

Effectiveness of Possible Additional Mitigation Measures: Same as Alternative C.

Cumulative Impacts: Cumulative impacts would be identical to those described under Alternative C.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: Alternative D would have identical negligible to major beneficial effects as Alternative C on water quality in the Project Area and the southern portion of the Tomales Bay watershed (Table 58). Under Alternative D as with Alternative C, the East and West Pastures would be completely restored, along with Olema Marsh. In terms of water quality, the only substantial difference would be the replacement of the Tomasini Creek Mesa Road culvert with a bridge or arch culvert, which may have some additional negligible beneficial effects on water quality in Tomasini Creek. Tomasini Creek would be completely realigned into one of its historic alignments just downstream of Mesa Road, which could eliminate potential contributions of nutrients and pathogens from the worker housing adjacent to Tomasini Creek just west of Mesa Road. In addition, there would be excavation of even more new tidal channels in the East Pasture, further increasing flow conveyance and exchange of waters with Tomales Bay. Cumulative floodwater volume would increase negligibly under this alternative in both the East and West Pastures, with negligible increases potentially in deposition of suspended sediment, pathogens, and other nutrients on Giacomini Ranch floodplains. The reduction in sediment and fecal coliform delivery to Tomales Bay would climb slightly relative to Alternative C to 19 percent and 17.1 percent, respectively, thereby resulting in a moderate beneficial effect on downstream water quality.

Vegetation Resources

Laws, Regulations, Policies, and Criteria Guiding Impact Analysis

Many native vegetation communities within the United States have been adversely impacted by introduction of non-native plant species, as well as a host of other anthropogenic factors such as commercial, residential, and agricultural development, and resource extraction. These activities have affected all vegetation communities, but the most highly publicized and pervasive threats are perhaps those to wetland and riparian communities. Because of the important functions wetlands and riparian areas provide to plants, wildlife, and humans, these habitats are often subject to oversight from federal, state, and local agencies.

The U.S. Army Corps of Engineers (Corps) oversees Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, both of which serve to ensure that impacts to navigable waters and special aquatic sites such as wetlands through discharge of fill or dredged material are minimized. In addition, wetlands are also regulated under other federal and state statutes and policies, including Section 401 of the Clean Water Act, the federal and California Coastal Act, the Porter-Cologne Act, and Park Service Management Policies. Some of these interpret impacts to include a much broader range of actions, including placement of material in upland areas that could affect wetlands, groundwater withdrawals, and livestock grazing. Riparian areas may or may not be considered wetlands under Section 404, but they are often regulated through establishment of "buffers" or non-development areas by other regulations and policies, including the Local Coastal Program (LCP) and California Coastal Commission (CCC) in the Coastal Zone, California Department of Fish and Game (CDFG) under Lake and Streambed Alteration Agreements, and the Point Reyes Station Community Plan. A more complete description of these policies can be found in Chapter 3 under Vegetation Resources.

Wetlands and other native vegetation communities provide habitats for native plant species, some of which have decreased dramatically in numbers or range because of development and threats from non-native species. In recognition of these threats, federal and state agencies have moved to protect individual plant species under federal and state Endangered Species Acts (ESA). The federal ESA of 1973, as amended, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) before taking actions that could jeopardize the continued existence of any federally listed plant or animal species (i.e., listed as threatened or endangered) or species proposed for listing. Threats to state-listed species require consultation with CDFG. Park Service policies require parks to not only avoid impacts to threatened and endangered species, but to look for opportunities to restore these habitats for these species (NPS 2006; Section 4.4.2.3). The U.S. Department of the Interior (DOI) NEPA significance criteria mandates that any



actions that may have a significant impact to species listed or species proposed for listing as threatened and endangered warrant evaluation in an EIS. Through establishment of CEQA significance criteria, Marin County evaluates proposed actions for their not only their potential to reduce numbers of endangered, threatened, or rare species, but to cause substantial alterations of their habitats, whether or not they are designated as Critical Habitat by the USFWS.

Many vegetation communities and special status plant species have been severely threatened by the introduction and rapid spread of non-native invasive plant species. Park Service Management Policies (2006) direct parks to manage and, if possible and prudent, eradicate invasive species that interfere with natural processes and the perpetuation of natural features, native species or habitats (Section 4.4.4.2). In addition, "exotic species will not be allowed to displace native species if displacement can be prevented" (Section 4.4.4). DOI has defined actions that "contribute to the introduction, continued existence, or spread of noxious weeds or non-native species ... or actions that may promote the introduction, growth, or expansion of the range of such species" as a criteria whether a project's actions might be significant enough to warrant an EIS.

General Assumptions and Methodologies

- The purpose of the proposed project is to restore natural hydrologic and ecological processes and functions and processes, which includes processes and functions associated with native vegetation communities.
- Changes to vegetation communities are analyzed using maps that predict long-term changes in vegetation communities based on computer-modeled changes in the extent and degree of tidal influence, as well as qualitative interpretation of the extent and strength of freshwater influences such as overbank flooding from creeks and surface flow from groundwater sources along the perimeter of the Project Area.
- For this impact topic, the duration category, "Short-Term," refers to a period of approximately 10 years during which vegetation communities would be expected to be in a transitional phase between baseline or construction and long-term conditions.

Described below are methodologies for significance criteria related to vegetation resources, including specific assumptions or details on methodologies.

Changes in Areal Extent of Native Vegetation Communities: Impact thresholds focus on change in vegetation resources in the Project Area, specifically changes in the areal extent of lands dominated or co-dominated by native vegetation communities relative to baseline conditions (Table 59). While not all non-native plant species are invasives and/or are documented to have negative effects on native plant species communities or wildlife habitats, vegetation communities dominated by natives are considered to have more ecological integrity and be perhaps more likely to support to native wildlife through providing habitat, food, and other important relationships, some of which may yet to be documented through research. The Park Service Management Policies (2006) require parks to preserve and restore the natural abundances, diversities, dynamics, and habitats of native plant and animal populations and the communities and ecosystems in which they occur (NPS 2006; Section 4.4.1). The documented or potential importance of vegetation communities dominated by native plant species is one of the reasons that some wetland functionality assessment methodologies include native vegetation communities.

In this analysis, the percentage of the Project Area dominated or co-dominated by native plant species or associations (grouping of plants) are evaluated under the various alternatives. As defined by the Seashore vegetation mapping methodology, a plant species is considered a dominant or co-dominant component of its community when it comprises 30 percent or more of the relative cover (Schirokauer and Parravano 2003). Native species are defined using criteria in the California Invasive Plant Council and/or Jepson Manual (1993) regarding the origin of species (i.e., native, non-native, or naturalized). The Park Service conducted a detailed assessment of vegetation within the Project Area that included mapping of plant associations or groupings of one to three dominant plant species (Parsons and Allen 2004b). Plant associations consisting either wholly of native species or that had less than 25 percent cover of non-native species were mapped as native vegetation communities.

Analysis of potential changes in cover or areal extent of native vegetation communities with implementation of the various alternatives is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium, or, more accurately, dynamic equilibrium conditions have been reached. Some of this analysis relies on information or knowledge regarding the potential invasibility of vegetation communities or which vegetation communities are less likely to support a dominant cover of non-native



species. Communities that are less likely to support a dominant cover of non-native species include Tidal Salt Marsh, Tidal Brackish Marsh, Freshwater Marsh dominated by tall and medium-sized emergent species, Forested Riparian, Scrub Shrub Riparian, and Moist Grassland dominated by wildrye (*Leymus triticoides*), etc., although non-native species may occur intermixed with native species. For the duration category in vegetation communities, "Short-Term," refers to a period of approximately 10 years.

TABLE 59. NATIVE VEGETATION COMMUNITIES

Source: Park Service Management Policies, Marin CWP Nature: Beneficial, Adverse Context: Project Area Duration: Short-Term, Long-Term	
No Impact	There would be no potential for impact to vegetation communities associated with the proposed project.
Negligible	There would be a negligible change (± 10 percent) in the areal extent of native vegetation communities.
Minor	There would be a minor change ($\pm 10 - 25$ percent) in the areal extent of native vegetation communities.
Moderate	There would be a moderate change ($\pm 26 - 50$ percent) in the areal extent of native vegetation communities.
Major or Substantial	There would be a substantial or major change (>50 percent) in the areal extent of native vegetation communities.

Changes in Wetlands: Impact thresholds focus on change in wetland resources, specifically changes in the areal extent of wetlands relative to baseline conditions (Table 60). Many of the functions associated with wetlands such as floodwater storage, water quality improvement, and wildlife habitat are evaluated separately in other sections. For evaluation purposes, the jurisdictional extent of wetlands subject to Corps' regulation under Section 404 of the Clean Water Act is used as the wetland boundary to assess changes relative to existing conditions. **However, this impact indicator does NOT analyze impacts to wetlands strictly on the basis on specific regulations issued by the Corps or other federal, state, and local agencies,** although it does reference conditions in the Corps' Nationwide Permit #27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) and Park Service policies (see below), particularly for setting impact thresholds for adverse impacts. Unlike regulations, however, these thresholds primarily evaluate change on the basis of whether the proposed project would either permanently impact existing wetlands such that wetlands would be eliminated or would no longer function as wetland or would cause only temporary disturbances that would not ultimately affect wetland characteristics or wetland functioning.

Federal policy requires proposed actions to result in no net loss of wetlands, and Park Service Management Policies push parks to strive for a net gain in wetland acreage. For this reason, impact thresholds reflect this mandate by establishing more stringent thresholds for adverse impacts. The Park Service requires a statement of finding and mitigation for any projects that may impact > 0.25 acres of "natural" wetlands except for those related to recreational facilities (e.g., overlooks, bike/foot trails, and signs) and minor stream crossings that completely span channel and wetlands (i.e., no pilings, fill, or other support structures). Under the LCP, diking, filling, and dredging in wetlands are allowable for the purpose of restoration if the alternative with the least environmental impacts is selected.

Beneficial impacts to wetlands through "net gain" in wetland acreage are evaluated using a broader range of criteria, because the high losses of wetlands that have occurred historically requires a higher percentage gain to be considered significant, particularly when viewed in a larger context such as the Tomales Bay watershed or the central California coast. Analysis of changes in cover or areal extent of wetlands is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium, or, more accurately, dynamic equilibrium conditions have been reached.

TABLE 60. WETLANDS

Source: Section 404 and 401 of the Clean Water Act, Park Service Management Policies, Coastal Act/Marin LCP, Marin CWP Nature: Beneficial, Adverse Context: Project Area, Watershed, Supraregional (central California coast) Duration: Construction, Long-Term	
No Impact	There would be no potential change in the areal extent of wetlands associated with the proposed project.
Negligible	Beneficial: There would be a negligible increase (≤ 0.05 acre) in the overall areal extent of wetlands.
	Adverse: There would be a negligible decrease (≤ 0.1 acre) in the overall areal extent of wetlands.

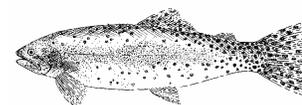


TABLE 60. WETLANDS

Minor	<p>Beneficial: There would be a minor increase (> 0.05 and ≤ 1 acre) in the overall areal extent of wetlands.</p> <p>Adverse: There would be a minor decrease (> 0.1 acre and ≤ 0.25 acre) in the overall areal extent of wetlands.</p>
Moderate	<p>Beneficial: There would be a moderate increase (> 1 and ≤ 5 acres) in the overall areal extent of wetlands.</p> <p>Adverse: There would be a moderate decrease (> 0.25 acre and ≤ 1.0 acre) in the overall areal extent of wetlands. If the decrease in overall areal extent of wetlands is > 1.0, the loss must be for the purpose of Aquatic Habitat Restoration, Establishment, and Enhancement Activities as defined by conditions in the Corps' Nationwide Permit #27.</p>
Major or Substantial	<p>Beneficial: There would be a substantial and major increase (> 5 acres) in the overall areal extent of wetlands.</p> <p>Adverse: There would be a substantial or major decrease (> 1.0 acre) in the overall areal extent of wetlands, or a clear potential for violation of federal, state, or local wetland protection policies.</p>

Changes in Extent of Riparian and Bluff Habitat: Impact thresholds focus on change in riparian and bluff resources, specifically changes in the areal extent of riparian and bluff habitat relative to baseline conditions (Table 61). Many of the functions associated with riparian habitat such as water quality improvement and wildlife habitat are evaluated separately in other sections. Several agencies oversee activities and development in riparian habitat, including the Corps, which regulates impacts to portions of riparian habitat that are considered “wetlands;” CDFG, which regulates both wetland and non-wetland habitat on state, local, and privately owned lands; and Marin County, which has developed LCP and Community Plan policies relating to both riparian and Point Reyes Mesa bluff habitat. For analysis purposes, the extent of riparian habitat subject to LCP oversight under the Coastal Act is used as the riparian habitat boundary to assess change relative to existing conditions. This boundary may include riparian areas that would be considered both jurisdictional and non-jurisdictional wetlands by the Corps.

Within the Coastal Zone, the Streamside Conservation Area (SCA) is defined to include all riparian vegetation on both sides of the stream AND the area 50 feet landward from the edge of the riparian vegetation (Marin County Comprehensive Planning Department 1981). In no case shall the stream buffer be less than 100 feet in width, from either side of the stream, as measured from the top of the stream bank. In addition, the LCP (Marin County Comprehensive Planning Department 1981) and the Point Reyes Station Community Plan (Marin County Community Development Agency 2001) have developed some specific protection objectives regarding the Point Reyes Mesa bluff, including “preservation of the physical, ecological, and visual integrity of the bluff area located above the old railroad right-of-way through the development review process establishment of a 100-foot buffer zone extended eastward from the eastern edge of the railroad grade.”

As with wetlands, because federal, state, and local policies have tried to halt the downward trend in the numbers of acres of riparian habitat, impact thresholds for adverse impacts to riparian and bluff resources reflect this regulatory agenda by establishing stringent thresholds for evaluating intensity of impacts. While thresholds cannot be interpreted as evaluating compliance with any one set of regulations or policies, thresholds for adverse impacts do draw upon federal, state, and local policies. The Park Service requires a statement of finding and mitigation for impacts >0.25 acres of “natural” wetlands, which include riparian areas that would be considered wetlands, except for projects related to recreational facilities (e.g., overlooks, bike/foot trails, and signs) and minor stream crossings that completely span channel and wetlands (i.e., no pilings, fill, or other support structures). Under the LCP, no development or vegetation removal is permitted within the SCA unless no alternatives are feasible. Similar to regulations governing impacts to wetlands, permanent loss of riparian habitat is construed as removal with no potential for future reestablishment (i.e., riparian habitat replaced with structure), whereas temporary impacts are considered those that might trim or remove vegetation and thereby temporarily decrease functionality, but would be expected to rapidly re-establish. Situations in which rapid re-growth would not occur naturally and would therefore require intervention through plantings to reestablish riparian vegetation would be considered a permanent impact.

Similar to the analysis for wetlands, beneficial impacts on riparian habitat through “net gain” of acreage are analyzed using a broader range of criteria, because gains in riparian habitat will have to be relatively high to offset the high losses suffered historically and to therefore be considered major or substantial, particularly when viewed in a larger context such as the state. Analysis of changes in cover or areal extent of riparian communities is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium, or, more accurately, dynamic equilibrium conditions have been reached.



TABLE 61. RIPARIAN AND BLUFF HABITAT

<p>Source: Coastal Act/Marin LCP, Community Station Plan, Park Service Management Policies CDFG Lake and Streambed Alteration Agreement Nature: Beneficial, Adverse Context: Project Area, Supraregional (California) Duration: Construction, Long-Term</p>	
No Impact	There would be no potential for impact to riparian habitat associated with the proposed project.
Negligible	Beneficial: There would be a negligible increase (≤ 0.5 acre) in the areal extent of riparian habitat. Adverse: There would be a negligible decrease (≤ 0.1 acre) in the areal extent of riparian habitat.
Minor	Beneficial: There would be a minor increase (≤ 1 acre) in the areal extent of riparian habitat. Adverse: There would be a minor decrease (> 0.1 acre and ≤ 0.25 acre) in the areal extent of riparian habitat.
Moderate	Beneficial: There would be a moderate increase (> 1 and ≤ 5 acres) in the areal extent of riparian habitat. Adverse: There would be a moderate decrease (> 0.25 acre and ≤ 1.0 acre) in the areal extent of riparian habitat.
Major or Substantial	Beneficial: There would be a substantial and major increase (> 5 acres) in the areal extent of riparian habitat. Adverse: There would be a substantial and major decrease (> 1.0 acre) in the areal extent of riparian habitat and/or a potential for violation of federal, state, or local riparian habitat protection policies.

Effect on Special Status Plant Species: Impact thresholds focus on effects of the proposed project on special status plant species, specifically potential changes in number of plants and areal extent of habitat relative to baseline conditions (Table 62). The Project Area does not provide habitat for any threatened or endangered plant species, but does support several plant species that are considered of concern to the Sacramento USFWS office and the California Native Plant Society (CNPS). The proposed project could affect viability of these annual species through both construction- and project-related actions. For the purposes of this analysis, separate impact indicators have been developed for construction and project-related effects. Construction-related effects are based on incorporation of standard Best Management Practices (BMPs) related to minimizing impacts of construction on annual plant species. Because the seed bank for most of these species is long-lived and can persist for more than 100 years, impacts to reproduction during construction are scaled accordingly, such that construction occurring during a portion of the reproduction season would not necessarily be considered a major or substantial impact. In addition, the typical season of reproduction does vary from year to year due to environmental conditions such as the amount and timing of precipitation.

