herbicides on Humboldt Bay nor in the Eel and Mad River estuaries.
There are mechanical methods for removal that are safe and effective for corgrass removal. Arcata and Eureka both have established policies which only allow pesticide and herbicide use as last resort. These policies were created by the people of Humboldt to protect the native plants, fish, people, and other bay life from pesticide and herbicide exposure. Please respect those policies and DO NOT choose to take such an unnecessary risk.
Sincerely,
Jessica Doremus (RN,kayaker,Watershed Steward)

JD - 1

From: mike black
To: jgerwein@scc.ca.gov
Subject: NO (MORE) HERBICIDES IN HUMBOLDT BAY
Date: Sunday, January 13, 2013 10:06:40 AM

Hello,

I am writing to say that I want the California Coastal Conservancy to adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR. I eradicated noxious weeds and invasive plants for a living while working with the USFS. Humboldt Bay is a sensitive and delicate ecosystem that already suffers from human land use activities, past and present. Given that mechanical methods are an effective treatment for cordgrass it should not even be an option to use herbicides.

MB - 1

I would be a lot more stoked to see a scheduled monthly day where the public and agencies could get involved with eradication.

Thank you for your time

Mike

From: MAUREEN ROCHE
To: jgerwein@scc.ca.gov
Subject: No to Poisoning Humbolt Bay , Eel River nor Mad River Estuary
Date: Monday, January 14, 2013 10:47:51 AM

Please use alternative 1: mechanical removal, as poison is cumulative with unknown ,untoward interactions with toxins and drugs and synthetic fertilzers and Dioxin and a myriad of not yet found, nor looked for chemicals that are not compatible with life.
We are fortunate especially this winter for a return of hopeful numbers of salmon, not to be thwarted again with hazards unnecessary and ineffective. Precedent has shown poison favors the invasive. This is a radical misinformed approach driven by industry without responsibility , as Coastal Commission has, to maintain and improve viability and healthy ecosystem functions.

MR - 1

Thank You for Your Attention,
Maureen Roche

From: Leslie Kemp
To: jgerwein@scc.ca.gov
Subject: RE: Action Alert! Say No to Herbicides in Humboldt Bay Salt Marshes!
Date: Saturday, January 12, 2013 5:39:08 PM

Coastal Conservancy

I say No to Herbicides in Humboldt Bay Salt Marshes!
I support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries.

please adopt **Alternative 1, Mechanical Methods Only,** for the Spartina Eradication Programmatic EIR! The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. **The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay.**

LK - 1

Heres why:
The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

Leslie

From: Dian Bacigalupi
To: jgerwein@scc.ca.gov
Subject: Salt Marsh treatments- Humboldt Bay
Date: Tuesday, January 15, 2013 1:08:31 PM

Please utilize Alternative 1: Mechanical Methods Only for the Humboldt Bay and Salt Marsh treatment. Our bay is impaired by previous activities in our area- as are our bodies from constant exposure to the multitude of synthetic toxins forced on us by the chemical industry and agencies that support them.

DB - 1

Community efforts have brought many improvements towards a healthy environment in Humboldt, and aquaculture is a promise for the health of our economic future.

Give Mechanical Treatments a reasonable chance. The jobs created will be much appreciated as will the wisdom of your choices. Think of the future of your own children. They will remember and thank you.

Dian Bacigalupi
Humboldt

From: Tom Richardson
To: jgerwein@scc.ca.gov
Subject: Spartina Eradication Program Humboldt Bay
Date: Monday, January 14, 2013 5:23:01 PM

Dear Joel,

I would like to comment on the California Coastal Conservancy's draft plan to eradicate the invasive cordgrass (Spartina densiflora) on Humboldt Bay salt marshes,and the Eel River and Mad River estuaries.

I would like to request that you Adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Program, instead of spraying the herbicide "imazapyr". The cities of Arcata and Eureka only allow herbicides and pesticides a last resort. The proposed plan should respect and comply with the cities pesticide policies.

TR - 1

I am concerned about the risk that incoming tides could spread the non specific herbicide over large areas potentially exposing rare native plants, eelgrass, fish, shellfish and people who use the bay for commerce and recreation . These risks should not be taken when there are safe, effective alternatives such as manual or mechanical methods

I would also like to thank you and the California Coastal Conservancy for all your efforts to protect our beautiful coast.

Thank you,

Tom Richardson
1 Marina Way
Eureka California
95501

From: Kerry McNamee
To: jgerwein@scc.ca.gov
Subject: Spartina Eradication Programmatic EIR Comment
Date: Saturday, January 12, 2013 11:31:50 PM

Hello Joel and the Coastal Conservancy,

Initially upon learning about the plan to eradicate invasive spartina in Humboldt Bay and the Mad and Eel River estuaries, I was pleased. Until reading that the Coastal Conservancy plans to use herbicides. From what I understand, mowing and weedwhacking are highly effective at eradicating spartina cordgrass, and I-a tax paying citizen in the area-would rather fund a plan that encompasses mechanical eradication of invasive spartina, not one using chemical means. The cities of Arcata and Eureka only allow herbicides to be used as a last resort, the Coastal Conservancy should respect the local governments policies. Herbicides contain harmful chemicals, and when sprayed on salt marshes, will undoubtedly bioaccumulate in marine species and humans, as well as contaminate ground water. PLEASE pursue mechanical means of eradicating spartina only and adopt Alternative 1.

