4.0 EVALUATION OF PROJECT ALTERNATIVES

4.1. COMPARISON OF ALTERNATIVES

There is a strong contrast in the comparisons of alternatives from the perspectives of long-term versus short-term environmental consequences. Normally, with private development or public works projects, the "no action" alternative is associated with more environmentally benign protection or conservation of existing natural resources. In this case, the existing natural resources are undergoing long-term degradation because of "biological pollution" caused by non-native invasive cordgrass species.

Alternatives 1 and 2 (Regional Eradication Using All Available Control Methods and Regional Eradication Using Only Non-chemical Control Methods, respectively; **Table 4-1**) clearly cause significantly more adverse short-term, acute, direct, and indirect environmental impacts than the no-action Alternative 3 (Continued Uncoordinated Treatment), which would have lesser, but still potentially significant treatment impacts. The short-term impacts of Alternatives 1, 2, and 3 are the inevitable consequences of eradication methods that devegetate tidal wetlands invaded by non-native cordgrass. Alternatives 1 and 2, and to a lesser extent Alternative 3 eliminate or displace the wildlife that inhabit them, and cause significant short-term side effects from operation of vehicles and equipment. Alternatives 2 and 3 may have less short-term, acute, direct, and indirect impact than Alternative 1 because it excludes impacts related to application of aquatic herbicides, such as operation of helicopters and vehicles, and risk of spray drift, overspray and accidental spillage. However, if chemical eradication methods are selected and used in accordance with the Program Approach described in Alternative 1(mostly as a secondary treatment following mechanical treatment), the potential impacts from Alternative 1 would be reduced from compared with impacts from repeated physical eradication methods that may be necessary under Alternative 2. Thus, Alternative 2 could prolong wetland degradation and ultimately exceed the net impact of combined use of manual, mechanical, and chemical methods proposed in Alternative 1. Alternative 3's lack of coordination would exacerbate this impact, compared with Alternative 2.

Alternative 2 also has a higher risk of failure to control and eventually eradicate invasive cordgrasses compared to Alternative 1. If Alternative 2 failed to control these invasives, it eventually would result in the same long-term environmental consequence as described below for Alternative 3. Alternative 3's lack of regional coordination would allow the continued and increasing spread of Atlantic smooth cordgrass. This would result in diminishing local control effectiveness and increasing local costs for non-native cordgrass "maintenance" control over time. Probably within one to two decades, only flood control and navigation interests would have incentives and resources to combat overwhelming invasion rates of Atlantic smooth cordgrass hybrids, especially if

Table 4-1. Description of Project Alternatives Considered in This EIS/R

Alternative	*Description*
1	Regional Eradication Using All Available Control Methods
2	Regional Eradication Using Only Non-Chemical Control Methods
3	No Action – Continued Limited, Regionally Uncoordinated Treatment

tidally restored salt ponds generate vast new hybrid populations and seed sources. Alternative 3A, therefore, would result in the same long-term regional wetland quality degradation as Alternative 3B, but would have the added short-term treatment impacts.

Assuming that both Alternatives 1 and 2 could achieve the project objectives, the following is a comparison of environmental consequences of the project alternatives as they relate to several pivotal issues.

4.1.1 Tidal Marsh Restoration

Under Alternative 1, and possibly under Alternative 2, the original restoration objective of native tidal marsh vegetation structure and composition would be supported, and probably could be achieved within 50 to 100 years in many locations. Under Alternatives 3A and 3B, all San Francisco Bay salt ponds restored to tidal marsh eventually would be dominated exclusively by hybrid Atlantic smooth cordgrass, at least for several hundred years. After that time, there might be a possibility that a habitat similar to the Estuary's native upper marsh habitat could evolve.

4.1.2 California Clapper Rails

Under Alternatives 1 and 2, assuming that successful strategies were implemented to integrate clapper rail conservation and invasive cordgrass eradication, clapper rails would endure short-term impacts, and would gain the long-term benefits of native habitat structure and composition from tidal marsh restoration. Under Alternatives 3A and 3B, as large acreages of tall cordgrass habitat increase, California clapper rail populations would likely benefit in the short term and be significantly adversely impacted in the long-term (next 50 to 75 years). However, the integrity of the distinctive California subspecies' behavioral adaptations likely would be lost as rails evolved and adapted to the new Atlantic-type marsh environment. Also, the Atlantic marsh habitat type, as it matured within the limited size of Pacific estuaries, would likely become only marginally supportive of clapper rails.