For project-related effects, the potential effect of the project on areal extent of habitat size and, to a lesser degree, population stability is considered. The proposed project also incorporates the potential for beneficial and adverse impacts to special status plant species. Plant species within the Project Area are largely annual plant species with a high interannual variability in numbers, with the range in numbers between consecutive years for some occurrences varying as widely as 250 to 6,000 plants. These annual plant species are also highly responsive to precipitation and disturbance patterns and able to persist through less optimal environmental conditions due to a long-lived seed bank. For these reasons, population stability was deemphasized under this impact indicator because of the inability to reliably interpret subtle trends in plant numbers. To some degree, context is used to assess intensity, because actions conducted as part of the proposed project will have to be considered in a larger context to accurately interpret the intensity of effects with respect to viability of regional subpopulations, extent of the species' range, or viability of the species as a whole. Analysis of changes in special status plant species habitat is based on knowledge of species' general habitat requirements, along with any microtopographic affinities (e.g., specific elevation zones, topographic features such as swales, or typical plant associates) within these broader habitat categories. Analysis of changes in cover or areal extent of special status plant species habitat is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium, or, more accurately, dynamic equilibrium conditions have been reached.

TABLE 62. SPECIAL STATUS PLANT SPECIES

<p>Source: Endangered Species Act (federal and California), Regional FWS Species of Concern, Park Service Management Policies, CCC/LCP, Marin CWP, CNPS Nature: Adverse Context: Project Area Duration: Construction</p>

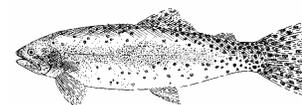
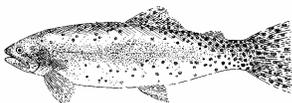


TABLE 62. SPECIAL STATUS PLANT SPECIES

No Impact	There would be no potential for impact to special status plant species associated with construction of the proposed project.
Negligible	Construction would adhere to BMPs such that construction would not occur in those areas during the typical season of reproduction for special status plant species documented in the Project Area, with typical season of reproduction identified by the timeframe listed by either CNPS (2001) or Seashore rare plant database. Any special status plant species areas affected by construction would have topsoils stockpiled and replaced correctly.
Minor	Construction would impact at least a portion of the typical season of reproduction (≤ 33 percent) for special status plant species documented in the Project Area, with typical season of reproduction identified by the timeframe listed by either CNPS (2001) or Seashore rare plant database. Construction would adhere to stockpiling BMPs such that any special status plant species areas affected by construction would have topsoils stockpiled and replaced correctly.
Moderate	Construction would impact at least a portion of the typical season of reproduction (> 33 percent and ≤ 66 percent) for special status plant species documented in the Project Area, with typical season of reproduction identified by the timeframe listed by either CNPS (2001) or Seashore rare plant database. Construction would largely adhere to stockpiling BMPs such that most (> 50 percent) of special status plant species areas affected by construction would have topsoils stockpiled and replaced correctly.
Major or Substantial	Construction would impact most of the typical season of reproduction (> 66 percent) for special status plant species documented in the Project Area, with typical season of reproduction identified by the timeframe listed by either CNPS (2001) or Seashore rare plant database. Construction would not or only partially adhere to stockpiling BMPs such that <50 percent of special status plant species areas affected by construction would have topsoils stockpiled and replaced correctly.
<p>Source: Endangered Species Act (federal and California), Regional FWS Species of Concern, Park Service Management Policies, CCC/LCP, Marin CWP, CNPS Nature: Beneficial, Adverse Context: Project Area, Regional (Watershed/Park), Supra-Regional (Species Range) Duration: Long-Term</p>	
No Impact	There would be no potential for change in the areal extent of special status plant species habitat associated with implementation of the proposed project.
Negligible	There would be a negligible change in areal extent of special status plant species habitat (≤ 1 percent) relative to the extent of areas currently supporting these species. Would be expected to have no measurable effect on populations in the Project Area or regional distribution of species.
Minor	There would be a minor change in the areal extent of special status habitat (>1 percent and ≤ 10 percent) relative to the extent of areas currently supporting these species. Would be expected to have a measurable effect on Project Area distribution of species, but not on regional distribution.
Moderate	There would be a moderate change in the areal extent of special status habitat (> 10 percent and ≤ 25 percent) relative to the extent of areas currently supporting these species. Would be expected to have an appreciable effect on Project Area distribution of species and a measurable effect on regional distribution.
Major or Substantial	There would be a major or substantial change in the areal extent of special status habitat (> 25 percent) relative to the extent of areas currently supporting these species. Would be expected to have a major or substantial effect on Project Area distribution of species and an appreciable effect on regional distribution.

Changes in Extent of Invasive Plant Species: Impact thresholds focus on changes in non-native invasive plant species, specifically changes in the areal extent of non-native invasive plant species occurrences relative to baseline conditions (Table 63). For purposes of this analysis, evaluation focuses on non-native invasive plant species identified by the Seashore or the project planning team as high priority species for management or eradication (Seashore 1989), specifically cape ivy (*Delaria odorata*), pampas grass (*Cortaderia selloana*), English ivy (*Hedera helix*), Atlantic cordgrass and Atlantic cordgrass-Pacific cordgrass hybrids (*Spartina alterniflora* and *Spartina alterniflora* X *Spartina foliosa*), perennial pepperweed (*Lepidium latifolium*), and blackberry (*Rubus discolor*). Some of these species are currently in the Project Area, while others such as Atlantic cordgrass, Atlantic cordgrass-Pacific cordgrass hybrids, or perennial pepperweed occur in the watershed or region and have the potential for occurring in the Project Area in the future. Projects have the potential for affecting the extent of invasive plant species through 1) increasing disturbance, which can encourage expansion of species adapted to disturbance; 2) direct or indirect removal or eradication of invasive plant species occurrences; and 3) changing physical conditions such that viability of existing occurrences and potential for establishment or expansion is affected, either positively or negatively. Analysis of changes in physical or ecological conditions that could affect potential for establishment or viability and expansion



potential of existing non-native invasive species is based on results from hydraulic and hydrodynamic modeling (KHE 2006a), as well as maps that predict long-term changes in vegetation communities in the Project Area once equilibrium or dynamic equilibrium conditions have been reached (~ > 10 years).

TABLE 63. INVASIVE PLANT SPECIES

Source: Park Service Management Policies, DOI Nature: Beneficial, Adverse Context: Project Area, Regional (Park) Duration: Short-Term/ Long-Term	
No Impact	There would be no potential for change in the areal extent of non-native invasive plant species associated with the proposed project.
Negligible	There would be a negligible change in areal extent of non-native invasive species (\pm 10 percent) associated with the proposed project.
Minor	There would be a minor change in areal extent of non-native invasive species (\pm 11 to 25 percent) associated with the proposed project.
Moderate	There would be a moderate change in areal extent of non-native invasive species (\pm 26 to 50 percent) associated with the proposed project.
Major or Substantial	There would be a substantial or major change in areal extent of non-native invasive species (> 50 percent) associated with the proposed project.

Impact Analysis

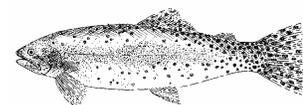
TABLE 64. INTENSITY, NATURE, TYPE, DURATION, AND CONTEXT OF IMPACTS FOR VEGETATION RESOURCES.

All impacts would be considered Project Area and are separately analyzed for Construction, Short-Term, and Long-Term.

	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Impact Indicator	Intensity, Nature, Type, Duration, and Context of Impact				
Native Vegetation Communities	Beneficial - Negligible	Beneficial - Negligible	Beneficial - Negligible	Adverse - Minor	Adverse - Minor
Short-Term					
Long-Term	Beneficial - Minor	Beneficial - Moderate	Beneficial - Major	Beneficial - Major	Beneficial - Major
Wetlands	Adverse - Negligible	Adverse - Moderate	Adverse - Moderate	Adverse - Moderate	Adverse - Moderate
Construction/Temporary					
Short-Term/Long-Term	Beneficial - Minor	Beneficial - Major	Beneficial - Major	Beneficial - Major	Beneficial - Major
Riparian and Bluff Habitat	No Impact	Adverse - Major	Adverse - Major	No Impact	No Impact
Construction/Temporary					
<i>NEPA: Intensity Following Mitigation</i>		Moderate	Minor		
<i>CEQA: Significance Following Mitigation</i>		Less than Significant	Less than Significant		
Short-Term/Long-Term	Beneficial - Negligible	Beneficial - Moderate	Beneficial - Major	Beneficial - Major	Beneficial - Major
Special Status Species	Adverse-Minor	Adverse - Minor	Adverse - Minor	Adverse - Minor	Adverse - Minor
Construction					
Long-Term	Beneficial - Minor	Beneficial - Major	Beneficial - Major	Beneficial - Major	Beneficial - Major
Invasive Plant Species	Beneficial - Negligible	Beneficial - Minor	Beneficial - Moderate	Beneficial - Moderate	Beneficial - Moderate
Short-Term/Long-Term					

No Action Alternative

Analysis: The effects of the No Action Alternative on vegetation and wetland resources in the Project Area would generally range from minor adverse to minor beneficial (Table 64). Under the No Action Alternative,



levees, tidegates, and culverts in the Giacomini Ranch are not breached or removed, except for the 11-acre wetland restoration area in the northeastern corner of the East Pasture. The Park Service is required under its existing agreement with CalTrans to restore wetlands as mitigation for impacts caused by CalTrans to aquatic habitat from a road repair on State Route 1 in Marin County in exchange for the Park Service receiving monies to purchase and restore the Giacomini Ranch. The remainder of the levee would not be deconstructed, although there would be no levee maintenance. Olema Marsh is also not restored, and there would no construction or expansion of public access facilities.

The No Action Alternative would have minor beneficial effects on vegetation resources in the Project Area, largely because of the elimination of intensive agricultural management practices. In Olema Marsh, where there is no agricultural use, conditions would be expected to remain fairly similar to baseline conditions. Under the existing purchase agreement with the Giacomini Trust, the Giacomini Ranch dairy had a 7-year Reservation of Use agreement that allowed the Giacomini family to continue dairying until the agreement expires in spring 2007. At that time, the dairy will close, and agricultural management practices associated with dairying will cease. These management practices include periodic removal of riparian vegetation associated with maintenance of levees and creek crossings; frequent removal of aquatic vegetation in drainage ditches; light and intensive spreading of manure; irrigation; and annual mowing. Most of these practices occur almost exclusively in the East Pasture, although there is some infrequent ditch maintenance and annual mowing in the West Pasture. In terms of management, the East Pasture represents the more intensively managed area that is characteristic of dairy operations, while the West Pasture more closely resembles the much less-intensively managed lands used for grazing of dairy heifers and beef cattle.

Under the No Action Alternative, there is a potential for leased grazing of dairy heifers or beef cattle on the Giacomini Ranch lands in the future, which would be in accordance with the parks' GMP. Leasing would undergo a separate environmental review process, but it is likely that, if lease or leases were approved, that the Seashore would institute restrictions on resource setbacks or setbacks from creeks, riparian areas, and certain wetland areas, as well as the intensity, duration, and timing of grazing. In addition, certain creeks in the West Pasture would continue to be dredged to eliminate flood risks to adjacent private residences.

Vegetation Communities: Agricultural management practices have dramatically affected vegetation communities in the Project Area. Most of the Giacomini Ranch has been turned into pastureland that is dominated by non-native herbs and forbs or grasses (Wet and Dry Pasture) through exclusion of tidal influence, irrigation, and seeding of forage species (Parsons and Allen 2004b). Approximately 467 of the 613 acres in the Project Area are dominated or co-dominated by non-native plant species. Riparian habitat has been reduced considerably through grazing and direct removal during maintenance activities, with most of the Forested and Scrub Shrub Riparian habitat now restricted to the ranch perimeters.

Some other native vegetation communities – communities dominated or co-dominated by native species -- and/or pockets of native vegetation communities such as Diked Brackish Marsh, Freshwater Marsh, and Wet Meadow have encroached upon portions of the ranch that are less actively – or less successfully -- managed by grazing, irrigation, or other agricultural practices. A large extent of the northern portions of both the West and East Pastures have slowly reverted to communities dominated or co-dominated by salt marsh or brackish marsh plant species such as Diked Brackish Marsh and Salt Marsh Pasture. This reversion is due either to direct tidal influence through failing or malfunctioning tidegates or interactions between high groundwater tables and residual salts remaining in soils from tidal action prior to levee construction. The western and eastern perimeters of the Project Area often support considerable expanses of largely unmanaged Freshwater Marsh and Wet Meadow vegetation communities due to seasonal or permanent groundwater inflow from the Inverness Ridge. This groundwater emerges at the base of the ridge and sheetflows across the pastures in addition to elevating groundwater tables in the Project Area. The most notable of these features is the 7.2-acre freshwater marsh in the northern portion of the West Pasture adjacent to Sir Francis Drake Boulevard.

Discontinuation of management practices, combined with the potential for lower grazing intensity, would be expected to keep the Giacomini Ranch largely grassland, although, over time, the plant species composition would be expected to shift some in response to the lack of seeding, irrigation, and manure spreading. The absence of irrigation is expected to have the largest effect on the southern portion of the East Pasture, which would revert to a non-native grassland with more species characteristic of upland areas. Within the northern, lower-elevation portions of the East Pasture, the removal of irrigation would have little effect on hydrology, with the soils remaining inundated or saturated even without irrigation. However, in these areas, discontinuation of irrigation would still be expected to produce some of the shifts in vegetation communities and plant species that would be similar to that already observed in northern portions of the West Pasture, where residual salts in the soils have promoted establishment of halophytic or salt-tolerant communities (Salt



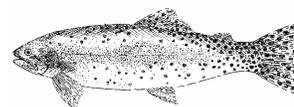
Marsh Pasture, Diked Brackish Marsh) and species. These salt-tolerant communities have been expanding under existing conditions in the West Pasture because of changes in muted tidal flow with recent replacement of a tidegate. The extent of salt marsh and/or brackish marsh habitats would be expected to continue to increase not only in the portion of the pasture directly adjacent to the north levee, but in the northern portion of the freshwater marsh. Over the long-term, discontinuation of management practices would be expected to result in deterioration of the levees such that conditions may come to resemble those described under Alternative C. However, the trajectory of these changes is difficult to predict in light of the strong interaction between levee deterioration and wet years or series of large storms.

Some of the potential changes in vegetation communities would be determined to a large extent by whether or not leased grazing occurs. Without grazing, the pastures, and particularly the East Pasture, would be expected to respond dramatically to the removal of grazing pressures through substantial increases in overall plant biomass and rapid expansion of weedy, ruderal species such as thistles (e.g., milk thistle or *Silybum marianum*) and non-native grasses (e.g., common velvet grass or *Holcus lanatus*) that appear well-adapted to exploiting nutrient-rich soils and reduced grazing pressure. This dynamic has been well-documented in vernal pool wetlands, where grazing is removed to protect endangered and threatened plant species only to result in a rapid increase in grassland height and biomass that either shades out or encroaches upon the rare plant species and threatens population viability. Within the Seashore, removal of grazing from one of the historic ranches near Drake's Beach – D Ranch – led to an explosion in cover and overall height of grasses and thistles, including common velvetgrass, poison hemlock (*Conium maculatum*), perennial ryegrass (*Lolium perenne*), and bull thistle (*Cirsium vulgare*; NPS unpub. data).

The potential for this phenomenon to occur – and the intensity if it does occur -- would be dictated by a number of factors, including presence and intensity of leased grazing, the nutrient content of soils, and the salt content of waters and soils. While lighter in intensity, leased grazing would be expected to maintain biomass and vegetation more characteristic of grazed lands depending upon grazing restrictions imposed by the Seashore for resource protection needs. Variability in nutrient loads would also affect vulnerability to invasion by weedy species. As discussed under Soil Resources in Chapters 3 and 4, nutrient concentrations within soils may differ between grazed and ungrazed areas, with some of the East Pasture areas having roughly double the nitrate and phosphate content of soils in the undiked marsh north of Giacomini Ranch (NPS, unpub. data). Nitrate concentrations are even higher in areas where manure was intensively spread, with levels 42 times higher than intensively grazed areas in other portions of the East Pasture (NPS, unpub. data). Some weedy or ruderal species are well-adapted to high nutrient conditions, expanding rapidly and either outcompeting or shading out other species, including native ones that may not be respond as rapidly to disturbance and changes in conditions because of low rates in seed production, clonal expansion, and recruitment. In terms of plant distribution, the effects of nutrient enrichment appear to be long-lived, with former agricultural lands believed to perhaps take decades for nutrients to decrease to levels characteristic of non-agricultural lands.