KM - 1

Thank you.
Kerry McNamee

--
"Change your thoughts and you can change your world"- N.V. Peale

From: Rita Carlson
To: jgerwein@scc.ca.gov
Subject: Spartina Eradication Programmatic EIR
Date: Sunday, January 13, 2013 12:46:43 PM

Dear Mr. Gerwein:

It is my understanding that the California Coastal Conservancy's draft plan to eradicate the invasive cordgrass (Spartina densiflora) would allow spraying the aquatic herbicide "imazapyr" on Humboldt Bay salt marshes, despite the fact that non-chemical methods like mowing and weedwhacking are highly effective.

I support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries. I urge you to adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

RC - 1

The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort.

The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay. Heres why:

The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish. The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

I strongly urge the Coastal Conservancy to adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

Sincerely,

Rita Carlson

POB 3753, Eureka, CA 95502-3753

(707) 445-8744

From: Larry Glass
To: jgerwein@scc.ca.gov
Subject: Spartina Eradication Programmatic EIR
Date: Monday, January 14, 2013 11:35:10 AM

Joel Gerwein

Project Manager

California Coastal Conservancy

Mr Gerwein,

Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR. There is wide spread opposition to the use of poison in/or near water in Humboldt County. Humboldt Bay has abundant wildlife both in and near the bay. Wildlife in all of it's forms will be threaten by the use of poison Herbicides. Herbicides that will have to be used indefinitely to even have chance of long term success. I say chance of success, but the the track record is very poor. Once again Please adopt Alternative 1, Mechanical Methods Only.

LG - 1

Larry Glass

President of the Board of Directors

Northcoast Environmental Center

Arcata, California

larryglass71@gmail.com

707-845-7136

From: tim haywood
To: jgerwein@scc.ca.gov
Subject: Spartina Eradication
Date: Friday, January 11, 2013 10:10:07 PM

I'm concerned about the use of any chemical or pesticide in Humboldt Bay and other local areas to aid in the eradication of Spartina. Please adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

TH - 1

Tim Haywood

From: Ken Miller
To: jgerwein@scc.ca.gov
Subject: Spartina PEIR
Date: Saturday, January 12, 2013 3:16:59 PM

Dear Mr. Gerwein,

I support Spartina eradication, but not the use of herbicide in Humboldt Bay and the Eel and Mad River estuaries. Please adopt **Alternative 1, Mechanical Methods Only,** for the Spartina Eradication Programmatic EIR!

The cities of Arcata and Eureka only allow herbicides and pesticides as a last resort. **The proposed plan should respect and comply with the cities pesticide policies, it should also apply those policies throughout the Bay.**

KM2 - 1

The incoming tides could spread the herbicide far and wide, potentially exposing rare native plants, eelgrass, fish, and shellfish.The current plan does not propose any protections for the risk of exposure to people eating fish or shellfish harvested near spray sites, merely stating that such exposure poses minimal risks. These risks should not be taken when there are safe, effective alternatives.

The Coastal Conservancy should adopt Alternative 1, Mechanical Methods Only, for the Spartina Eradication Programmatic EIR!

Thank you,

Ken Miller, MD
1658 Ocean Drive
McK, CA 95519
707-8397444

From: Douglas Parkinson
To: jgerwein@scc.ca.gov
Subject: Spartina Spraying
Date: Friday, January 11, 2013 4:47:35 PM

My name is Douglas Parkinson. I currently work in Arcata Ca and employed (sometimes and occasionally get paid what I'm worth). I work as Biological Consultant, Douglas Parkinson and Associates.

I would support use of herbicides for ***Spartina*** control on Humboldt Bay wetlands. Mechanical methods are labor intensive and admirable. However,t he spread and proliferation of invasive plant species requires immediate attention use of the most effective tools necessary. Once an invasive plant or animal has established dominance over a native population the return of a native population is nearly impossible to gain dominance.

DP - 1

My personal opinion is that we do not have the time to experiment with unproven slower methodologies considering the risks of losing a native population forever.

Thank You

Doug Parkinson
890 L Street
Arcata, CA 95521

Response to Comment TL-1

Comment noted. See Master Response 2.

Response to BC-1

Comment noted. It is not clear how the relative distance of pesticide drift and seed dispersal relates to the project's environmental effects. The PEIR discusses potential pesticide drift with wind, and incorporates mitigation measures to protect sensitive receptors (for example, see Section 4.7 and Impact AQ-3).