4.1.3 Other Endangered Wildlife and Plants

The conservation or recovery of a number of plant and wildlife species of concern would probably be feasible under successful implementation of Alternatives 1 and 2. Under Alternatives 3A and 3B, the tidal habitats of the salt marsh harvest mouse would be variously degraded or eliminated by invasive non-native cordgrass, particularly Atlantic smooth cordgrass. Native Pacific cordgrass would become jeopardized, and eventually extinct. The recovery of California sea-blite in San Francisco Bay would be precluded, and many plant and wildlife species of concern would probably become jeopardized.

4.1.4 Shorebirds and Waterfowl

Permanent and interim tidal flat habitats of migratory waterbirds would be protected under successful implementation of Alternatives 1 and 2. Under Alternatives 3A and 3B, migratory shorebirds and waterfowl of the Pacific Flyway would be impacted by long-term reduction in tidal flat habitat in San Francisco Bay, and eventually in other critical stopovers in the Pacific Flyway in this region, such as Tomales Bay and Drakes Estero. Interim benefits of the mudflat phase of tidal marsh succession in restored salt ponds would be quickly lost.

4.2. NEPA ENVIRONMENTALLY PREFERRED ALTERNATIVE

The agencies understand Alternative 1 to include impacts of the efficient use of the variety of physical removal methods and judicious and minimized use of herbicides within a coordinated regional strategy. The Federal lead agencies conclude that Alternative 1 is most likely to achieve long-term protective benefits for California's estuarine environments, and the most favorable ratio of environmental costs to benefits. Therefore, Alternative 1 is identified as the NEPA environmentally preferable alternative. Alternative 1 is most likely to result in the greatest overall (net) environmental benefits in the long-term, despite greater short-term impacts compared with Alternative 3, and more likely to achieve the project objectives than Alternative 2, with little additional environmental risk. These short-term impacts can be further reduced by implementation of mitigation measures identified in this EIS/R. If only short-term impacts of the project itself were evaluated, or if they were attributed much greater weight in evaluating the public interest compared with long-term benefits, then Alternative 3 (no action) would be environmentally superior.

4.3. CEQA ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines (Section 15126.6(a) and (e)(2)) require that an EIR's analysis of alternatives identify the "environmentally superior alternative" among all of those considered. In addition, if the No Project Alternative is identified as environmentally superior, then the EIR also must identify the environmentally superior alternative among the other alternatives. As described above, because the project is, in effect, an environmental restoration and protection project, its primary adverse impacts are short-term, during the treatment process. The No Project Alternatives (3A and 3B) would eliminate these short-term impacts, but would also forego the longer-term environmental benefits of the project. As described in Section 4.1.2, above, Alternative 2 could have somewhat less environmental impacts than Alternative 1 because it would exclude impacts related to application of aquatic herbicides.. However, these reduced impacts could be offset by the need for additional mechanical treatment if chemicals are not used, and by the potential impacts resulting from repeated treatment under Alternative 2. In addition, Alternative 2 also has a lower probability of achieving the project's ultimate environmental benefits than Alternative 1. Therefore this EIR considers the CEQA Environmentally Superior Alternative to be a modified version of Alternative 1 in which all mitigations in this EIS/R have been incorporated into the program. This is identified as the Mitigated Project Alternative. It should be noted, however, that despite mitigation, some significant adverse impacts would remain under this Alternative, as with Alternatives 1 and 2.

Under CEQA, the goal of identifying the environmentally superior alternative is to assist decision-makers in considering project approval. CEQA does not, however, require an agency to select the environmentally superior alternative (CEQA Guidelines Sections 15042-15043).

4.4. UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS

Biological Resources

Alternatives 1 and 2 would result in significant unavoidable short-term impacts to the salt-marsh harvest mouse, tidal shrew, California clapper rail, California black rail, (Impacts BIO-4.1, BIO-5.1, and BIO-5.2). Alternative 3 would reduce the short-term unavoidable impacts on these species, but would result in long-term unavoidable adverse impacts on them.

Visual Resources

Alternatives 1 and 2 would result in significant unavoidable short-term impacts to visual quality of treated marshes (VIS-1). Alternative 3 would reduce the short-term unavoidable impacts on visual quality, but would result in long-term unavoidable adverse impacts on this resource.