The pressures of lowering or eliminating grazing intensity and nutrient-enriched soils are countered to some degree in areas where there is either a direct source of salt from muted tidal inflow or from elevated groundwater tables interacting with residual salts in the soil. Some areas within the West Pasture had soil salinities as high as 60 ppt, which is almost double the salinity of seawater. Many non-native species cannot physiologically tolerate elevated soil salinities physiologically, which is one of the reasons why functioning, undisturbed salt marshes support largely native plant species and vegetation communities. Most of the invasion of non-native species takes place within higher elevation portions of salt marshes and upland ecotones, where salinities are lower and most of the development in terms of levees and roads occur. Even slight decreases in salinity can increase the number of non-native plant species, with a considerably larger number of non-native species occurring in brackish (salinities ~ 0.5 to 30) habitats, particularly diked brackish habitats or ones not regularly or exposed daily to tidal action.

Based on these factors, the most visible response to removal of grazing and agricultural management would probably occur in the East Pasture, where nutrient concentrations are higher due to higher historic levels of grazing intensity and manure spreading. Salinity patterns within the groundwater table would suggest that, within the East Pasture, the southern portions would probably be most affected, because of the reduced salinities in soils and groundwater. Grazing and management pressure is already considerably lower in the West Pasture, and, so, therefore, the response to closing of the dairy would not be expected to be as dramatic. At some point in the future, grasslands within the Project Area may undergo yet another change as nutrient pools within soils are reduced to levels more characteristic of non-agricultural lands. These communities are likely to be ones supporting a combination of both native and non-native species, as



currently already occurs in the very northern portion of the East Pasture that is no longer actively managed and supports non-native forage species such as bentgrass (*Agrostis stolonifera*), as well as impressive numbers of the native grass species meadow barley (*Hordeum brachyantherum*). However, with the exception of perhaps the establishment of wildrye (*Leymus triticoides*) in more saline areas, native-dominated grasslands would be unlikely to establish naturally in wet conditions due to the overwhelming number of non-native hydrophytic grass species that dominate most grassy wetland areas in California.

Despite problems with reduced grazing and nutrient-enriched soils, a minor decrease in non-native vegetation communities would still be expected over the long-term under Alternative A, although issues associated with conversion from agricultural to non-agricultural conditions would mean that improvements over the short-term (~10-15 years) would be more negligible. The considerable proportion of non-native vegetation communities already present in the Giacomini Ranch under baseline conditions means that most of the potential spread in weedy, ruderal species would occur in areas already dominated or co-dominated by non-natives. Simultaneously, the small wetland restoration component, combined with discontinuation of agricultural management and lower intensity of grazing should grazing occur, would allow a small expansion of native vegetation communities, resulting in an approximately 11 percent decrease in the extent of non-native vegetation communities relative to baseline conditions.

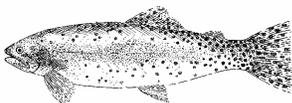
Wetland and Riparian Resources: The wetland restoration component would expand Tidal Salt Marsh habitat by approximately 11.4 acres, with at least 11 acres of mid-marsh and 0.4 acres of high marsh proposed. Lower elevation Tidal Salt Marsh or low marsh, may establish in the very northern end of the East Pasture Old Slough, which would be re-opened to tidal action, and could potentially be colonized by species of local concern such as Pacific cordgrass (*Spartina foliosa*). Riparian habitat would be expected to expand naturally with a reduction in grazing and levee and creek maintenance, particularly in areas where the Seashore established riparian setbacks if leased grazing was allowed. Within the West Pasture, riparian habitat would most likely increase along the upstream portions of Fish Hatchery Creek, as well as along the pasture's perimeter where groundwater flow from the Inverness Ridge creates optimal conditions for riparian growth. Other communities such as Wet Meadow and Freshwater Marsh would also potentially expand in the East Pasture, as well, with elimination of frequent ditching that act to drain many of the pastures and limit the extent of these communities. In northern portions of the Project Area, the slow, steady reversion to Diked Brackish Marsh communities would be expected to continue.

While the Giacomini Ranch is considered by most passers-by as primarily pastureland, most of the ranch is wetland subject to jurisdiction or oversight by the Corps, the CCC, and Park Service directives. Approximately 490 acres of Corps' jurisdictional wetlands and another approximately 47 of jurisdictional waters or unvegetated aquatic areas already exist within the 613-acre Project Area. Under the No Action Alternative, there would be approximately 0.46 acres of permanent impacts to wetlands from construction of the new levee separating the wetland restoration component from the rest of the East Pasture. However, removal of the East Pasture Lagunitas Creek levees would create 0.86 acres of wetlands, resulting in a minor net gain of 0.4 acres. As discussed earlier, further expansion of wetlands would be expected from more passive means of restoration related to discontinuation of ditching practices that have drained wetland areas on the perimeter of the Giacomini Ranch. If this alternative was selected, a Statement of Findings would need to be prepared in accordance with Park Service policy, because more than 0.25 acres of wetlands would be adversely impacted: a Statement of Findings for the preferred alternative can be found in Appendix D.

Elimination of levees and discontinuation of irrigation during the summer might have very negligible adverse impacts on the extent of wetlands, but, due to the already very wet conditions, irrigation appeared to primarily extend the length of time that good foraging conditions exist rather than increase the extent of wetlands. Levees also do not appear to have artificially increased the extent of wetlands relative to what would exist without levees through impoundment of waters. Negligible adverse effects on these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts. These are discussed in more detail under Chapter 2. Overall, construction would be expected to have adverse negligible effects from temporary stockpiling, while short-term and long-term effects would be considered minor beneficial, because there would be a net gain of at least 0.4 acres.

There would be no direct project impacts to riparian habitat, although, as alluded to earlier, riparian habitat may expand naturally under the No Action Alternative due to elimination of grazing under open space land uses or reduction in grazing intensity and riparian setbacks if leased grazing is permitted.

Long-Term Changes: The effect of sea level rise under the No Action Alternative is hard to predict. Recently published studies suggest that sea level may be rising at a much higher rate than originally, with water levels



possibly rising as much as 3 feet by 2100 (Overpeck et al. 2006). Levees should preclude waters from inundating the East and West Pasture, but if there are breaches during storms or should tidal currents begin to further erode levees, these areas could become subject to tidal inundation. The projected rate of sea level rise could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland communities. The effects of sea-level rise could be compounded over the long-term by continued deterioration of the levees, which would not be maintained under this alternative.

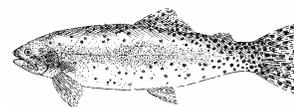
Changes in the extent of riparian habitat would also potentially occur in Olema Marsh under the No Action Alternative. A large stand of Forested Riparian habitat borders Olema Marsh, a large Freshwater Marsh impoundment dominated by tall emergent marsh species such as cattails (*Typha* sp.) and tules (*Scirpus* or *Schoenoplectus californicus* and *S. acutus*). Unlike the Giacomini Ranch, vegetation communities with Olema Marsh are exclusively native ones, which attest to the low "invasibility" potential of certain vegetation communities such as Freshwater Marsh (particularly areas dominated by medium- and tall emergent plant species) and established riparian communities. Conversely, the grassland that borders Olema Marsh to the east on the shutter ridge created by movement of the San Andreas Fault is dominated entirely by Non-Native Dry Grassland vegetation communities.

During recent years, water levels within Olema Marsh appear to be rising as a result of poor drainage from the marsh caused by a number of factors, including blockage of the western culvert by sedimentation, low capacity of the eastern culvert relative to the increased volume of flow now being directed to this culvert, and a small berm from a past fill event that acts as a funnel, limiting outflow, near the eastern culvert outlet (KHE 2006b). These drainage problems may have increased water surface levels as much as 6 feet since the early 1990s, and water surface levels are currently 4 feet above the eastern culvert invert (KHE 2006b). Increasing water levels appear to be expanding the extent of Freshwater Marsh at the expense of Forested and Scrub Shrub Riparian Habitat, with a ring of dead trees evident on the outer perimeter of the marsh adjacent to the riparian vegetation. Under the No Action Alternative, water surface levels would potentially continue to rise, thereby increasing threats to riparian vegetation on the marsh's edge. The implications of this for wildlife habitat and use are addressed under Fish and Wildlife Resources.

Special Status Plant Species: Most of the special status species that occur or have to potential to occur in the Project Area are wetland- or riparian-associated species. At least five special status species have been documented either in the Project Area or immediate vicinity, and all of these are Tidal Salt Marsh or Tidal Brackish Marsh associates, including Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*), Humboldt Bay owl's-clover (*Castilleja ambigua* ssp. *humboldtiensis*), salt marsh owl's-clover (*Castilleja ambigua* ssp. *ambigua*), Lyngbye's sedge (*Carex lyngbyei*), and Pacific cordgrass (*Spartina foliosa*). None of these species are listed as endangered, threatened or rare by either the USFWS or CDFG, but they have been designated as Species of State or Local Concern by the regional USFWS office or by CNPS. Three of these species are annual plant species from the same plant family (Scrophulariaceae) that occur between the mid- and high marsh intertidal marsh zones of undiked marshes. As with many annuals, these species respond positively to moderate or intermediate levels of disturbance from storm events or wrack deposition that create gaps in the vegetation canopy and often show wide fluctuations in numbers between years or groups of years such as a drought cycle in response to variable environmental conditions. Continued viability of these populations often relies on a long-lived seed bank, which has been shown for other species of bird's-beak to persist up to 100 years.

Two other species of concern, Lyngbye's sedge and Pacific cordgrass, are perennial grass or sedge species that occur in the lower elevations of Tidal Brackish Marsh and Tidal Salt Marsh, respectively. The Point Reyes region represents the southern extent of the known range for Lyngbye's sedge. Pacific cordgrass has become a plant of strong local concern, because of the accidental introduction and subsequent rapid invasion by and hybridization with its Atlantic and Gulf Coast counterpart, Atlantic cordgrass (*Spartina alterniflora*). Until 1993, the native cordgrass was not known to occur in Tomales Bay, however, since that sighting during the feasibility study for the proposed project, it has expanded rapidly throughout the Project Area and southern Tomales Bay.

These plants do not occur in the Project Area within diked marsh areas, although Humboldt Bay owl's-clover has established on the tidal marsh fringe or shelf on the outboard of both the West and East Pasture levees. Under the No Action Alternative, there would be only a minor expansion of undiked marsh habitat, with restoration of the 11-acre wetland as part of the Park Service's existing mitigation agreement with CalTrans.



Ostensibly, this restoration component would increase potential habitat for all of these species, with the exception of perhaps Lyngbye's sedge, because low, mid-, and high marsh habitat would be restored. However, not all salt marsh habitat has the equivalent potential to support these special status species. Most salt marsh species are restricted to specific intertidal zones or even to microtopographic habitats within these zones. Within the Project Area, Humboldt Bay owl's-clover appears to occur at a slightly lower microtopographic intertidal zone than Point Reye's bird's-beak that differs only by an inch or two. However, in terms of absolute elevation, Humboldt Bay's owl's-clover appeared to occur within a broad range of elevations from 4 to 6 feet NAVD88 in the Project Area, suggesting that other factors influence establishment and persistence of this species such as frequency of tidal inundation, gaps in vegetation canopy, etc. Therefore, it is difficult to predict whether the restored wetland would be colonized by these species, but the proximity to established populations does considerably increase the potential for establishment to occur. Indeed, removal of levees either as part of construction or because of deterioration due to lack of maintenance has the potential to have a minor adverse effect on existing occurrences, because plants occur on the tidal marsh fringe on the outboard (or outside) of that levee. For potential losses associated with construction, appropriate BMPs would be employed to minimize impact to special status species as discussed in Chapter 2.

Invasive Plants: Under the No Action Alternative, the Seashore would implement some of the established invasive plant management programs within the Project Area, targeting some of the highest priority species. Invasive plant species represent a select subset of largely, although not exclusively, non-native species that are believed to represent some of the worst threats to viability and persistence of native vegetation communities and functions played by these communities for wildlife. For the proposed project, the list of invasive species was determined by consulting the list of high, medium, and low priority invasive species for eradication that is published by the California Invasive Plant Species Council (CalIPPC), as well as the Exotic Plant Management Program already operating within the Seashore and north district of the GGNRA. Species proposed to be removed under the No Action Alternative include cape ivy (*Delairea odorata*) and pampas grass (*Cortaderia selloana*). The areal extent of these species within the Project Area is very low (~0.4 acres) and restricted to riparian habitat along Sir Francis Drake Boulevard and one small clump on the Tomasini Creek levee in the East Pasture. This alternative would completely eradicate occurrence of these species within the Project Area, but would have an overall minor effect on the total acreage of invasive plant species within the Project Area, reducing it by only 1.3 percent.

Possible Additional Mitigation Measures: No mitigation measures would be proposed under this alternative.

Effectiveness of Possible Additional Mitigation Measures: Not applicable

Cumulative Impacts: The No Action Alternative would either have either no cumulative impact or very negligible cumulative impact with other projects proposed in the local community, Seashore, coastal Marin, or San Francisco Bay region.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of the No Action Alternative on vegetation and wetland resources in the Project Area would generally range from minor adverse to minor beneficial (Table 64). The only active changes under this alternative would be an 11-acre wetland restoration component that is required under the Park Service's existing mitigation agreement with CalTrans, reduction in intensity or elimination of grazing, and the discontinuation of agricultural management practices that appear to have had negative effects on native vegetation communities, wetlands, riparian habitat, and special status species.

Under this alternative, the Giacomini Ranch would largely remain grassland, although it would change in nature due to the elimination of grazing or reduced grazing intensity and the elimination of intensive agricultural management practices. Depending upon a number of factors, including future grazing intensity, nutrient concentrations in soils, and influence of salts through surface waters or groundwater, this response would vary spatially. A large proportion of the pastures could respond to reduced grazing and management with a rapid increase in vegetation biomass and plant height, particularly of weedy, ruderal species such as common velvet grass and milk thistle that are well-adapted to nutrient-enriched soils and changes in environmental conditions. The extent and intensity of this response would be governed by nutrient and salt



concentrations of soils, with the most visible changes occurring in areas with high nutrients and low salts such as the southern end of the East Pasture.

Despite this, there would be a minor decrease in non-native vegetation communities expected under this alternative, at least over the long-term, probably because most of the areas that would have a higher potential to support weedy species are already dominated by non-natives. Negligible to minor increases in native-dominated wetland and riparian vegetation communities would occur in the Giacomini Ranch, because of the 11-acre wetland restoration component, the reduced grazing pressure on riparian habitat, and the expansion of Wet Meadow and Freshwater Marsh communities with the elimination of frequent ditching to drain pastures. Negligible adverse effects on these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts. Overall, construction would be expected to have adverse negligible effects from temporary stockpiling, while short-term and long-term effects would be considered minor beneficial, because there would be a net gain of at least 0.4 acres. In Olema Marsh, which would not be restored under the No Action Alternative, decreases in riparian habitat would continue to occur from what appears to be steadily increasing water levels over the last decade due to poor drainage through undersized culverts.

There would also be potentially minor beneficial effects on the salt marsh-associated special status plant species that already occur in the Project Area in close proximity to the restored wetland, as well as negligible beneficial effects on invasive plant species through eradication of some of the highest priority species within the Seashore (cape ivy and pampas grass). At some point in the future, grasslands within the Project Area may change yet again to communities dominated by both native and non-native species once nutrient pools within soils are reduced to levels more characteristic of non-agricultural lands. However, with the exception of perhaps more saline areas, native grasslands would be unlikely to establish naturally in these types of wet conditions due to the overwhelming number of non-native hydrophytic grass species that dominate most grassy wetland areas in California.

Alternative A

Analysis: The effects of Alternative A on vegetation and wetland resources in the Project Area would generally range from major adverse to major beneficial (Table 64). Major and substantial impacts that would be significant under CEQA would be mitigated to less than significant under CEQA and moderate under NEPA. Under Alternative A, only the East Pasture would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. There would be no restoration or construction of new public access facilities in the West Pasture or Olema Marsh, although there would be the potential in the future for an extension of the southern perimeter trail to Inverness Park. The levees along and tidegate/culvert in the West Pasture and Tomasini Creek would be retained. In the East Pasture, restoration would involve breaching of levees in the East Pasture along Lagunitas Creek, and excavation of new tidal channels. The southwestern corner of the creek bank would be regraded to a more stable profile and actively revegetated with riparian vegetation. Most of the actions under this alternative focus on removal or restoration of agricultural infrastructure such as filling of ditches, ripping of compacted roads, fence removal, and removal of pumps, pipelines, and concrete spillways.

Relative to the minor effects that discontinuation of agricultural management practices had on vegetation resources under the No Action Alternative, Alternative A would have moderate to major beneficial effects on native vegetation communities, wetlands, riparian habitat, and special status species in the Giacomini Ranch, largely because of the removal of agricultural infrastructure and reestablishment of hydrologic connectivity between the East Pasture and Lagunitas Creek and the southern portion of Tomales Bay. In Olema Marsh, where there is no agricultural use, conditions would be expected to remain fairly similar to the No Action Alternative, where negligible to minor losses or dieback of riparian habitat might occur due to increased water levels and expansion of the Freshwater Marsh.