Response to BC-2

See Master Response 2.

Response to BC-3

With the mitigation measures described in the PEIR, the project is not expected to affect marbled murrelets or their prey.

Response to BC-4

As described in Section 4.11.4 of the draft PEIR, most existing toxicity studies on imazapyr were conducted with the technical grade product, which includes the "ingredients" referenced by the commenter.

Response to BC-5

The commenter does not provide any references or evidence for the statement. Based on our review of information, this is not the case.

Response to BC-6

The control program takes an adaptive management approach in which selection of control methods will be ongoing, based on the best available information at the time. Also, control rates cannot be predicted for each water body because this is dependent on a number of items including funding and regulatory approvals. See Master Response 1 regarding maximum application rates of imazapyr.

Response to BC-7

Spartina control efforts are described and considered in the Humboldt Bay Regional *Spartina* Eradication Plan, which is incorporated by reference into the draft PEIR.

Response to BC-8

The PEIR is by definition programmatic and hence does not include site specific evaluations. As described in the PEIR and Humboldt Bay Regional *Spartina* Eradication Plan, there will be site specific evaluations prior to *Spartina* control.

Response to BC-9

Each control method has some potential for environmental effects. The State Coastal Conservancy maintains that it is environmentally preferable to have all the methods available for use.

Response to BC-10

Comment noted.

Response to BP-1

Comment noted.

Response to HBK2-1

Comment noted. See Master Responses 1 and 2.

Response to SG-1

Comment noted.

Response to Comment BM-1

Comment noted.

Response to Comment BM2-1

Comment noted.

Response to Comment MO-1

Comment noted. See Master Response 2.

Response to Comment MD-1

Comment noted.

Response to Comment ME-1

Comment noted.

Response to Comment CP-1

Comment noted.

Response to Comment ER-1

Comment noted. See Master Response 2.

Response to Comment JD-1

Comment noted. See Master Response 2.

Response to Comment MB-1

Comment noted. See Master Response 1.

Response to Comment MR-1

Comment noted. See Master Response 1.

Response to Comment LK-1

Comment noted. See Master Response 2.

Response to Comment DB-1

Comment noted.

Section 4.13.3 of the PEIR has been modified as follows:

MITIGATION LU-3. Mechanical Methods near Agriculture. If crops (including aquaculture crops such as oysters and clams) are growing in the vicinity of spraying, such that these crops would be more difficult to sell even if herbicides are undetectable, mechanical methods of treatment shall be selected.

Response to Comment TR-1

Comment noted. See Master Response 2.

Response to Comment KM-1

Comment noted. See Master Responses 1 and 2.

Response to Comment RC-1

Comment noted. See Master Responses 1 and 2.

Response to Comment LG-1

Comment noted. See Master Response 1.

Response to Comment TH-1

Comment noted.

Response to Comment KM2-1

Comment noted. See Master Responses 1 and 2.

Response to Comment DP-1

Comment noted.

Section 3: Master Responses

Master Response 1

This Master Response is pertinent to comments ARC-1, BC-6, HBK2, HBK-4, HBK2-1, KM-1, KM2-1, LG-1, MB-1, MR-1, RC-1, SCC-3, SCC-4, SCC-5, SCC-10, SCC-17, and SCC-18.

As a point of clarification, there is no municipal ordinance in the City of Eureka specifying that pesticides be used only as a last resort. The City of Eureka utilizes an Integrated Pest Management approach to maintain its parks, natural areas, and other spaces. This plan allows for the use of pesticides when they are determined to be the most appropriate method of pest control, considering environmental impact, effectiveness, feasibility, and other factors.

Comments were received generally requesting that (1) there should be a maximum area that can be treated annually with imazapyr in the Eel River estuary, Humboldt Bay and the Mad River estuary, (2) there should be a maximum treatment area allowed per year, and (3) herbicides should only be used as a "last resort" for *Spartina* treatment. In recognition of these requests, the following has been added to Section 2.4 of the PEIR:

> Due to requests by the public, mechanical methods will be preferred over the use of imazapyr. To select imazapyr application as a treatment method at a specific site, the Regional Coordinator must find that:
>
> - Compared to mechanical methods, imazapyr substantially reduces treatment costs, and
> - Compared to mechanical methods, imazapyr has a greater likelihood of successfully controlling Spartina.
>
> Additionally, the area of annual treatment with imazapyr will be limited as follows:
>
> - Mad River Estuary: 7 acres (all of the mapped *Spartina*)
> - Humboldt Bay: 200 acres (approximately 1/5 of the mapped *Spartina*)
> - Eel River Estuary: 200 acres (approximately 1/3 of the mapped *Spartina*)
>
> Additionally, no site shall be treated with imazapyr more than three times during any five year period.

Master Response 2

This Master Response is pertinent to comments ARC-1, BC-2, ER-1, HBK-7, HBK2-1, JD-1, KM-1, KM2-1, LK-1, MO-1, TL-1, TR-1, and RC-1.

Comments were received generally stating that tides could spread imazapyr "far and wide" and that the PEIR does not propose any protections to people eating fish or shellfish. The following is a response to these comments:

As described in the draft PEIR, research has shown that imazapyr and surfactants are not likely to spread "far and wide". This is because imazapyr is water soluble and the surfactants are quickly dispersed in areas with strong tidal action, such as those found in the project area. The concentrations of imazapyr and surfactants in water adjacent to treatment areas rapidly drops to orders of magnitude below those concentrations that could result in injury or mortality to aquatic invertebrates and larger animals. The concentrations of imazapyr and surfactants at greater distances from application areas will be orders of magnitude lower due to dilution. Patten (2003) found that "Applications of imazapyr to native eelgrass (*Zostera marina* L.) and Japanese eelgrass covered by a thin film of tidal water had no effect." This result indicates that imazapyr applied in a tidal setting will not impact non-target plants except through direct overspray. This is consistent with the USEPAs conclusion that imazapyr has no effect on submerged aquatic vegetation (USEPA 2006). The USEPA's review of potential impacts from imazapyr in their reregistration review (ibid.) also supports this conclusion. While the USEPA review found that the herbicide could impact non-target aquatic and terrestrial plants if applied improperly, it found that following application requirements and rates would prevent such impacts. The USEPA found that drift impacts to non-target plants could occur if imazapyr were applied at maximum rates directly to water. However, this project does not propose to apply imazapyr directly to water, and drift impacts would not occur given the application methods proposed for this project. As described in the PEIR, it is unlikely that imazapyr or the surfactants will have any effect on animals, including humans. This is primarily because imazapyr is highly soluble in water, has low solubility in lipids, preventing it from bioaccumulating, and has low toxicity to animals, as it acts on a metabolic pathway which is only present in plants.

Section 4: References

Boyd, R.S., J.D. Freeman, J.H. Miller, and M.B. Edwards. 1995. Forest herbicide influences on floristic diversity seven years after broadcast pine release treatments in central Georgia, USA. New Forests 10:17-37.

Homyack, J.A. and C.A. Haas. 2009. Long-term effects of experimental forest harvesting on abundance and reproductive demography of terrestrial salamanders. Biological Conservation 142:110-121.

Patten, K. 2003. Persistence and non-target impact of imazapyr associated with smooth cordgrass control in an estuary. Journal of Aquatic Plant Management 41:1-6.

[USEPA] U.S. Environmental Protection Agency. 2006. Reregistration Eligibility Decision for Imazapyr. EPA 738-R-06-007.

Section 5: Mitigation Monitoring and Reporting Plan

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
MITIGATION AV-1: Post Educational Signs. Educational signs shall be posted in areas where public use is high. The signs will explain Spartina's ecological impacts and describe the project. Increased public understanding of the project will improve the public's reaction to the temporary adverse change to the scenic marsh vista.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	Beginning of first treatment season and each treatment season thereafter
MITIGATION AV-2: Limit covering. In any given area that is visible from a public vantage point, including roads, highways and other areas of relatively high public use, covering shall be limited to 0.5 acres.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	During control
MITIGATION AQ-1: Dust Control. Apply dust control measures where treatment methods may produce visible dust clouds and where sensitive receptors (i.e., houses, schools, hospitals) are located within 500 ft of the treatment site. The following dust control measures shall be included: • Suspend activities when winds are too great to prevent visible dust clouds from affecting sensitive receptors; and • Limit traffic speeds on any dirt access roads to 15 mi per hour.	Spartina control contractor	Coordinating Entity Project Manager	During control
MITIGATION AQ-2: Smoke and Ash Emissions. The Management Area is within NCUAQMD Smoke Management Zones 1 and 2. Therefore, for prescribed burns, notification of and coordination with NCUAQMD and a local fire agency shall happen well in advance, prior to initiating the burn. Depending upon the quantity of material to be burned, the District APCO may request that a burn authorization number be obtained prior to ignition. On a project specific basis, a burn permit may be required with NCUAQMD to address potential issues with smoke and as a component of a smoke management plan, if deemed necessary. Additional notification to the local fire agency and/or department may also be required as deemed appropriate by the APCO. The following shall be conducted as a part of this mitigation measure: • Initiate consultation with the District APCO by calling (707) 443-3093 (or the current phone number) to determine if the following would be required for the site specific project: o Burn authorization number,	Coordinating Entity Project Manager	Coordinating Entity Project Manager	At least one month before initiating burns