Vegetation Communities: The largest single change under Alternative A comes from the substantial conversion of grasslands to brackish and salt marsh with reintroduction of tidal action through both breaching of levees and reconnection and expansion of the historic slough (East Pasture Old Slough) that had been ditched and straightened once the marsh was leveed. Approximately 100-150 acres of Tidal Salt Marsh would be expected to establish in the lowest elevation portions of the East Pasture at its northern end, with salt marsh distribution dictated to some degree by proximity to tidal channels or creeks such as Lagunitas Creek and the East Pasture Old Slough. Higher elevation areas, areas further from tidal channels or creeks, and



areas receiving more freshwater influence from flooding of Lagunitas Creek during the winter or from seasonal to perennial emergent groundwater sources on the Point Reyes Mesa would remain brackish in nature.

Brackish communities, particularly low-growing ones that occur in diked areas, often closely resemble Tidal Salt Marsh, as they support many of the same suite of halophytic or salt-tolerant species such as saltgrass (*Distichlis spicata*), pickleweed (*Salicornia* or *Sarcocornia virginica*), jaumea (*Jaumea carnosa*), and alkali heath (*Frankenia salina*), along with species that are characteristic of primarily brackish areas such as fat-hen (*Atriplex triangularis*). However, low-growing, infrequently flooded brackish communities are usually more susceptible to invasion by non-native species such as brass buttons (*Cotula coronopifolia*), annual beard-grass (*Polypogon* spp.), birdfoot trefoil (*Lotus corniculatus*), loosestrife (*Lythrum hyssopifolia*), and curly dock (*Rumex crispus*). Within diked areas, these species can be persistent, but they also often occur as transitional species when tidal influence is reintroduced, because of their propensity to establish and expand rapidly under disturbance conditions and their tolerance of moderate salinities.

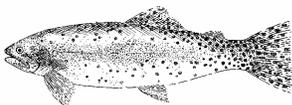
These non-native brackish species would be expected to move into much of the East Pasture that is influenced by tides for some period of time, as the salts in tidal waters slowly kill off the non-salt-tolerant – or at least less salt-tolerant – pasture grasses and convert grassland into marsh. This dynamic would minimize the conversion from non-native to native communities over the short-term, leading to only potentially a negligible beneficial effect during this timeframe. The rate at which more native salt marsh vegetation communities begin to establish within the East Pasture probably depends on a number of factors. Based on vegetation surveys in the West Pasture, conversion to salt marsh appears to take place more rapidly in areas adjacent to tidal channels. Repair of the tidegate on Fish Hatchery Creek in the West Pasture levee appears to have resulted in a minor increase in tidal inflow, which has some effect on the distribution of salt and/or brackish marsh habitats what was once ruderal marsh and grassland habitat in the portion of the West Pasture nearest the tidegate. Elongation of a remnant tidal marsh creek near the tidegate in response to increased tidal influence has strongly dictated the pattern of salt marsh and/or brackish marsh establishment, with these habitats appearing to almost radiate outward from the creek. More distant, less frequently tidally inundated areas, conversely, support an abundance of non-native brackish marsh species such as brass buttons and annual beard grass amidst some native salt marsh species.

Frequent tidal inundation likely increases the salt content of soils above that tolerated by some of the brackish species. The rate of establishment of native salt marsh vegetation communities will also depend on climatic cycles, with wet or high-precipitation years perhaps favoring persistence of brackish marsh non-natives. In 2006, which was characterized by a series of moderately sized to large floods, curly dock (*Rumex crispus*) suddenly appeared in the undiked salt marsh north of the Giacomini Ranch in much larger than normal numbers, probably in response to fresher or less saline surface water conditions.

Within 10-20 years, then, predominantly native vegetation communities would be expected to replace non-native vegetation communities characteristic of brackish conditions in those lowest elevation areas that are close to creeks and frequently inundated by tides. At higher elevations that are less frequently inundated by tides and more subject to freshwater influence from groundwater or run-off, communities that are more characteristic of disturbed conditions would be expected to persist for some time. These disturbance-adapted communities would be further promoted by the high nutrient concentrations present in the former dairy pastures due to high grazing intensities and practices such as manure spreading. Nutrient concentrations probably are highest in the southern portion of the East Pasture, where elevations are highest, tidal influence would be least, and disturbance from overbank flooding of Lagunitas Creek would be highest. A more complete description of this issue can be found under the No Action Alternative. Species within these brackish vegetation communities would probably consist of a diverse variety of species, including brass buttons, annual beard's grass, fat hen, curly dock, bent grass, ryegrass, and other moderately salt tolerant grasses and forbs.

Within the West Pasture, where no restoration would be performed, conditions would remain similar to those described for the No Action Alternative, with the exception that there would be no grazing. Vegetation communities in the southern portions of the West Pasture and the western perimeter would largely remain unchanged, however, in the northern portion, salt marsh and/or brackish communities would continue to expand into areas directly adjacent to the north levee and the northern portion of the freshwater marsh, as is already occurring under baseline conditions. Grazing removal would favor natural expansion of riparian habitat along Fish Hatchery Creek and the western perimeter where groundwater flow creates optimal conditions for riparian vegetation.

Hauling of excavated sediments to quarries in the Tomales or Pierce Point area would not be expected to have any long-term effect on native vegetation communities. Most of these quarries are serviced directly by roads.



One of the quarries would require crossing through a pasture dominated by pastoral herbs and forbs, as well as scattered patches of native grasses, herbs, and shrubs, including some wetland and rare plant areas (see more detailed description below). Short-term effects would be expected to be negligible adverse, because the Park Service would institute construction BMPs to ensure that rare plants and, to the extent possible, wetlands are not impacted (see Chapter 2).

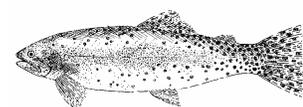
Wetland and Riparian Resources: Similar to the No Action Alternative, riparian habitat and, along certain portions of the ranch perimeter, freshwater wetland communities such as Wet Meadow and Freshwater Marsh would be expected to expand slightly in response to removal of grazing and the discontinuation of frequent ditching that was performed to drain pastures. These passive restoration components would combine with the more active restoration components of levee breaching, road removal, excavation of concentrated manure disposal, and removal of spoil piles to have a major beneficial effect on wetlands in the Project Area. Approximately 490 acres of Corps' jurisdictional wetlands and another approximately 47 of jurisdictional waters or unvegetated aquatic areas already exist within the 613-acre Project Area.

While Alternative A would involve at least 0.27 acres of wetland loss from construction of a culverted berm trail on the eastern perimeter of the East Pasture adjacent to Tomasini Creek and the Point Reyes Mesa bluff, the passive and active restoration components would result in an increase of approximately 9.2 acres for a net gain of 8.9 acres. Over the long-term, this gain would represent a major beneficial effect. Construction of the eastern perimeter trail would also require approximately another 0.2 acres of temporary impacts from removal of riparian vegetation, with these losses negatively affecting the ability of this habitat to function in water quality improvement and dissipation of flood flow energy of Tomasini Creek until vegetation can re-establish. Activities within wetlands would require permits from the Corps under Section 404 of the CWA, the CCC under the federal Coastal Act, and the RWQCB under Section 401 of the CWA (see Chapter 5 for more information). Because losses exceed 0.25 acres, if this alternative was selected, a Statement of Findings would need to be prepared in accordance with Park Service policy: a Statement of Findings for the preferred alternative can be found in Appendix D.

There may also be permanent fill of wetlands associated with the potential future extension of the southern perimeter trail to Inverness Park through possible widening of the Sir Francis Drake Boulevard road berm. The level of impact with berm widening would vary depending on final design, but impacts would be expected to minor to moderate unless the trail was placed instead on a boardwalk through the West Pasture. Within the East Pasture, there would be some major conversion of wetland types such that ditches would be filled to create emergent marsh, but at least 4.3 acres of new tidal channels with a planform or morphology more characteristic of natural marshes would be excavated to increase tidal influence into the interior of the pasture. Minor adverse effects on these communities may occur during construction from stockpiling of excavated sediments and from hauling of excavated sediments to quarries to one of the quarries in the Tomales or Pierce Point area would have the potential for some construction-related effects on wetlands. If the western route to the McClure DG is used, temporary impacts to wetlands could total up to 0.06-acre. Where possible, impacts would be avoided by staging construction areas in uplands or carefully routing truck traffic, however, if this is not possible, impacts would be reduced through construction-related BMPs. These are discussed in more detail under Chapter 2.

Construction of the eastern perimeter trail would not only affect wetlands, but riparian habitat that is subject to oversight by both the CCC under the Streamside Conservation Areas (SCA) established under the LCP for Zone II and the Point Reyes Mesa bluff protection policies outlined in the Point Reyes Station Community Plan (see discussion earlier in this section). Approximately 0.54 acres of the riparian habitat would be permanently impacted by construction of the culverted berm, with another 0.34 acres temporarily impacted through removal of riparian vegetation for trail construction. In addition, riparian habitat in the West Pasture could possibly be impacted by the potential future extension of the southern perimeter trail, as berm widening would not only affect wetlands, but would require removal of riparian habitat. For the latter, placement of the trail on a boardwalk in the West Pasture would eliminate these potential impacts.

While the construction of the eastern perimeter trail would impact less than 1 acre, it would potentially violate state and local policies regarding protection of riparian resources. Under the LCP, no development or vegetation removal is permitted within the SCA unless no alternatives are feasible. Alternatives for construction of an eastern perimeter trail are limited. One of the few other options would be to construct the trail on the berm separating Tomasini Creek from the East Pasture, but this berm is in bad condition from erosion and lack of maintenance, and construction and maintenance of a trail on the berm was considered to have more of a potential impact on natural hydrologic and ecological processes and functions than



constructing a trail on the railroad grade. The only other option would be to not construct the through-trail component at all, which is evaluated under Alternatives C and D.

In addition to LCP policies, construction of the eastern perimeter trail would potentially violate the Point Reyes Station Community Plan (Marin County Community Development Agency 2001) protection objectives regarding the Point Reyes Mesa bluff, including "preservation of the physical, ecological, and visual integrity of the bluff area located above the old railroad right-of-way through the development review process establishment of a 100-foot buffer zone extended eastward from the eastern edge of the railroad grade." Construction of the trail would potentially violate the ecological integrity of the bluff area. Therefore, while impacts would total less than 1 acre, potential violation of LCP and Point Reyes Station Community Plan policies would constitute a major or substantial impact and a significant impact under CEQA. These impacts would be mitigated to moderate levels under NEPA and less-than-significant levels under CEQA through active and passive restoration of riparian habitat in other Streamside Conservation Areas, including Lagunitas Creek and Fish Hatchery Creek. Because this area is on federal lands, CDFG jurisdiction would not apply.

Over the long-term, some of these impacts would be offset by increases by both passive and active restoration of riparian habitat. Under Alternative A, active riparian revegetation of the southwestern corner would be conducted on the East Pasture creek bank after being regraded to a more stable profile. Passive riparian restoration would be expected to occur along the upper portions of Fish Hatchery Creek, where a stand of young arroyo willows (*Salix lasiolepis*) and red alders (*Alnus rubra*) are already beginning to establish. As a result of passive and active restoration, riparian habitat would increase by as much as 3.2 acres for a net gain of 2.5.

Long-Term Changes: Over the next 100 years, a net increase in wetlands and a subtle shift in wetland types could occur if sea levels rise as dramatically as has been recently projected. Recently published studies suggest that sea levels may be rising at a much higher rate than originally predicted, with water levels now predicted to rise as much as 3 feet by 2100 (Overpeck et al. 2006). This rate of sea level rise could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88, converting to intertidal emergent wetlands to subtidal and intertidal unvegetated habitats, and a shift upwards in the extent of areas subject to tidal inundation, thereby increasing wetland habitat and decreasing upland or grassland habitat within the Project Area.

Special Status Species: As discussed under the No Action Alternative, most of the special status species that occur or have to potential to occur in the Project Area are wetland- or riparian-associated species, although there are a few non-wetland species in the vicinity of the quarry access route to the McClure DG quarry. At least five wetland species have been documented either in the Project Area or immediate vicinity, and all of these are Tidal Salt Marsh or Tidal Brackish Marsh associates, including Point Reyes bird's-beak, Humboldt Bay owl's-clover, salt marsh owl's-clover, Lyngbye's sedge, and Pacific cordgrass. These plants do not occur in the Project Area within diked marsh areas, although Humboldt Bay owl's-clover has established on the tidal marsh fringe or shelf on the outboard or outside of both the West and East Pasture levees. None of these species are listed as endangered, threatened or rare by either the USFWS or CDFG, but they are designated as Species of State Concern by CNPS and/or were formerly designated as Species of Regional Concern by the Sacramento USFWS office.

Because this alternative would be expected to have major beneficial effects on Tidal Salt Marsh and Tidal Brackish Marsh, it would also be expected to have major beneficial effects on the potential for special status plant species to expand in areal extent and numbers. This alternative would create more than 300 acres of salt and brackish marsh habitat. As was noted under the No Action Alternative, not all salt marsh habitat has the same potential to support these special status species. For this reason, it is difficult to predict whether the restored wetland would be colonized by these species, but the proximity to established populations does considerably increases the potential for establishment to occur. As with the No Action Alternative, breaching of the East Pasture levees would have the potential to have a minor adverse effect on existing species status plant species occurrences, because Humboldt Bay owl's-clover occurs on the tidal marsh fringe on the outboard of that levee. Appropriate BMPs would be employed to minimize impact to special status species as discussed in Chapter 2.

A number of special status species have been mapped in the area of the pasture that would be used as an access route to the McClure DG. The species that have been recorded on or directly adjacent to the established access routes or within what would be potential stockpiling and staging area for the quarry are: woolly-headed spineflower (*Chorizanthe cuspidata* var. *villosa*; CNPS List 1B.2), Blasdale's bent grass (*Agrostis blasdalei*, SR, former FSacSC, CNPS List 1B); Point Reyes blennosperma (*Blennosperma nanum* var.



robustum, CNPS List 1B.2), Michael's reign orchid (*Piperia michaelii*, former FSacSC, CNPS List 4.2), Mountain phlox (*Leptosiphon grandiflorus*, CNPS List 4.2), and Point Reyes ceanothus (*Ceanothus gloriosus* var. *gloriosus*, CNPS List 4.3). CNPS List 4 species are not considered endangered, but are of limited distribution.

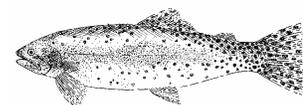
The eastern and west established approach routes to the quarry cross through wetlands and several large patches of woolly-headed spineflower and Blasdale's bent grass. In addition to the temporary wetland impacts discussed earlier, hauling could potentially impact 0.2 acre of Blasdale's bent grass and 0.09 acre of woolly-headed spineflower. Hauling would typically occur after the reproductive season for these species, which would minimize impacts to some degree. Based on timing of hauling and total amount of habitat impacted, hauling could have the potential for negligible to minor impacts on plants and a moderate short-term impact on habitat of these species, because topsoils would not be stockpiled and replaced. These impacts could be minimized by 1) creating a new approach at the mouth of the quarry for the western access route that would avoid the Blasdale's bent grass occurrence; 2) collecting seed from woolly-headed spineflower plants growing in the access route before hauling begins and storing seed for dispersal once hauling and other construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. In addition, other appropriate BMPs may be implemented such as discussed under Chapter 2.

Invasive Plants: Under Alternative A, the Seashore would expand invasive plant removal efforts to target approximately 5 acres of Himalayan blackberry in addition to cape ivy and pampas grass. Invasive plant species represent a select subset of largely, although not exclusively, non-native species that are believed to represent some of the worst threats to viability and persistence of native vegetation communities and functions played by these communities for wildlife. For the proposed project, the list of invasive species was determined by consulting the list of high, medium, and low priority invasive species for eradication that is published by the California Invasive Plant Species Council (CalIPPC), as well as the Exotic Plant Management Program already operating within the Seashore and north district of the GGNRA. Himalayan blackberry would be removed from the southern portion of the East Pasture levee or creek bank, as well as from the small hillslope below the dairy facility on the mesa. This alternative would completely eradicate cape ivy and pampas grass within the Project Area and would remove approximately 31 percent of the Himalayan blackberry within the Project Area. Overall, it would have a minor effect on the total acreage of invasive plant species within the Project Area, reducing it by 16 percent.

Proposed Mitigation Measures: Construction of the eastern perimeter trail would potentially cause a violation of state and local policies regarding protection of riparian resources and was, therefore, considered to have major or substantial effect under NEPA and a significant impact under CEQA. Because no alternatives exist that would avoid impacts to riparian habitat (other than eliminating construction of a through-trail – see Alternatives C and D), impacts to riparian habitat in a SCA would be mitigated to at least moderate levels under NEPA and a less-than-significant level under CEQA through active and passive restoration of riparian habitat in other SCAs, including Lagunitas Creek and Fish Hatchery Creek. These restoration efforts would result in establishment of at least 3.2 acres of riparian habitat in SCAs, resulting in a net gain of 2.5 acres. In addition, to ensure that invasive or weedy species from the Project Area do not become established within the quarry area, tires of trucks hauling excavated sediment to the McClure DG would be washed prior to exiting the Project Area to remove seeds and vegetative materials that could become established elsewhere.