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
○ Burn permit, and/or ○ Smoke management plan, as well as ○ Consultation with additional agencies such as the local fire agency and/or department. • If the treatment is occurring within the jurisdiction of a local fire agency and/or department, initiate consultation well in advance, prior to the initiating the burn.			
MITIGATION BIO-1: Minimize Effects of Mechanical Spartina Removal Methods to Special Status Fish Species. On a project specific basis, a habitat analysis shall be done to determine if special status fish species have the potential to occur. If they could occur, then surveys may be done to establish that these species are absent, using protocols approved by USFWS or NMFS. If such surveys are not conducted, then the species will be assumed present. If special status fish species are present, then *Spartina* control methods will be selected that minimize potential impacts. To minimize erosion effects, control methods that are most likely to cause erosion (i.e., grinding, tilling, disking and digging/excavating) will not occur within 15 ft of any aquatic habitat containing special status fish species, but this distance could be increased depending on site specific conditions, such as soil stability and bank slopes. Additionally, amphibious vehicles will not contact the channel substrate where special status fish species are present and the vehicles will be operated in such a manner that they avoid causing erosion into the channels. Furthermore, no flooding will be conducted in areas where special status fish species are present. Treatments that do not involve ground disturbance, such as top mowing, crushing, chemical treatment and covering will be the only methods used in close proximity (e.g., within 15 ft) to special status fish species. This mitigation measure is intended to avoid take as defined by the ESA and California ESA.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Habitat analysis to be conducted at least one month before treatment

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
MITIGATION BIO-2: Minimize Noise Effects. Breeding special status birds could be present based on habitat and time of year. The breeding season is generally October through mid-August. On a project specific basis, a habitat analysis shall be done to determine if special status bird species have the potential to occur. If the habitat would support special status birds, and if eradication is planned to occur when these birds may be breeding, then surveys will be done to establish that these species are absent, using protocols approved by USFWS. If such surveys are not conducted, then the species will be assumed present. Response of birds to noise varies by species as well as site specific factors including ambient noise levels, topography and vegetation. A limit of 60 dB reaching breeding songbirds has recently been advocated for the by the California Department of Fish and Wildlife (see ICF Jones and Stokes 2009). For the purpose of this PEIR, if breeding birds are known or assumed present within close proximity to *Spartina* control activities than actions will be taken to ensure that ≤60 dB reaches the breeding area. Actions may include the use of sound measuring devices to determine the range of noise production and limit *Spartina* control methods accordingly (i.e., use quieter methods near breeding special-status birds).	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Habitat analysis to be conducted at least 1 month before treatment. Breeding bird survey to be conducted no more than one week prior to treatment. Delineation of exclusion zones prior to treatment.
MITIGATION BIO-3: Avoid Northern Harrier and Short-Eared Owl Nests. The breeding season is March-August for northern harriers (Loughman and McLandress 1994) and March-July for short-eared owls (Gill 1977). If Spartina control activities are planned to occur during these periods (i.e., between March-August) then a qualified biologist will assess whether there is potential nesting habitat for northern harrier or short-eared owls. If there is potential habitat, it will be avoided or a qualified biologist will survey the potential habitat immediately prior to Spartina control work and if nests are found then a minimum 300 ft buffer zone will be delineated. The buffer zone will be avoided by Spartina control workers and equipment.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Habitat analysis to be conducted at least 1 month before treatment. Breeding bird survey to be conducted no more than one week prior to treatment. Delineation of exclusion zones prior to treatment.
MITIGATION BIO-4: Minimize Impacts to Special Status Plant Species. On a site specific basis, a habitat analysis shall be done to determine if special status plant species have the potential to occur. If they could occur, then surveys may be done to establish that these species are absent, using protocols approved by CDFW. If such surveys are not conducted, then the species will be assumed present. If special status plant species are present, then *Spartina* control methods will be selected that avoid or minimize	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Surveys for annuals in the spring immediately prior to treatment. For perennials, surveys may occur in the prior year. Delineation of exclusion areas and worker training prior to treatment.

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
potential impacts. Staked locations of special status plant populations or special status plant habitat shall be recorded, and field crews on foot or in vehicles shall be instructed to avoid and protect special status plant populations or plant habitat. Impact to the endangered dune plants beach layia and Humboldt Bay wallflower will be avoided by selecting access routes that do not contain these plants. For Humboldt Bay owl's clover and Point Reyes bird's beak, avoidance is determined not to be necessary because temporary effects during *Spartina* control are mitigated by the explosive increase in population that has been demonstrated after *Spartina* control (Pickart 2012). For other annual special status plants such as Western sand spurrey, avoidance shall occur by using only treatment methods that are highly selective; for example heavy equipment will not be operated where these plants or their habitat occur. For perennial plants such as Lyngbye's sedge, a qualified botanist shall stake out locations of special status plants and provide training to control crews to ensure that they minimize impacts to these plants. If special status plant populations or habitat occur near the high tide line, wrack and large deposits of mown *Spartina* shall be removed during the growing season. Special status plant populations shall be covered with fabric adjacent to areas sprayed with herbicide, or spray-drift barriers made of plastic or geo textile (aprons or tall silt fences) shall be installed. If accidental exposure to spray drift occurs, affected plants shall be thoroughly washed with silt-clay suspensions. To avoid trampling of special status plant species, in areas where frequent access will occur, paths shall be marked and used that avoid special status plant species to the maximum extent possible.			
MITIGATION BIO-5: Avoid Impacts to Eelgrass. Workers removing *Spartina* in areas with the potential for eelgrass shall be trained to recognize eelgrass and the mudflats that are habitat for eelgrass. Training shall be conducted by a qualified biologist. Only methods that avoid physical disturbance to eelgrass plants shall be used in close proximity to eelgrass, such as top mowing and excavation. With this mitigation measure, there will be no impact to eelgrass.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Training prior to treatment. Exclusion during treatment.
MITIGATION BIO-6: Reduce Noise near Marine Mammals. If marine mammals are present within 200 ft of *Spartina* control operations, then methods which cause relatively high levels of noise (i.e., brushcutters, the Marsh Master and airboats) shall not be used. Other methods which do not generate a relatively high level of noise can be used.	Spartina control contractor	Coordinating Entity Project Manager	During treatment

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
MITIGATION CR-1: Worker Awareness. Workers shall be made aware of the potential of uncovering artifacts or human remains, and instructed to cease work should any artifacts or human remains be found, and to contact the California Native American Heritage Commission (CNAHC), National Crime Information Center and/or County Coroner as appropriate. When treatment is allowed to begin again, areas identified as potentially having artifacts will be treated with methods that do not disturb the soil, such as top mowing, crushing and chemical treatment.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Training prior to treatment. Response to artifacts or remains during treatment
MITIGATION CR-2: Site Specific Planning for Artifacts. Site specific planning will include a consultation with the Wiyot Tribe to determine the likelihood that artifacts are present. If there are indications that artifacts are likely to be found, soil disturbing methods shall be avoided.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	Planning at least one month prior to treatment
MITIGATION CR-3: Site Specific Planning for Human Remains. If, during site specific planning, indications are that human remains are likely to be found (e.g., based on literature or communications with representatives from a Tribe), soil disturbing methods shall not be used until the remains are located and properly removed. If the coroner determines that the remains may be Native American, the coroner will contact CNAHC. CNAHC staff will notify the most likely descendants of the deceased. The descendants may, with permission of the land owner or representative, "inspect the site of the discovery of the Native American remains and may recommend to the owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods" (Public Resources Code Section 5097.98). The descendants must make their recommendations within 48 h of being contacted by CNAHC. The land owner will insure that the area within the immediate vicinity of the remains is not further disturbed or damaged until the land owner and the most likely descendants have "discussed and conferred" reasonable options.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	Planning at least one month prior to treatment
MITIGATION GS-1/WQ-5: Erosion Control. *Spartina* control methods which directly impact the soil (i.e., grinding, tilling, disking, digging and excavation) shall not be conducted on salt marsh areas that are within 15 ft of a salt marsh edge that is directly exposed to wave action. Other control methods can be used in these areas. This mitigation measure only applies to salt marsh edges along Humboldt Bay proper where wave action is relatively	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	During treatment

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
high, not attached sloughs/channels nor the Eel River or Mad River estuaries. Future research may reveal that control methods that directly impact the soil do not result in a significant level of erosion and that this mitigation is not necessary.			
MITIGATION HHM-1: Worker Injury from Accidents Associated with Manual and Mechanical Non-native Spartina Treatment. A health and safety plan shall be developed to identify and educate workers engaged in *Spartina* removal activities. Appropriate safety procedures and equipment, including hearing, eye, hand and foot protection, and proper attire, shall be used by workers to minimize risks associated with manual and mechanical treatment methods. Workers shall receive safety training appropriate to their responsibilities prior to engaging in treatment activities.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Training prior to treatment.
MITIGATION HHM-2: Accidents Associated with Release of Chemicals and Motor Fuel. Contractors and equipment operators on site during treatment activities will be required to have emergency spill cleanup kits immediately accessible. If fuel storage containers are utilized exceeding a single tank capacity of 660 gallons or cumulative storage greater than 1,320 gallons, a Hazardous Materials Spill Prevention Control and Countermeasure Plan (HMSPCCP) would be required and approved by the NCRWQCD. The HMSPCCP regulations are not applicable for chemicals other than petroleum products; therefore, the contractor shall prepare a spill prevention and response plan for the specific chemicals utilized during treatment activities. This mitigation is intended to be carried-out in conjunction with Mitigation WQ-2.	Spartina control contractor	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during treatment.
Mitigation HHM-3: Worker Health Effects from Herbicide Application. Appropriate health and safety procedures and equipment, as described on the herbicide or surfactant label, including PPE as required, shall be used by workers to minimize risks associated with chemical treatment methods. Mixing and applying herbicides shall be restricted to certified or licensed herbicide applicators	Spartina control contractor	Coordinating Entity Project Manager	During treatment
MITIGATION HHM-4: Avoid Health Effects to the Public and Environment from Herbicide Application. For areas targeted for application of herbicides that are within 500 ft of human sensitive receptors (i.e., houses, schools, hospitals), prepare and implement an herbicide drift management plan to reduce the	Coordinating Entity Project Manager and Spartina control	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during treatment.