Effectiveness of Proposed Mitigation Measures: Implementation of the proposed mitigation measures would reduce the intensity of impacts in sensitive construction zones to less-than-significant levels under CEQA and to moderate levels under NEPA. The success of riparian establishment in higher elevation floodplains would be enhanced through active planting and irrigation, while natural recruitment would be expected to occur quickly in lower elevation floodplains. While these mitigation measures would satisfactorily address LCP policies by causing a net gain in other SCAs, they would have only marginal success in mitigating conflicts with the Point Reyes Mesa Bluff protection policies, because natural recruitment along areas that are not already vegetated would not be expected to readily occur.

Cumulative Impacts: There are a number of projects that would have cumulative beneficial effects should Alternative A be implemented. The closest and most direct cumulative impact would come from the Bear Valley Creek Watershed Enhancement Project. The Bear Valley Creek proposes to replace failing or underperforming hydrologic infrastructure at a number of locations on Bear Valley Creek within the Seashore boundaries. There is no definitive timeframe for construction of this project, but it would be expected to benefit hydrologic and ecological processes on Bear Valley Creek and thereby have a cumulatively beneficial effect on Olema Marsh. Within the Tomales Bay watershed, the Tomales Bay Watershed Council with other



local groups and agencies on a proposed restoration project at Chicken Ranch Beach on the western border of Tomales Bay that would potentially increase estuarine and riverine wetlands through removal of fill that is currently dominated by non-native upland vegetation communities.

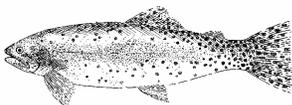
The Seashore and the GGNRA are undertaking a number of wetland and watershed restoration projects, most of which have occurred or would occur in coastal portions of the parks that adjoin the Pacific Ocean. Most of the Seashore projects are in the Drakes Estero-Limantour Estero watershed. Similar to the proposed project, these projects focus on restoring hydrologic connectivity through removal of infrastructure that constrains natural hydrologic and ecological processes and functions. Most of these projects would result in a conversion in wetland type rather than an increase in total wetland acreage, but almost all would increase the extent of estuarine wetlands such as Tidal Salt Marsh that were lost when dams and roads were constructed. Cumulatively, the proposed project, in combination with these other projects, would be expected to have a minor to perhaps even moderate beneficial effect on estuarine wetlands and wetland functioning within the coastal Marin region and a negligible beneficial effect on native vegetation communities.

On a larger San Francisco Bay regional scale, the proposed project would benefit regional distribution of rare species, including Point Reyes bird's-beak and Pacific cordgrass. The proposed project, in combination with other regional marsh restoration projects, would be expected to increase the distribution and numbers of rare species such as Point Reyes bird's-beak, which occurs in Tomales and San Francisco Bays. In addition, the proposed project will also have a cumulatively beneficial effect on efforts to eradicate non-native cordgrass and reestablish native cordgrass in San Francisco Bay. A large percentage of the Pacific cordgrass occurrences in San Francisco Bay have been extirpated by invasion of Atlantic cordgrass or the Atlantic-Pacific cordgrass hybrid. The incredible resurgence and spread of Pacific cordgrass within Tomales Bay provides a source population of native cordgrass for possible recolonization within San Francisco Bay once extensive efforts to eradicate its invasive congeners have been successful. Therefore, over the long-term, the proposed project would be expected to have negligible to minor cumulative beneficial effects with non-native removal projects and the large number of ongoing wetland restoration projects in San Francisco Bay for species such as Pacific cordgrass and Point Reyes bird's-beak.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative A on vegetation and wetland resources in the Project Area would generally range from major adverse to major beneficial. Major and substantial impacts that would be significant under CEQA would be mitigated to less than significant under CEQA and moderate under NEPA. The largest single change under this alternative relative to the No Action Alternative would come from the substantial conversion of grassland to salt and brackish marsh through breaching of the East Pasture levee, removal of agricultural infrastructure, and tidal reconnection and expansion of the historic tidal slough. Through these actions, more than two-thirds of the East Pasture would be expected to shift from grassland to marsh. These actions would result in a moderate decrease in non-native vegetation communities of approximately 30 percent over the long-term. However, a transitional period would be expected over the short-term during which, as pasturelands slowly convert through exposure to saline conditions to marsh, restored areas would be dominated by a mix of non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions such as brass buttons, annual beard-grass, loosestrife, birdfoot trefoil, curly dock, and others. These species could persist in higher elevation portions of the East Pasture that are only infrequently inundated, subject to freshwater influence from run-off or emergent groundwater, and high in residual soil nutrients because of dairy cattle grazing and manure spreading. Native-dominated salt marsh communities would eventually move into those lower elevations that are close to tidal creeks and are more frequently inundated by tides.

No restoration would occur in either the West Pasture or Olema Marsh, but some changes would still be expected. As discussed under the No Action Alternative, increased tidal influence in the West Pasture would increase the extent of salt marsh and/or brackish marsh communities in the northern portion of the West Pasture, including in the existing freshwater marsh. Grazing removal would favor natural expansion of riparian habitat along Fish Hatchery Creek and the western perimeter where groundwater flow creates optimal conditions for riparian vegetation. Riparian habitat, on the other hand, would continue to potentially decrease in Olema Marsh in response to what appears to be increasing water levels caused by poor drainage from undersized culverts and other factors. Open water and Freshwater Marsh communities would increase as a result.



Over the long-term, moderate to major beneficial effects on wetland and riparian vegetation communities would occur, because of discontinuation of agricultural management practices, elimination of grazing, and removal of agricultural infrastructure such as levee breaching, removal of tidegates, and tidal reconnection and expansion of historic sloughs. Minor adverse effects on these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts. These are discussed in more detail under Chapter 2. Overall, there would be moderate adverse effects during construction temporary impact to approximately 0.25 to 0.5 acres of wetlands from construction of the eastern perimeter trail and temporary stockpiling. However, over the short- and long-term, the permanent loss of 0.27 acres from construction of the eastern perimeter trail would be offset considerably, creating a net gain of 8.9 acres. This gain would represent a major beneficial effect.

Construction of the eastern perimeter trail would result in a 0.34-acre temporary impact and permanent losses of 0.54 acre of riparian habitat within a SCA. While impacts would total less than 1 acre, potential violation of LCP and Point Reyes Station Community Plan policies would constitute a major or substantial impact under NEPA and a significant impact under CEQA. These impacts would be mitigated to at least moderate levels under NEPA and less-than-significant levels under CEQA through establishment of 3.2 acres of riparian habitat in other Streamside Conservation Areas, including Lagunitas Creek and Fish Hatchery Creek, through passive and active restoration, thereby resulting in a net gain of 2.5 acres.

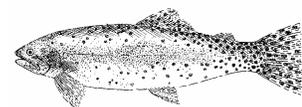
There would also be major beneficial effects on the salt marsh-associated special status plant species that already occur in the Project Area in close proximity to the restored wetland, although minor adverse effects may occur during construction due to impacts to occurrences adjacent to removed levees. Based on timing of hauling and total amount of habitat impacted, hauling could have the potential for negligible to minor impacts on plants and a moderate short-term impact on habitat of these species, because topsoils would not be stockpiled and replaced. These impacts could be minimized by 1) creating a new approach for the western access route to avoid Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. Minor beneficial effects would be expected on extent on invasive plant species through eradication of cape ivy, pampas grass, and Himalayan blackberry.

Alternative B

Analysis: The effects of Alternative B on vegetation and wetland resources in the Project Area would generally range from major adverse to major beneficial (Table 64). Major and substantial impacts that would be significant under CEQA would be mitigated to less than significant under CEQA and minor under NEPA. Under Alternative B, the East and West Pastures would be restored, but not Olema Marsh. Most of the new public access facilities would continue to be limited to the eastern and southern perimeters of the East Pasture, although a viewing area would replace the informal existing trail on the West Pasture north levee, which would be removed. Restoration would involve complete removal of levees in the East Pasture along Lagunitas Creek and excavation of even more new tidal channels. Breaches would be created in the West Pasture levee. The whole southern East Pasture creek bank would be restored through removal of rip-rap bank stabilization and regraded.

Relative to the moderate effects that discontinuation of agricultural management practices, removal of agricultural infrastructure, and minor restoration actions have on vegetation resources under Alternative A, Alternative B would have major beneficial effects on native vegetation communities, wetlands, riparian habitat, and special status species in the Giacomini Ranch, largely because of the complete removal of the East Pasture and breaching of the West Pasture Levee. In Olema Marsh, where there is no agricultural use, conditions would be expected to remain fairly similar to the No Action Alternative, where negligible to minor losses or dieback of riparian habitat might occur due to increased water levels and expansion of the Freshwater Marsh.

Vegetation Communities: Under Alternative B, the areal extent of salt marsh vegetation communities would expand dramatically in relation to the extent of grassland communities under baseline conditions and the No Action Alternative and brackish marsh and wet non-native grassland communities under Alternative A. Tidal Salt Marsh, including mid-, high, and high/upland ecotone communities, would be expected to cover more than 60 percent of the East Pasture, extending up to the maximum intertidal elevations with conversion from pasture to marsh promoted by an expanded tidal channel network. Within channels, intertidal and subtidal conditions would occur, with low marsh zones colonized either by Pacific cordgrass nearest the mouth and



alkali bulrush (*Scirpus* or *Schoenoplectus maritimus*) in the interior. Dry non-native grassland would establish at the highest elevations in the southern portion of the East Pasture, well above intertidal elevations but frequently disturbed by overbank flooding with flood frequency to increase to 2-year flood events. Brackish marsh communities consisting of sparsely vegetated mudflats would continue to persist in the northeastern portion of the East Pasture at the very lowest elevations, supported by continued muted tidal inflow from Tomasini Creek and ponding of surface freshwater run-off. The extent of Freshwater Marsh would increase in the East Pasture with excavation of a 5.4-acre feature, the Tomasini Triangle marsh, which is expected to be inundated through mid-summer with surface run-off and emergent groundwater from the adjacent Point Reyes Mesa. The duration of ponding would be enhanced by construction of a low berm at its western edge that would limit both outflow and inflow from extreme high events, maintaining fresh salinities.

The Tomasini Triangle marsh would help to offset the continuing conversion under baseline conditions of approximately half (4.5 acres) of the marsh in the West Pasture from freshwater to brackish conditions. The other half (3.9 acres) would remain freshwater marsh due to the slightly elevated topographic elevation relative to the northern portion, the distance from Fish Hatchery Creek, and proximity to large perennial sources of freshwater, the 1906 drainage and groundwater flow emerging from the base of the Inverness Ridge. Within the West Pasture, Tidal Salt Marsh would be concentrated in the northern and eastern portions in close proximity to tidal creeks such as Lagunitas and Fish Hatchery. A relatively limited amount of brackish marsh would develop around the perimeter of Tidal Salt Marsh near the upstream extent of tidal influence during the summer and fall. However, most of the western and southern portions of the West Pasture would remain similar to baseline conditions and conditions under the No Action Alternative, with Freshwater Marsh, Wet Meadow, Forested Riparian, Scrub-Shrub Riparian, and wet non-native grassland communities continuing to persist along the ranch's boundary with the Inverness Ridge due to the abundant groundwater supply. Riparian habitat would be expected to expand naturally with the removal of grazing and discontinuation of agricultural management practices, along with some limited revegetation efforts along the upper portion of Fish Hatchery Creek.

Over the long-term, these changes would result in a major beneficial effect on native vegetation communities, decreasing the extent of non-native vegetation communities by almost 70 percent relative to the 467 acres that exist under baseline conditions. As discussed under both the No Action Alternative and Alternative A, the response would not be as dramatic over the short-term in terms of reduction in non-native communities, with only a negligible beneficial effect expected. Non-native opportunistic species characteristic of brackish conditions such as brass buttons, annual beard grass, loosestrife, and curly dock would move into areas disturbed by levee removal and breaching for some period of time, as the salts in tidal waters slowly killed off the non-salt-tolerant – or at least less salt-tolerant – pasture grasses and convert grassland into marsh. The rate at which native salt marsh replaces these transitional communities probably depends on a number of factors, including proximity to tidal channels, frequency of tidal inundation, amount of freshwater inundation, climatic cycles such as a series of very wet or high-precipitation years, and soil nutrient and salt conditions. This dynamic would minimize the conversion from non-native to native communities over the short-term, leading to only potentially a negligible beneficial effect during this timeframe.

At higher elevations that are less frequently inundated by tides and perhaps more subject to freshwater influence from groundwater or run-off, communities more characteristic of disturbed conditions would be expected to persist for some time, if not indefinitely. These disturbance-adapted communities would be further promoted by the high nutrient concentrations present in the former dairy pastures due to high grazing intensities and practices such as manure spreading. Nutrient concentrations probably are highest in the southern portion of the East Pasture, where elevations are highest, tidal influence would be least, and disturbance from overbank flooding of Lagunitas Creek would be highest. A more complete description of this issue can be found under the No Action Alternative. These factors would lead the large grassland area within the East Pasture to remain dominated by largely non-native species, although, with time, some native species may begin to be present.

Hauling of excavated sediments to quarries in the Tomales or Pierce Point area would not be expected to have any long-term effect on native vegetation communities. Most of these quarries are serviced directly by roads. One of the quarries would require crossing through a pasture dominated by pastoral herbs and forbs, as well as scattered patches of native grasses, herbs, and shrubs, including some wetland and rare plant areas (see more detailed description below). Short-term effects would be expected to be negligible adverse, because construction BMPs would be implemented to ensure that impacts to rare plants and wetlands are minimized (see Chapter 2).



Wetland and Riparian Resources: Similar to Alternative A, riparian habitat and, along certain portions of the ranch perimeter, freshwater wetland communities such as Wet Meadow and Freshwater Marsh would be expected to expand slightly in response to removal of grazing and the discontinuation of frequent ditching that was performed to drain pastures for improved grazing. These passive restoration components would combine with the more active restoration components of levee breaching and removal, tidal channel creation, freshwater marsh creation, road removal, excavation of concentrated manure disposal, and removal of spoil piles to have a major beneficial effect on wetlands in the Project Area. Approximately 490 acres of Corps' jurisdictional wetlands and another approximately 47 of jurisdictional waters or unvegetated aquatic areas already exist within the 613-acre Project Area.

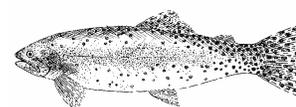
While Alternative B would still incorporate a trail on the eastern perimeter of the East Pasture, wetland losses in this area would be decreased by use of a boardwalk rather than a culverted berm trail. However, at least 1.74 acres of wetlands would be filled for creation of high tide refugia for a special status bird species in the West Pasture and a low refugia berm adjacent to the created Tomasini Triangle freshwater marsh in the East Pasture. At least 0.3 acre of drainage ditches in the East Pasture would also be filled. In addition, as noted above, hauling of excavated sediments to quarries to one of the quarries in the Tomales or Pierce Point area (McClure DG) would have the potential for approximately 0.06-acre of construction-related effects on wetlands. The construction-related effects on wetlands are expected to be no more than minor adverse, because of BMPs implemented by the Park Service to avoid or minimize impacts as discussed in Chapter 2. Activities within wetlands would require permits from the Corps under Section 404 of the CWA, the CCC under the federal Coastal Act, and the RWQCB under Section 401 of the CWA (see Chapter 5 for more information). Because losses exceed 0.25 acres, if this alternative was selected, a Statement of Findings would need to be prepared in accordance with Park Service policy: a Statement of Findings for the preferred alternative can be found in Appendix D.

These losses would be offset by creation of approximately 15.8 acres of wetland through levee removal; restoration of the ranch roads; and excavation of spoil piles, berms, manure disposal areas, and upland areas, resulting in a net gain of 13.8 acres of wetlands. Construction of the eastern perimeter trail would still require approximately 0.2 acres of temporary impacts to riparian habitat from vegetation, with these losses expected to affect functionality until vegetation can re-establish, and there would be additional temporary impacts from stockpiling, with total temporary effects estimated to range from 0.25 to 0.5 acres. Overall, then, construction or temporary impacts would be moderate adverse, while over the short- and long-term, the net gain of 14.1 acres of wetlands would constitute a major beneficial effect. There may also be permanent fill of wetlands and removal of riparian habitat associated with the potential future extension of the southern perimeter trail to Inverness Park through possible widening of the Sir Francis Drake Boulevard road berm. The level of impact with berm widening would vary depending on final design, but impacts would be expected to minor to moderate unless the trail was placed instead on a boardwalk through the West Pasture.

Within the East Pasture, there would be some major conversion of wetland types such that ditches would be filled to create emergent marsh, but at least 4.6 acres of new tidal channels with a planform or morphology more characteristic of natural marshes would be excavated to increase tidal influence into the interior of the pasture. Minor adverse effects on these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts.

Similar increases would occur for riparian habitat in the Giacomini Ranch through both passive and active restoration. Under Alternative B, active riparian revegetation would be conducted along the entire southern portion of the East Pasture Lagunitas Creek bank after being regraded to a more stable profile and removal of invasive Himalayan blackberry. Unlike Alternative A, active riparian restoration would also be conducted along the upper portions of Fish Hatchery Creek to speed up reestablishment of riparian vegetation, and passive restoration would be expected to increase riparian extent along the perimeter of both the East and West Pastures. As a result, riparian habitat would increase by as much as 11 acres for a net gain of almost 10 acres.