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
possibility of chemical drift into populated areas. The Plan shall include the elements listed below. To minimize risks to the public, mitigation measures for chemical treatment methods related to timing of herbicide use, area of treatment, and public notification, shall be implemented by entities engaging in treatment activities as identified below: • Coordinate herbicide applications with the County Agricultural Commissioner. Identify nearby sensitive areas (e.g., houses, schools, hospitals) and/or areas that have non-target vegetation that could be affected by the herbicide and provide advanced notification. • Establish buffer zones to avoid affecting sensitive receptors. • Identify the type of equipment and application techniques to be used in order to reduce the amount of small droplets that could drift into adjacent areas. Consult with herbicide manufacturer for proper application instructions and warnings. • Herbicide shall not be applied when winds are below 3 mile per hour or in excess of 10 mi per hour or when inversion conditions exist (consistent with Supplemental California Manufacturer Labeling), or when wind could carry spray drift into inhabited areas. This condition shall be strictly enforced by the implementing entity. Herbicide applications should not be conducted when surface-based inversions are present. Refer to Section 4.7, Air Quality, for discussion on inversions. The site-specific work plan should identify how meteorological conditions would be obtained. • Signs shall be posted at and/or near any public trails, boat launches, or other potential points of access to herbicide application sites a minimum of one week prior to treatment. • Application of herbicides shall be avoided near areas where the public is likely to contact water or vegetation. • At least one week prior to application, signs informing the public of impending herbicide treatment shall be posted at prominent locations within a conservative 500-foot radius of treatment sites where sensitive receptors could be affected. Schools and hospitals within 500 ft of any treatment site shall be separately noticed at least one week prior to the application. • No surfactants containing nonylphenol ethoxylate will be used.	contractor		
MITIGATION HHM-5: Health Effects to Workers, the Public and the Environment Due to Accidents Associated with Chemical Spartina Treatment. Appropriate health and safety procedures and equipment shall be used to minimize risks	Coordinating Entity Project Manager and	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
associated with *Spartina* treatment methods, including exposure to or spills of fuels, petroleum products, and lubricants. These shall include the preparation of a health and safety plan, a spill contingency plan, and if threshold onsite storage values are exceeded, an HMSPCCP.	Spartina control contractor		treatment.
MITIGATION HHM-6/WQ-4: Assess existing contamination. For projects where ground disturbance methods (such as digging or excavation) or imazapyr application are considered, a preliminary assessment shall be performed to determine the potential for contamination in sediments prior to initiating treatment. The preliminary assessment shall include (1) review of existing site data and (2) evaluation of historical site use and/or proximity to possible contaminant sources. If the preliminary assessment finds a potential for historic sediment contamination, an appropriate sediment sampling and analysis guide shall be followed and implemented, or soil contamination shall be assumed to be present. If contaminants with a known potential for synergistic effects with imazapyr are present or assumed to be present at levels higher than background levels that would result in synergistic effects, an alternative treatment method (that shall not disturb sediment or apply imazapyr) will be implemented, such as repeated top-mowing, or the project shall apply to the Regional Water Board for site-specific Waste Discharge Requirements (WDRs). If contaminants are present or assumed to be present at levels higher than background levels (but below levels that might trigger site cleanup), and these contaminants raise concerns for potential impacts from ground disturbance but not from synergistic effects due to imazapyr application, treatment methods that shall not disturb sediment (e.g., top mowing or imazapyr application) shall be used, or the specific project shall apply to the Regional Water Board for site-specific WDR. If significant contamination that warrants site cleanup is identified, sampling information shall be provided to the U.S. Environmental Protection Agency or other appropriate authority.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during treatment.
MITIGATION WQ-1: Managed Herbicide Control. Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper dry times before tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label. The Control Program shall obtain coverage under the statewide General NPDES Permit for the Discharge of Aquatic Pesticides for	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Obtain permit coverage prior to treatment. Implementation during treatment.

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
Aquatic Weed Control in Waters of the United States (SWRCB 2004). The specific measures that will be required are not known at this time.			
MITIGATION WQ-2: Minimize Herbicide Spill Risks. Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and surfactants on or near project sites shall be allowed only in accordance with a spill prevention and containment plan approved by the NCRWQCD; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters. This mitigation is intended to be carried out in conjunction with Mitigation HMM-2.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during treatment.
MITIGATION WQ-3: Minimize Fuel and Petroleum Spill Risks. Fueling operations or storage of petroleum products shall be maintained off-site, and a spill prevention and management plan shall be developed and implemented to contain and clean up spills. Transport vessels and vehicles, and other equipment (e.g., mowers) shall not be serviced or fueled in the field except under emergency conditions; hand-held gas-powered equipment shall be fueled in the field using precautions to minimize or avoid fuel spills within the marsh. For example, gas cans will be placed on an oil drip pan with a PIG® Oil-Only Mat Pad placed on top to prevent oil/gas contamination. Only vegetable oil-based hydraulic fluid will be used in heavy equipment and vehicles during *Spartina* control efforts. When feasible, biodiesel will be used instead of petroleum diesel in heavy equipment and vehicles during *Spartina* control efforts. Other, specific BMPs shall be specified as appropriate to comply with the Basin Plan and the other applicable Water Quality Certifications and/or NPDES requirements. This mitigation is intended to be carried out in conjunction with Mitigation HMM-2 in order to reduce potential impacts to less than significant level.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Planning at least one month prior to treatment. Implementation during treatment.
MITIGATION WQ-6: Designate Ingress/Egress Routes. Designated ingress/egress routes shall be established at control sites to minimize temporarily disturbed areas. Where areas adjacent to staging and stockpile areas are erosion prone, the extent of staging and stockpile areas shall be minimized by flagging their boundaries. An erosion/sediment control plan (ESCP) shall be developed for erosion prone areas outside the treatment	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Routes shall be established during planning, at least one month prior to treatment. Implementation during treatment.

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
area where greater than ¼ acre of ground disturbance may occur as a result of ingress/egress, access roads, staging and stockpile areas. The ESCP shall be developed by a qualified professional and identify BMPs for controlling soil erosion and discharge of treatment-related contaminants. The ESCP shall be prepared prior to any treatment activities, and implemented during construction.			
MITIGATION WQ-7: Removal of Wrack. During site specific planning, tidal circulation will be visually assessed. In areas with relatively low tidal circulation, it will either be assumed that DO levels are depressed or monitoring will be conducted to determine if DO levels are depressed. In treatment areas located within or adjacent to waters known or expected to have depressed DO, if wrack is generated during the treatment process, the wrack shall be removed from the treatment area subject to tidal inundation or mulched finely and left in place.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Identification of areas of concern during planning, at least one month prior to treatment. Implementation during treatment.
MITIGATION WQ-8: Approval of Structures in Floodplains. Temporary structures used to impound water for submerging *Spartina* including but not limited to earthen dikes, cofferdams, inflatable dams, geotextile tubes or concrete ecology blocks that are proposed for placement in a regulatory FEMA flood zone shall be reviewed and approved by the local floodplain administrator prior to placement.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	Approval prior to treatment
MITIGATION LU-1: Use Certified Herbicide Applicators. Herbicides will only be applied by certified applicators.	Spartina control contractor	Coordinating Entity Project Manager	During treatment
MITIGATION LU-2: Compliance Monitors. Applicators shall be assigned a compliance monitor who observes that spray does not reach agricultural fields.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	During treatment
MITIGATION LU-3: Mechanical Methods near Agriculture. If crops (including aquaculture crops such as oysters and clams) are growing in the vicinity of spraying, such that these crops would be more difficult to sell even if herbicides are undetectable, mechanical methods of treatment shall be selected.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	During planning, at least one month prior to treatment

Mitigation	Implementing Responsibility	Monitoring Responsibility	Timing
MITIGATION LU-4: Posting Notices and Limiting Access. Public safety shall be ensured by posting notices and limiting access during treatment periods. Public notice shall be posted at the entrances of public lands, at trailheads, and on the websites of agencies responsible for the public lands, such as HBNWR. If members of the public access lands during treatment, the field supervisor shall have the authority to ask them to leave for their safety.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	Post notices one week prior to treatment. Monitor public access during treatment.
MITIGATION LU-5: Do not treat Spartina during peak public use periods: Although public use is minimal in the salt marshes where Spartina primarily occurs, there is some use, particularly by waterfowl hunters. Spartina treatment will not occur in waterfowl hunting areas during periods of time when hunters are active. If other peak periods of public use are identified in Spartina infested areas then control efforts will also avoid these time periods.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	During treatment
MITIGATION N-1: Use Relatively Quiet Brushcutters. All brushcutters shall be new and quieter models, with noise not exceeding 90 dB.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	During treatment
MITIGATION N-2: Selective Use of the Marsh Master. Avoid treatment that uses the Marsh Master, if residential receptors are within 800 ft.	Coordinating Entity Project Manager	Coordinating Entity Project Manager	During planning, at least one month prior to treatment
MITIGATION N-3: Limit Hours of Operation. Within 3,200 ft of homes, hours of operation shall be within times that residents would be the least disturbed, as in during work and school hours, and avoiding early morning or early evening.	Coordinating Entity Project Manager and Spartina control contractor	Coordinating Entity Project Manager	During treatment