Approximately 0.54 acres of the riparian habitat would be permanently impacted by construction of the boardwalk, with another 0.34 acres temporarily impacted through removal of riparian vegetation for trail construction. As discussed under Alternative A, these losses could potentially violate state and local policies regarding protection of riparian resources, specifically the LCP's SCA policy and the Point Reyes Station Community Point Reyes Mesa Bluff protection objective. Under the LCP, no development or vegetation removal is permitted within the SCA unless no alternatives are feasible, while the Point Reyes Station Community Plan protects the "physical, ecological, and visual integrity of the bluff area." As discussed under



Alternative A, there are few feasible alternatives for minimizing these impacts that would not either cause additional impacts to other types of natural resources or eliminating a through-trail component on the eastern perimeter, as is included in Alternatives C and D. While impacts would total less than 1 acre, potential violation of LCP and Point Reyes Station Community Plan policies would constitute a major or substantial impact under NEPA and a significant impact under CEQA. These impacts would be mitigated to minor levels under NEPA and less-than-significant levels under CEQA through establishment of at least 4 acres of riparian habitat in other SCAs, including Lagunitas Creek, Fish Hatchery Creek, and upper Tomasini Creek, thereby resulting in a net gain of at least 3.2 acres of riparian habitat in SCAs.

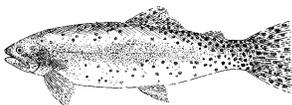
Long-Term Changes: Over the next 100 years, a net increase in wetlands and a subtle shift in wetland types may occur if sea levels are rising as dramatically as has been recently projected. Recently published studies suggest that sea level may be rising at a much higher rate than originally predicted, with water levels now predicted to increase as much as 3 feet by 2100 (Overpeck et al. 2006). This rate of sea level rise could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88, converting to intertidal emergent wetlands to subtidal and intertidal unvegetated habitats, and a shift upwards in the extent of areas subject to tidal inundation, thereby increasing wetland habitat and decreasing upland or grassland habitat within the Project Area.

Special Status Plant Species: Alternative B would have very similar effects to Alternative A on special status plant species, with the intensity of effects ranging from minor adverse during construction to major beneficial following implementation. As with Alternative A, this alternative would have major beneficial effects on Tidal Salt Marsh and Tidal Brackish Marsh. Therefore, it would also be expected to have major beneficial effects on the potential for the five Tidal Salt Marsh and Tidal Brackish Marsh special status plant species to expand in areal extent and numbers. This alternative would create more than 350 acres of salt and brackish marsh habitat. Under Alternative B, the West Pasture is breached, and the East Pasture, completely removed. These actions have the potential to result in a minor adverse effect on species such as Humboldt Bay owl's-clover and Lyngbye's sedge, both of which occur on the tidal marsh fringe on the outboard of Giacomini Ranch levees. As discussed in detail under Alternative A, there is a potential for negligible to moderate impacts associated with hauling of excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route to avoid Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. Appropriate BMPs would be employed in all portions of the Project Area to minimize impact to special status species as discussed in Chapter 2.

Invasive Plants: Under Alternative B, the Seashore would expand invasive plant removal efforts to target approximately 9 acres of Himalayan blackberry in addition to the cape ivy and pampas grass removal efforts proposed under Alternative A. Himalayan blackberry would be removed from the entire southern portion of the East Pasture levee or creek bank, as well as from the small hillslope below the dairy facility on the mesa. This alternative would completely eradicate cape ivy and pampas grass within the Project Area and would remove approximately 60 percent of the Himalayan blackberry within the Project Area. Overall, it would have a moderate effect on the total acreage of invasive plant species within the Project Area, reducing it by 30 percent.

Proposed Mitigation Measures: Construction of the eastern perimeter trail would potentially cause a violation of state and local policies regarding protection of riparian resources and was, therefore, considered to have major or substantial effect under NEPA and a significant impact under CEQA. Because no alternatives exist that would minimize impacts to riparian habitat (other than eliminating construction of a through-trail – see Alternatives C and D), impacts to riparian habitat in a SCA would be mitigated to minor levels under NEPA and less-than-significant levels under CEQA through active and passive restoration of riparian habitat in other SCAs, including Lagunitas Creek, Fish Hatchery Creek, and upper Tomasini Creek. These restoration efforts would result in establishment of at least 4 acres of riparian habitat in SCAs, resulting in a net gain of 3.2 acres. In addition, to ensure that invasive or weedy species from the Project Area do not become established within the quarry area, tires of hauling trucks to the McClure DG quarry would be washed prior to exiting the Project Area to remove seeds and vegetative materials that could become established elsewhere.

Effectiveness of Proposed Mitigation Measures: The effectiveness of the proposed mitigation measures would be similar to that described under Alternative A, however, because active restoration would also occur on Tomasini Creek, these measures would better mitigate conflicts with the Point Reyes Mesa Bluff protection policies, because natural recruitment in currently unvegetated areas would not be expected to



readily occur because of the high elevations and amount of disturbance. Washing tires would be moderately effective at reducing potential for establishment of invasive species.

Cumulative Impacts: As was discussed in detail under Alternative A, there are a number of projects that would have cumulative beneficial effects should Alternative B be implemented. These include the Bear Valley Creek Watershed and Fishery Enhancement Project; the Chicken Ranch Beach in Tomales Bay; and a number of wetland and watershed restoration projects in the park, Marin County, and San Francisco Bay. Most of these projects would result in a conversion in wetland type rather than an increase in total wetland acreage, but almost all would increase the extent of estuarine wetlands such as Tidal Salt Marsh that were lost when dams and roads were constructed. These projects would also increase distribution and long-term viability of certain rare species that occur in wetlands along the Marin Coast and in San Francisco Bay such as Pacific cordgrass and Point Reyes bird's-beak. Cumulatively, the proposed project, in combination with these other projects, would be expected to have major beneficial effects on estuarine wetlands and wetland functioning within Tomales Bay and the Point Reyes region and even a negligible to minor beneficial effect on native vegetation communities and rare plant species.

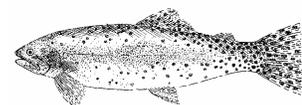
Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: Alternative B would result in major beneficial and adverse effects on vegetation and wetland resources in East and West Pastures of the Giacomini Ranch. Major and substantial impacts that would be significant under CEQA would be mitigated to less than significant under CEQA and minor under NEPA. Under this alternative, most of the grassland that exists under baseline and No Action Alternative conditions would be converted over the long-term to native salt marsh vegetation communities. Restoration would result in a decrease in non-native vegetation communities of approximately 70 percent over the long-term. However, over the short-term, changes in non-native vegetation communities would be expected to more negligible due to rapid establishment of non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions such as brass buttons, annual beard-grass, loosestrife, curly dock, birdfoot trefoil, and others during the transitional period as pasturelands slowly convert through exposure to tidal action and increased salts in water and soils. These species could persist in higher elevation portions of the pastures that are only infrequently inundated, subject to freshwater influence from run-off or emergent groundwater, and/or high in residual soil nutrients because of dairy cattle grazing and manure spreading. No restoration would occur in Olema Marsh, but the extent of riparian habitat may continue to shrink in response to what appears to be steadily increasing water levels caused by poor drainage.

Major beneficial effects on wetland and riparian vegetation communities would occur, because of discontinuation of agricultural management practices, elimination of grazing, and removal of agricultural infrastructure such as levee breaching and removal, removal of tidegates, tidal reconnection and expansion of historic sloughs, and freshwater marsh creation. Minor adverse effects on these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts. These are discussed in more detail under Chapter 2. Overall, there would be moderate construction-related temporary impacts of 0.25 to 0.5 acres of wetlands from construction of the eastern perimeter trail and temporary stockpiling. However, permanent loss of 1.74 acres of wetland from construction of high tide refugia berms would be offset by passive and active restoration, resulting in a net gain of 8.9 acres.

Construction of the eastern perimeter trail would result in a 0.34-acre temporary impact and permanent losses of 0.54 acre of riparian habitat within a SCA. While impacts would total less than 1 acre, potential violation of LCP and Point Reyes Station Community Plan policies would constitute a major or substantial impact under NEPA and a significant impact under CEQA. These impacts would be mitigated to minor levels under NEPA and less-than-significant levels under CEQA through establishment of at least acres of riparian habitat in other SCAs, including Lagunitas Creek, Fish Hatchery Creek, and upper Tomasini Creek, through passive and active restoration, thereby resulting in a net gain of at least 3.2 acres in SCAs and 10 acres throughout the Project Area.

There would also be major beneficial effects on the salt marsh-associated special status plant species that already occur in the Project Area in close proximity to the restored wetland, although minor adverse effects may occur during construction due to impacts to occurrences adjacent to removed levees. As discussed in detail under Alternative A, there is a potential for negligible to moderate impacts associated with hauling of



excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route that would avoid the Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. Moderate beneficial effects would be expected on extent on invasive plant species through expansion of eradication efforts on cape ivy, pampas grass, and Himalayan blackberry.

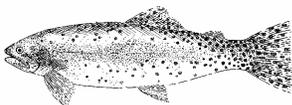
Alternative C

Analysis: The effects of Alternative C on vegetation and wetland resources in the Project Area would be similar to those of Alternative B, although there would be no potential for major adverse impacts. Effects would range in intensity from minor adverse to major beneficial (Table 64). As with Alternative B, Alternative C would have major beneficial effects on native vegetation communities, wetlands, riparian habitat, and special status species in the Giacomini Ranch, largely because of the complete removal of both the East Pasture and West Pasture levees in addition to discontinuation of intensive agricultural management practices, elimination of grazing, removal of agricultural infrastructure, and other restoration actions. In the East Pasture, the effects of this alternative would be enhanced relative to Alternative B through other restoration actions, as well, including expanded tidal channel creation, realignment of more than 60 percent of Tomasini Creek in the Project Area into one of its historic channel alignments, and scraping of weed-dominated surface soils from approximately 40 acres in the southern portion of the East Pasture. Native vegetation communities already dominate Olema Marsh, however, a minor to moderate adverse effect on these communities may occur over the short-term following construction during the process of lowering water surface levels and reestablishing new equilibrium conditions. Most of the new public access facilities would continue to be limited to the eastern and southern perimeters of the East Pasture, although access along the eastern perimeter would be scaled back relative to Alternative B through conversion of the through-trail component into two spur trails. There would also still be the potential for extension of the southern perimeter trail to Inverness Park through a separate project conducted jointly with the county

Vegetation Communities – Giacomini Ranch: Under Alternative C, the areal extent of salt marsh vegetation communities remains fairly similar to Alternative B, although it represents 24 times the amount of acreage present under baseline conditions. Similar to Alternative B, Tidal Salt Marsh, including mid-, high, and high/upland ecotone communities, would be expected to cover more than 60 percent of the East Pasture, extending up to the maximum intertidal elevations with conversion from pasture to marsh promoted by an expanded tidal channel network. Under this alternative, excavated channels convert from primarily being dominated by tidal influence to being dominated by both tidal and creek influences with realignment of Tomasini Creek into the East Pasture Old Slough, one of its historic channel alignments. Realignment may expand the influence of brackish conditions within and along the channel, creating a larger, localized zone of Tidal Brackish Marsh communities with distribution of low intertidal zone species such as alkali bulrush (*Scirpus* or *Schoenoplectus maritimus*) extending even further northward along the creek toward its mouth. Brackish marsh communities consisting of sparsely vegetated mudflats would continue to persist in the northeastern portion of the East Pasture at the very lowest elevations, supported by continued muted tidal inflow from Tomasini Creek and ponding of surface freshwater run-off.

As with Alternative B, the extent of Freshwater Marsh would increase in the East Pasture through excavation of a 5.4-acre feature, the Tomasini Triangle marsh, which is expected to be inundated through mid-summer with surface run-off and emergent groundwater from the adjacent Point Reyes Mesa. The duration of ponding would be enhanced by construction of a low berm at its western edge that would limit both freshwater outflow and tidal inflow during extreme high tide events, thereby maintaining fresh salinities. The largest single change in the East Pasture under Alternative C would occur in the grassland areas in the southern portion of the pasture. These areas, which are above intertidal elevations, would be scraped to eliminate the existing surficial weed (and nutrient) layer, and some limited revegetation would be performed to try and promote some establishment by native grasses and herbs. The difficulty in establishing native-dominated grassland without extensive maintenance would result in non-native species continuing to be present in revegetated areas, although total cover would drop relative to Alternatives A and B. Over the long-term, this grassland would remain a combination of non-native and native species, partly due to the regular disturbance expected from more frequent (2-year flood event versus 3.5-year) overbank flooding by Lagunitas Creek that sometimes favors establishment by non-native, disturbance-adapted species.

While under Alternative C, there would be changes in hydrologic processes related to higher volumes of floodwater flowing through during overbank flooding by Lagunitas Creek during storm events, the extent of

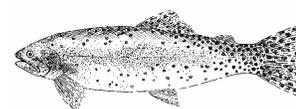


tidal inundation would remain similar to that under Alternative B, leading to few, if any changes, in expected distribution of vegetation communities relative to that alternative. As noted under Alternative B, the Tomasini Triangle marsh in the East Pasture would be created to help offset the continuing conversion under baseline conditions of approximately half (4.5 acres) of the freshwater marsh in the West Pasture from fresh to brackish conditions. The other half (3.9 acres) would remain fresh due to its slightly higher elevation; the distance from Fish Hatchery Creek; and proximity to large perennial sources of freshwater such as the 1906 drainage and groundwater flow from the Inverness Ridge. Within the West Pasture, Tidal Salt Marsh would be concentrated in the northern and eastern portions in close proximity to tidal creeks such as Lagunitas and Fish Hatchery Creeks. A relatively limited amount of brackish marsh would develop around the perimeter of Tidal Salt Marsh near the upstream extent of tidal influence during the summer and fall. However, most of the western and southern portions of the West Pasture would remain similar to baseline conditions and to conditions described for the No Action Alternative, with Freshwater Marsh, Wet Meadow, Forested Riparian, Scrub-Shrub Riparian, and wet non-native grassland communities continuing to persist along the ranch's boundary due to the abundant groundwater supply from the Inverness Ridge. Riparian habitat would expand naturally from with the removal of grazing and discontinuation of agricultural management practices, as well as from some limited revegetation efforts along the upper portion of Fish Hatchery Creek.

Vegetation Communities – Olema Marsh: Perhaps, the largest change relative to vegetation resources under Alternative C comes from restoration of Olema Marsh. Under the adaptive restoration approach, a small berm that acts as a funnel would be removed. This berm limits outflow from the marsh through its only available remaining, the eastern culvert, to Lagunitas Creek. Shallow excavation would also be performed along the flow path of Bear Valley Creek, which runs currently along the marsh's eastern perimeter, directly adjacent to the shutter ridge. Water surface levels within the marsh appear to have possibly increased as much as 6 feet since the early 1990s due to a number of factors, including elimination of drainage from the once-dominant western culvert under Levee Road due to a massive influx of sediment during the 1998 flood event (KHE 2006b). Currently, water surface levels within the marsh are consistently perched approximately 4 feet above the eastern culvert invert. These hydrologic conditions have promoted extensive establishment by Freshwater Marsh vegetation, making the Bear Valley Creek channel vegetation-choked and indistinct from the rest of the marsh. In addition, increasing water surface levels appear to be expanding Freshwater Marsh at the expense of the Forested and Scrub Shrub Riparian vegetation communities at the marsh's perimeter, with a ring of dead or dying trees evident along the marsh-riparian interface.

With implementation of the initial adaptive restoration actions, water surface levels would be expected to drop as much as 1- to 4 feet (KHE 2006b). Implementation at a later time of some of the other adaptive restoration actions could lower water surface levels another 2 feet (KHE 2006b). As waters drain down, the upper 1- to 2 feet of the marsh surface, which appear to be largely peat or undecomposed organic matter, would be dewatered and exposed to air. Through oxidation, the surface layer of these peat soils would begin to break down and decompose, causing a lowering of the marsh surface through subsidence or compaction. Subsidence rates are difficult to predict, but based on general elevations of the marsh soil surface from topographic surveys conducted, Olema Marsh could subside by as much 1-2 feet. This subsidence or compaction of soils or peat would be expected to be accompanied by an extensive die-back in tall emergent Freshwater Marsh vegetation such as cattails (*Typha* spp.), California bulrush (*Scirpus* or *Schoenoplectus californicus*), and other bulrush (*Scirpus* or *Schoenoplectus acutus*), with conditions largely becoming drier although some spatial variability would be expected in the degree of drawdown and vegetation die-back. During interim conditions, as the marsh begins to adjust to new water levels, there may be some invasion of non-native species in response to disturbance and a pulse in concentrations of soil and water nutrients from rapid decomposition of peat and organic-rich mineral soils and release of bound nutrients such as ammonium (Delaune and Smith 1985, Anisfeld and Benoit 1997, Portnoy 1999, Sommer and Horwitz 2001, Parsons and Martini-Lamb 2003).

The extent of die-back by native vegetation and invasion by non-native species would also be governed by the degree of lowering in soil pH because of the production of humic acids and other types of acids during oxidation of soils. Production of these acids even under natural conditions under summer or low tide-driven oxidation of soils often leads to a die-back of vegetation in salt marshes, creating gaps in the vegetation canopy (Cooper 1974; Mitsch and Gosselink 2000). The severity of this reduction in pH depends on the soil substrate and the degree of current or historic tidal influence. The pH in overlying waters often drops lower in saline or tidally influenced soils (pH ~2-4 with pH 7 considered normal or neutral) than in freshwater wetland or peat soils (pH ~5.0), because oxidation of pyrite and other iron-sulfur compounds in tidally influenced soils leads to extensive production of additional acidic compounds (e.g., sulfuric acid and ferrous



iron; Delaune and Smith 1985). In freshwater wetlands, acidity is primarily produced by breakdown of peat into humic acids.

The peat underlying Olema Marsh is expected to be relatively fresh or low salinity in nature, at least within surface layers, because tidal influences have been largely precluded or at least limited since construction of Levee Road in the late 1800s. However, estuarine-derived muds and peat probably underlie the peat at some unknown depth. Therefore, pHs generated by breakdown of organic matter would be expected to be closer to 5 than 2-4. The persistence of acidic conditions within overlying waters depends to a large degree on the influx rate of waters high in carbonates such as seawater, groundwater, or streams, with acids typically quickly buffered in wetlands with some consistent source of water. Low pHs typically persist for longer periods of time in systems with no to very low sources of inflowing water, because acid concentrations greatly exceed that of available carbonates. Permanent Bear Valley Creek inflow, combined with persistent subsurface groundwater inflow from the Inverness Ridge, would be expected to buffer acids within a short time of being produced, although there could be some spatial variability within the marsh where lower pHs would persist.

The reintroduction of tidal influence into Olema Marsh after many decades of absence may have other effects on vegetation. An influx of sulfates, which are naturally high in ocean waters, would occur during daily tidal flows, and these sulfates would typically be reduced in the low or no oxygen environment of wetland soils to its reduced form, sulfides. Abundant sulfides in the root zone can be extremely toxic to plants and is responsible for the poor performance of inland or high marsh plants (Hollis 1967; Mendelssohn et al. 1982) in Mitsch and Gosselink 2000; (DeLaune et al. 1987); Portnoy 1999). In most natural marshes, this toxicity is avoided through binding of sulfides with iron, which neutralizes its effect on plants. Tidally influenced marshes with low iron content and/or stagnant water conditions are likely to have higher sulfide concentrations within soils. Extensive die-back or poor plant colonization rates have been observed to occur in diked marshes undergoing tidal restoration that have been historically waterlogged with freshwater, because of the low levels of iron available to bind the new influx of sulfides produced from reduced sulfate (DeLaune et al. 1987; Portnoy 1999). While iron concentrations can be lower in San Francisco Bay region brackish and freshwater marshes (Goman 2005), analyses of metals within Project Area sediments showed extremely high concentrations of iron in all sediment samples high despite that some of the areas had been diked for decades and isolated from tidal influence (Parsons and Allen 2004a). Iron is naturally high in the Tomales Bay and other San Francisco Bay watershed and is detected regularly in creek and groundwater (NMWD, unpub. data). The permanent flow present in Bear Valley Creek, as well as subsurface groundwater inflow from the Inverness Ridge, would be expected to have maintained high iron concentrations in the peat despite the relative lack of tidal influence (Syrovetsnik and Neretnieks 2002). These iron stores would be expected to buffer Olema Marsh against any negative effects of seawater reintroduction.

Over time, subsidence and vegetation die-back would be expected to reach some kind of equilibrium with water surface levels, but while subsidence can occur relatively rapidly, the long-term effects of drainage on sediment, water quality, and vegetation can persist for some time, with effects noted in some marshes even 10 years after marshes had been drained (Portnoy 1999). The implications for soils and water quality are discussed under the Soil Resources and Water Resources –Water Quality sections. Within the short-term, assumed to be at least 10- to 15 years for vegetation, a large degree of variability in vegetation communities would be expected in degree of die-back, extent of invasion by non-native species, and rate of recolonization by marsh species some kind of equilibrium is reached. Some of this variability would be driven by localized microtopography; the extent of tidal influence within the marsh following drainage; and the volumes and distribution of freshwater flow from Bear Valley Creek and small drainages and emergent groundwater from the Inverness Ridge on the western side of the marsh.

In the long-term, brackish communities, probably dominated by tall emergent species, would be expected to establish in approximately 10- to 20 acres in the northwestern portion of the marsh influenced by tides (KHE 2006a). Freshwater Marsh would reestablish throughout most of the rest of the marsh, with the extent dependent on the degree of drawdown in water surface levels. A larger degree of drawdown in water surface levels would promote encroachment upon the existing Freshwater Marsh boundaries by riparian habitat, thereby countering current trends and perhaps ultimately increasing acreage of riparian habitat substantially relative to its current extent. In addition, some indirect changes in riparian and marsh habitat upstream of Bear Valley Road might occur as a result of the decrease in water impoundment in Olema Marsh. Lowering of water surface levels and improvement in hydrologic connectivity within Olema Marsh would be expected to reduce backwater flooding upstream on Bear Valley Creek upstream of Bear Valley Road and potentially decrease the areal extent of marsh and/or riparian habitat. However, based on the mapped extent of marsh conditions in prior USGS topographic maps, the width of the marsh in this portion of Bear Valley Creek



appears to have been relatively constant over time and has not measurably expanded latitudinally or longitudinally due to backwater flooding.

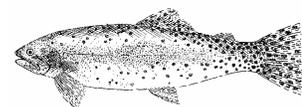
While short-term effects of restoration would have potentially moderate to major impacts on vegetation communities in Olema Marsh, over the long-term, this alternative would be expected to have minor to moderate beneficial effects on vegetation resources. While the composition of vegetation communities would perhaps not change dramatically, the sustainability of this system would be far greater than under non-restored conditions. The degree of restoration possible is ultimately constrained by the inability to effectively relink this once tidal marsh with the Giacomini Ranch because of the inordinate amount of fill present in Levee Road and White House Pool County Park, which now separates the marsh from Lagunitas Creek and the Giacomini Ranch. However, relative to current conditions, the trend in riparian habitat die-back would be stopped and even reversed, which would have important implications for wildlife that are discussed further under the Fish and Wildlife Resources section.

Another negligible change in vegetation communities adjacent to Olema Marsh would come from conversion of approximately 2 acres of upland grassland in the Olema Creek watershed to Open Water and Freshwater Marsh through excavation of several small depressional features as mitigation for impacts to California red-legged frog habitat.

Vegetation Communities – Quarry Access Routes: Hauling of excavated sediments to quarries in the Tomales or Pierce Point area would not be expected to have any long-term effect on native vegetation communities. Most of these quarries are serviced directly by roads. One of the quarries would require crossing through a pasture dominated by pastoral herbs and forbs, as well as scattered patches of native grasses, herbs, and shrubs, including some wetland and rare plant areas (see more detailed description below). Construction-related effects would be expected to be negligible adverse, because the Park Service would institute construction mitigation measures to ensure that rare plants and, to the extent possible, wetlands are not impacted.

Vegetation Communities - Project Area Summary: From an overall project perspective, changes under Alternative C would result in a major beneficial effect on native vegetation communities, decreasing the extent of non-native vegetation communities by almost 70- 90 percent relative to the 467 acres that exist under baseline conditions. The major change under Alternative C in terms of the extent of non-natives would come from complete removal of the West Pasture levee and restoration and revegetation efforts in the grasslands in the southern portion of the East Pasture. As discussed under all of the other alternatives, the response would not be as dramatic over the short-term in the Giacomini Ranch in terms of reduction in non-native communities. Non-native opportunistic species characteristic of brackish conditions such as brass buttons, annual beard grass, loosestrife, birdfoot trefoil, and curly dock would move into areas disturbed by levee removal and breaching for some period of time, as the salts in tidal waters slowly killed off the less salt-tolerant pasture grasses and convert grassland into marsh. The rate at which native salt marsh replaces these transitional communities probably depends on a number of factors, including proximity to tidal channels, frequency of tidal inundation, amount of freshwater inundation, climatic cycles such as a series of very wet years, and soil nutrient and salt conditions. This dynamic would minimize the conversion from non-native to native communities over the short-term, leading to only potentially a negligible beneficial effect during this timeframe. In combination with the moderate to major short-term adverse effects expected in Olema Marsh, the overall short-term effects for this alternative would be characterized as minor and adverse.

At higher elevations in the Giacomini Ranch that are less frequently inundated by tides and perhaps more subject to freshwater influence from groundwater or run-off, communities more characteristic of disturbed conditions would be expected to persist for some time, if not indefinitely. These disturbance-adapted communities would be further promoted by the high nutrient concentrations present in the former dairy pastures due to high grazing intensities and practices such as manure spreading. Nutrient concentrations probably are highest in the southern portion of the East Pasture, where elevations are highest, tidal influence would be least, and disturbance from overbank flooding of Lagunitas Creek would be highest. A more complete description of this issue can be found under the No Action Alternative. Under Alternative C, a considerable amount of this nutrient load is removed through scraping of surficial soils in approximately 40 acres, however, nutrient concentrations may be high in some of the lower soil strata, as well. Scraping is intended primarily to remove seeds and a large proportion of the existing non-native species present. As discussed earlier, these soil and flood disturbance factors would lead the large grassland area within the East Pasture to remain dominated by largely non-native species, although restoration efforts, including scraping



and limited revegetation, should increase cover of native species at least moderately relative to what would be expected with no restoration.

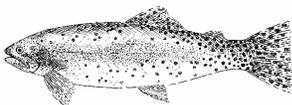
Wetland and Riparian Resources: Similar to Alternatives A and B, riparian habitat and, along certain portions of the ranch perimeter, freshwater wetland communities such as Wet Meadow and Freshwater Marsh would be expected to expand slightly in response to removal of grazing and the discontinuation of frequent ditching that was performed to drain pastures for improved grazing. These passive restoration components would combine with the more active restoration components of levee breaching and removal, tidal channel creation, freshwater marsh creation, road removal, excavation of concentrated manure disposal, and removal of spoil piles to have a major beneficial effect on wetlands in the Project Area. Approximately 490 acres of Corps' jurisdictional wetlands and another approximately 47 of jurisdictional waters or unvegetated aquatic areas already exist within the 613-acre Project Area.

Under Alternative C, the eastern perimeter trail would be converted into two spur trails, eliminating the wetland fill and riparian/bluff vegetation removal required to construct either a culverted berm or boardwalk through-trail. Alternative C would still result in approximately 1.74 acres of wetland loss from fill used to create a high tide refugia for special status species in the West Pasture and a low refugia berm adjacent to the created Tomasini Triangle freshwater marsh in the East Pasture. In addition, there could be some minor adverse construction-related effects to 0.06-acre of wetlands through hauling of excavated sediment on the established western approach route to the McClure DG quarry: these impacts would be avoided or minimized through implementation of BMPs discussed in Chapter 2. If this alternative was selected, a Statement of Findings would need to be prepared in accordance with Park Service policy, because more than 0.25 acres of wetlands would be adversely impacted: a Statement of Findings for the preferred alternative can be found in Appendix D. There would also be some potential permanent fill of wetlands and removal of riparian habitat associated with the potential future extension of the southern perimeter trail to Inverness Park through possible widening of the Sir Francis Drake Boulevard road berm. The level of impact with berm widening would vary depending on final design, but impacts would be expected to minor to moderate unless the trail was placed instead on a boardwalk through the West Pasture.

These losses would be offset, however, by creation of approximately 18.8 acres of wetland in the Giacomini Ranch through complete levee removal; restoration of the ranch roads; and excavation of spoil piles, berms, manure disposal areas, and upland areas, resulting in a net gain of 17.0 acres of wetlands. Restoration actions in Olema Marsh would not be expected to decrease the extent of wetlands, but rather to change the type of wetland (e.g., forested versus emergent). It may also temporarily decrease functionality of this wetland, but these effects are addressed under other sections of this chapter, including Soil Resources, Water Resources-Water Quality, and Fish and Wildlife Resources. Overall, then, moderate adverse impacts to wetlands would be expected during construction from temporary stockpiling. However, permanent loss of 1.74 acres of wetland from construction of high-tide refugia would be offset by passive and active restoration, resulting in a net gain of more than 17 acres.

Within the East Pasture and Olema Creek area, there would be some conversion of wetland types such that ditches would be filled to create emergent marsh, but at least 4.9 acres of new tidal channels with a planform or morphology more characteristic of natural marshes would be excavated to increase tidal influence into the interior of the pasture. In addition, construction of mitigation ponds near Olema Creek would potentially convert seasonally flooded, ruderal-dominated floodplains into open water- and freshwater marsh-dominated wetland communities. Moderate adverse effects on wetlands may occur during construction from stockpiling of excavated sediments, use of coffer dams to temporarily dewater construction areas, and excavation of a more defined flow path in Bear Valley Creek, but BMPs would be instituted to minimize construction impacts. Activities within wetlands would require permits from the Corps under Section 404 of the CWA, the CCC under the federal Coastal Act, and the RWQCB under Section 401 of the CWA.

Under Alternative C, there would be no direct adverse impacts to riparian habitat, unless the Levee Road culvert is replaced as part of the adaptive restoration approach for Olema Marsh or the southern perimeter trail is extended to Inverness Park by widening of the Sir Francis Drake Road berm as part of the potential future collaborative project with the County. Widening of the Bear Valley Creek outlet channel to improve hydraulic connectivity could result in loss of less than 0.05 acres of riparian habitat. Over the short-term, some indirect changes may occur in riparian habitats upstream of Bear Valley Road as a result of replacement of culverts that are undersized and cause backwater flooding upstream of the culvert. Improvement in hydrologic connectivity and a decrease in ponding upstream of the culverts would be expected to potentially reduce the width of the wetland and/or riparian habitat corridor for some distance upstream. Based on hydrology and the size of the wetland-riparian corridors in both areas, only a very negligible reduction in the



extent of wetland and riparian habitat would probably occur. Therefore, this alternative would not be expected to violate state and local policies regarding protection of riparian resources.

Similar to Alternative B, a net gain of riparian habitat would occur over the long term from both passive and active restoration efforts, with active restoration efforts resulting in a net increase of approximately 11.6 acres. Similar to Alternative B, active riparian revegetation would be conducted along the entire southern portion of the East Pasture Lagunitas Creek bank and along the upper portions of Fish Hatchery Creek to accelerate reestablishment of riparian vegetation. In addition, under Alternative C, riparian revegetation would occur on the north bank of Tomasini Creek between Mesa Road and the Giacomini Hunt Lodge, which would be the terminus for one of the spur trails proposed. As noted earlier, riparian habitat would also expand naturally in many portions of the Project Area, including the upland perimeters of the East and West Pastures and Olema Marsh, with the degree of expansion in the latter ultimately dependent on which adaptive restoration actions would be taken and the subsequent degree of drawdown in water surface levels.

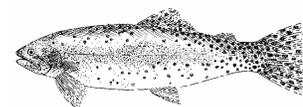
Long-Term Changes: Over the next 100 years, a net increase in wetlands and a subtle shift in wetland types could occur if sea levels rise as dramatically as has been recently projected. Recently published studies suggest that sea level may be rising as at much higher rates than originally predicted, with water levels potentially rising as much as 3 feet by 2100 (Overpeck et al. 2006). This rate of sea level rise could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88, converting to intertidal emergent wetlands to subtidal and intertidal unvegetated habitats, and a shift upwards in the extent of areas subject to tidal inundation, thereby increasing wetland habitat and decreasing upland or grassland habitat within the Project Area. Within Olema Marsh, a sea level rise of 3 feet would be expected to increase the extent of tidal influence within the marsh considerably, causing a large-scale conversion to brackish marsh.

Special Status Plant Species: As discussed under the other alternatives, most of the special status species that occur or have to potential to occur in the Project Area are wetland- or riparian-associated species, although there are a few non-wetland species in the vicinity of the quarry access route to the McClure DG quarry. At least five Tidal Salt Marsh or Tidal Brackish Marsh species have been documented either in the Project Area or immediate vicinity, including Point Reyes bird's-beak, Humboldt Bay owl's-clover, salt marsh owl's-clover, Lyngbye's sedge, and Pacific cordgrass. These plants do not occur in the Project Area within diked marsh areas, although Humboldt Bay owl's-clover has established on the tidal marsh fringe or shelf on the outboard of both the West and East Pasture levees. None of these species are listed as endangered, threatened or rare by either the USFWS or CDFG, but they are designated as Species of State Concern by CNPS and/or were formerly designated as Species of Regional Concern by the Sacramento USFWS office.

Because this alternative would be expected to have major beneficial effects on Tidal Salt Marsh and Tidal Brackish Marsh, it would also be expected to have major beneficial effects on the potential for special status plant species to expand in areal extent and numbers. Similar to Alternative B, this alternative would be expected to create more than 350 acres of salt and brackish marsh habitat. It is difficult to predict whether the restored wetland would be colonized by these species, but the proximity to established populations does considerably increases the potential for establishment to occur.

As discussed in detail under Alternative A, there is a potential for negligible to moderate impacts associated with hauling of excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route that would avoid the Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road.

Invasive Plants: Under Alternative C, the Seashore would expand invasive plant to remove approximately 10.5 acres of Himalayan blackberry in addition to the cape ivy, pampas grass, and Himalayan blackberry occurrences proposed for eradication under Alternative B. As was discussed under Alternative A, invasive plant species represent a select subset of largely, although not exclusively, non-native species that are believed to represent some of the worst threats to viability and persistence of native vegetation communities and functions played by these communities for wildlife. Under this alternative, Himalayan blackberry would be removed from the entire southern portion of the East Pasture levee or creek bank, as well as from the small hillslope below the dairy facility on the mesa. In addition, under this alternative, blackberry would be removed from the Tomasini Creek riparian zone between Mesa Road and the Giacomini Hunt Lodge. This alternative would completely eradicate cape ivy and pampas grass within the Project Area and would remove



approximately 70 percent of the Himalayan blackberry within the Project Area. Overall, it would have a moderate effect on the total acreage of invasive plant species within the Project Area, reducing it by approximately 35 percent.

Possible Additional Mitigation Measures: Possible additional mitigation measures to reduce short-term impacts to vegetation communities in Olema Marsh could include actions that would result in a more gradual change in water surface levels in Olema Marsh. Through a gradual reduction in water surface levels, changes to soil nutrient -- and potentially soil contaminant -- conditions would occur over a longer time period to ensure that impacts to vegetation and other resources are minimized to the extent possible. Possible mitigation measures include installation of a temporary culvert in the berm or excavation of a small lowered section or breach. With use of a breach measure, the marsh would drain over the summer, and high flows during the winter would blow out the remainder of the berm. Installation of a culvert may require construction of a temporary coffer dam to dewater conditions sufficiently to allow for proper placement.

Effectiveness of Possible Additional Mitigation Measures: By instituting a more gradual reduction in water surface levels, some of the adverse effects associated with pulses in nutrients and acids that would further impact vegetation communities in Olema Marsh might be lessened or tempered to some degree. This could reduce the amount of invasion by non-native species adapted to nutrient-rich conditions. However, ultimately, the degree of die-back would be similar with or without this mitigation measure, and this approach might prolong the length of time it takes the marsh to reach new equilibrium conditions, actually increasing impacts.

Cumulative Impacts: As was discussed in detail under Alternative A, there are a number of projects that would have cumulative beneficial effects should Alternative C be implemented. These include the Bear Valley Creek Watershed and Fishery Enhancement Project; the Chicken Ranch Beach project in Tomales Bay; and a number of wetland and watershed restoration projects along coastal Marin and in San Francisco Bay. Most of these projects would result in a conversion in wetland type rather than an increase in total wetland acreage, and some would increase the extent of estuarine wetlands such as Tidal Salt Marsh that were lost when dams and roads were constructed. These projects would also increase distribution and long-term viability of certain rare species that occur in wetlands along the Marin Coast and in San Francisco Bay such as Pacific cordgrass and Point Reyes bird's-beak. Cumulatively, the proposed project, in combination with these other projects, would be expected to have a major beneficial effect on estuarine and freshwater wetlands and wetland functionality within Tomales Bay and the Point Reyes region and even a negligible to minor beneficial effect on native vegetation communities and rare plant species.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative C on vegetation and wetland resources in the Project Area would be very similar to Alternative B, with the intensity of effects ranging from minor adverse to major beneficial. Under this alternative, the areal extent of salt marsh and other vegetation communities within the Giacomini Ranch would remain almost identical to that of Alternative B, but restoration would improve vegetation conditions in the grassland in the southern portion of the East Pasture by scraping off the surficial soil layer, thereby decreasing cover of non-native species and nutrient concentrations resulting from grazing and manure spreading. Native grasses and forbs would then be planted in an attempt to expand the amount of native vegetation in what would otherwise be largely a non-native dominated-grassland. Adaptive restoration efforts in Olema Marsh would be expected to halt the current downward trend in extent of riparian vegetation by dramatically lowering surface water levels within the impounded marsh. Over the long-term, these restoration efforts, including grassland restoration and revegetation and complete removal of the West Pasture levee, would result in a decrease in vegetation communities completely dominated by non-natives as much as 70-90 percent, with Olema Marsh already dominated by native vegetation communities.

Over the short-term, however, adverse effects on vegetation resources would be expected, because of moderate to major adverse changes in Olema Marsh as the marsh subsides anywhere from 1- to 4-feet initially in response to lowering of water surface levels. These adverse changes include establishment by non-native opportunistic species and a decrease in the extent of Freshwater Marsh relative to baseline conditions because of lowered water surface levels and subsequent encroachment by riparian vegetation. In the Giacomini Ranch, only a negligible beneficial effect on native vegetation communities would potentially occur over the short-term due to rapid establishment of non-native opportunistic, moderately salt-tolerant species



such as brass buttons, annual beard-grass, loosestrife, birdfoot trefoil, and curly dock as pasturelands slowly convert to marsh through exposure to tidal action and increased salts in water and soils. From an overall project perspective, taking into account changes in both the Olema Marsh and the Giacomini Ranch, effects over the short-term would be characterized as adverse and minor in intensity.

As with Alternative B, major beneficial effects on wetland and riparian vegetation communities would occur with discontinuation of agricultural management practices, elimination of grazing, complete removal of all levees, removal of agricultural infrastructure such as tidegates, tidal reconnection and expansion of historic sloughs, and freshwater marsh creation. The extent of wetlands would not be expected to change with implementation of adaptive restoration, although riparian habitat would probably increase. Minor adverse effects on the areal extent of these communities may occur during construction from stockpiling of excavated sediments, but BMPs would be instituted to minimize construction impacts. These are discussed in more detail under Chapter 2. Overall, moderate adverse impacts to wetlands would be expected during construction from temporary stockpiling. However, permanent loss of 1.74 acres of wetland from construction of high-tide refugia would be offset by 18.8 acres of passive and active restoration, resulting in a net gain of more than 17 acres. This would have a major beneficial effect on wetlands. There would be no temporary impacts to riparian habitat, and losses of less than 0.1 acres from public access-related clearing activities would be offset for a net gain of 11.6 acres. Therefore, this alternative would not violate any state or local policies protecting riparian resources.

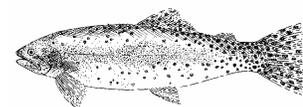
There would also be major beneficial effects on the salt marsh-associated special status plant species that already occur in the Project Area in close proximity to the restored wetland, although minor adverse effects may occur during construction due to impacts to occurrences adjacent to removed levees. As discussed in detail under Alternative A, there is a potential for negligible to moderate impacts associated with hauling of excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route that would avoid the Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. Moderate beneficial effects would be expected on extent on invasive plant species through expansion of eradication efforts on cape ivy, pampas grass, and Himalayan blackberry.

Alternative D

Analysis: The effects of Alternative D on vegetation and wetland resources in the Project Area would be largely identical to Alternative C, with the intensity of effects ranging from minor adverse to major beneficial (Table 64). As with Alternative C, Alternative D would have major beneficial effects on native vegetation communities, wetlands, riparian habitat, and special status species in the Giacomini Ranch, largely because of the complete removal of both the East Pasture and West Pasture levees in addition to discontinuation of intensive agricultural management practices, elimination of grazing, removal of agricultural infrastructure, and other restoration actions.

Vegetation Communities: The largest single change under Alternative D relative to Alternative C comes from excavation of the southwestern portion of the East Pasture to intertidal or to lower intertidal elevations. Approximately 32.5 acres of grassland and upland ecotone vegetation communities would be excavated and lowered to active floodplain and intertidal marshplain elevations. This restoration action would be expected to have a minor beneficial effect on native vegetation communities relative to Alternative C, although the overall effect would still be major. Another change under Alternative D is the realignment of the entire Tomasini Creek channel in the Project Area into one of its former historic alignments. This alignment would run through the created Tomasini Triangle freshwater marsh, which would be scaled back slightly from 5.4 acres under Alternative C to 5.2 acres. A small berm would be constructed on both sides of the realigned channel to discourage drainage of the marsh into the creek, and it would be actively revegetated with riparian plant species. In addition to the indirect effects on wetlands and riparian habitat upstream of Bear Valley Road, some indirect changes may occur in riparian habitats upstream of Mesa Road as a result of replacement of culverts that are undersized and cause backwater flooding upstream of the culvert. Improvement in hydrologic connectivity and a decrease in ponding upstream of the culverts would be expected to potentially reduce the width of the wetland and/or riparian habitat corridor for some distance upstream and potentially displace some obligate wetland plant species. Based on hydrology and the size of the wetland-riparian corridors in both areas, only a very minor reduction in width would probably occur.

As with Alternative C, changes under Alternative D would result in a major beneficial effect on native vegetation communities, decreasing the extent of non-native vegetation communities by almost 70- 90



percent relative to the 467 acres that exist under baseline conditions. As discussed under all of the other alternatives, the response would not be as dramatic over the short-term in the Giacomini Ranch in terms of reduction in non-native communities. In combination with the moderate to major short-term adverse effects expected in Olema Marsh, the overall short-term effects for this alternative would be characterized as minor and adverse. Under Alternative D, the extent of grassland is reduced from 40 acres to 26 acres through lowering of the southwestern portion of the East Pasture to intertidal elevations. As discussed under other alternatives, high nutrient concentrations and frequent flooding would lead the large grassland area within the East Pasture to remain dominated by largely non-native species, although restoration efforts, including scraping and limited revegetation, should increase cover of native species somewhat relative to what would be expected with no restoration.

Wetland and Riparian Resources: Alternative D would result in approximately 1.82 acres of wetland loss from fill used to create a high tide refugia for special status species in the West Pasture and the berms in the created Tomasini Triangle freshwater marsh in the East Pasture. If this alternative was selected, a Statement of Findings would need to be prepared in accordance with Park Service policy, because more than 0.25 acres of wetlands would be adversely impacted: a preliminary Statement of Findings for this alternative, which is the preferred alternative, can be found in Appendix D.

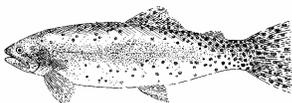
These losses would be offset, however, by creation of up to approximately 32.2 acres of wetland through excavation to intertidal elevations; complete levee removal; restoration of the ranch roads; excavation of spoil piles, berms, manure disposal areas, and upland areas, resulting in a net gain of up to 30.4 acres of wetlands. Overall, moderate adverse impacts to wetlands would be expected during construction from temporary stockpiling and hauling of excavated sediments to the McClure DG quarry (~0.06-acre of temporary impact). Overall, this alternative would have a major beneficial effect on wetlands.

As with Alternative C, restoration actions in Olema Marsh would not be expected to decrease the extent of wetlands, but rather to change the type of wetland (e.g., forested versus emergent) and temporarily decrease functionality. Approximately up to 2 acres of wetlands would be created within existing seasonally flooded, ruderal-dominated floodplain in the Olema Creek watershed adjacent to Olema Marsh as mitigation for impacts to California red-legged frog breeding habitat, resulting in conversion to open water and freshwater marsh-dominated wetland communities. Within the East Pasture, wetland conversion would also occur with ditches being filled to create emergent marsh, but at least 5.7 acres of new tidal channels would be excavated to increase tidal influence into the interior of the pasture.

Under Alternative D, there would be no adverse impacts to riparian habitat and no potential violation of state and local policies on protection of riparian habitat. Similar to Alternative C, a net gain of riparian habitat would occur from both passive and active restoration efforts, with active restoration efforts resulting in a net increase of approximately 11.8 acres relative to 11.6 acres under Alternative C. Under Alternative D, new riparian revegetation efforts would be limited to planting of the berm created in the Tomasini Triangle freshwater marsh.

Special Status Plant Species: As discussed under the other alternatives, at least five wetland species have been documented either in the Project Area or immediate vicinity, and all of these are Tidal Salt Marsh or Tidal Brackish Marsh associates, although there are a few non-wetland species in the vicinity of the quarry access route to the McClure DG quarry. Because this alternative would be expected to have major beneficial effects on Tidal Salt Marsh and Tidal Brackish Marsh, it would also be expected to have major beneficial effects on the potential for special status plant species to expand in areal extent and numbers. Similar to Alternative C, this alternative would be expected to create more than 350 acres of salt and brackish marsh habitat. As with the other alternatives, complete removal of the East and West Pasture levees would have the potential to have a minor adverse effect on existing species status plant species occurrences. Also, there is a potential for negligible to moderate impacts associated with hauling of excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route that would avoid the Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road.

Invasive Plants: Under Alternative D, the Seashore would expand invasive plant species removal efforts by increasing the amount of Himalayan blackberry removal up to approximately 11.4 acres and also by removing 0.34 acres of eucalyptus (*Eucalyptus globulus*) that is growing on the Tomasini Creek banks. This alternative would remove blackberry from the Tomasini Creek riparian zone between Mesa Road and the Giacomini Hunt Lodge, as well as the entire southern portion of the East Pasture levee or creek bank and the small hillslope



below the dairy facility on the mesa. This alternative would completely eradicate cape ivy and pampas grass within the Project Area and would remove approximately 75 percent of the Himalayan blackberry within the Project Area. Overall, it would have a moderate effect on the total acreage of invasive plant species within the Project Area, reducing it by approximately 39 percent.

Possible Additional Mitigation Measures: Possible additional mitigation measures would be the same as proposed under Alternative C.

Effectiveness of Possible Additional Mitigation Measures: The effectiveness of the possible additional mitigation measures would be the same as discussed under Alternative C.

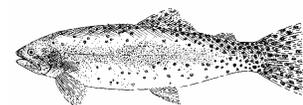
Cumulative Impacts: Cumulative impacts would be the same as described as under Alternative C.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative D on vegetation and wetland resources in the Project Area would be largely identical to Alternative C, with the intensity of effects ranging from minor adverse to major beneficial (Table 64). As with Alternative C, Alternative D would have major beneficial effects on native vegetation communities, wetlands, riparian habitat, and special status species in the Giacomini Ranch, largely because of the complete removal of both the East Pasture and West Pasture levees in addition to discontinuation of intensive agricultural management practices, elimination of grazing, removal of agricultural infrastructure, and other restoration actions.

Under this alternative, the areal extent of salt marsh and other vegetation communities within the Giacomini Ranch would remain very similar to that of Alternative C, with the exception that up to 32.5 acres would be excavated and lowered to increase active floodplain and intertidal marshplain areas. The extent of grasslands would be reduced from 40 acres under Alternative C to 26 acres under Alternative D through expansion of intertidal habitat. In addition, the size of the Tomasini Triangle freshwater marsh would be scaled back slightly from 5.4 under Alternative C to 5.2 acres, and a berm would be constructed along the channel to prevent drainage of waters within the marsh into the creek. Adaptive restoration efforts in Olema Marsh would be expected to reverse the downward trend in extent of riparian habitat by dramatically lowering surface water levels within the impounded marsh. Over the long-term, these restoration efforts would result in a decrease in vegetation communities completely dominated by non-natives as much as 70-90 percent, with Olema Marsh already dominated by native vegetation communities. Over the short-term, moderate to major adverse changes in vegetation and wetland communities would probably occur in Olema Marsh as it adjusts to almost 1- to 4 feet or more of lowering in water surface levels. From an overall project perspective, short-term effects would then be characterized as minor adverse.

Ultimately, major beneficial effects on wetland and riparian vegetation communities would occur, because of discontinuation of agricultural management practices, elimination of grazing, complete removal of all levees, removal of agricultural infrastructure such as tidegates, tidal reconnection and expansion of historic sloughs, and freshwater marsh creation. Overall, moderate adverse impacts to wetlands would be expected during construction from temporary stockpiling. However, permanent loss of 1.82 acres of wetland from construction of high-tide refugias would be offset by passive and active restoration, resulting in a net gain of more than 30 acres. This would have a major beneficial effect on wetlands. Under Alternative D, there would be no temporary impacts or permanent losses to riparian habitat, and, overall, there would be a gain of 11.8 acres. There would also be major beneficial effects on the salt marsh-associated special status plant species that already occur in the Project Area in close proximity to the restored wetland, although minor adverse effects may occur during construction due to impacts to occurrences adjacent to removed levees. As discussed in detail under Alternative A, there is a potential for negligible to moderate impacts associated with hauling of excavated sediments to the McClure DG quarry. These impacts could be minimized by 1) creating a new approach for the western access route that would avoid the Blasdale's bent grass; 2) collecting seed from spineflower plants in the access route before hauling begins and storing seed for dispersal once construction activities have been completed; and 3) clearly flagging the access route so that trucks do not wander off the established access road. Moderate beneficial effects would be expected on extent on invasive plant species through expansion of eradication efforts on cape ivy, pampas grass, and Himalayan blackberry.



Fish and Wildlife Resources

Laws, Regulations, Policies, and Criteria Guiding Impact Analysis

Many wildlife species within the United States have been adversely impacted by increasing urbanization, resource extraction, contamination from pesticides, metals, and other pollutants, and introduction of non-native wildlife species. A number of regulations and policies have attempted to protect wildlife from these negative impacts, with most of these focused either on preservation of key or critical habitat or protection and recovery of the species itself.

Some of the habitat protection is accomplished directly through establishment of Critical Habitat and Essential Fish Habitat or California's Lake and Streambed Alteration Agreement (Section 1600) and LCP Zone II's policies on Environmentally Sensitive Habitats. Marin's draft CWP (2005) proposes to establish policies for protection of essential habitat for special status species, wildlife nursery areas, movement corridors, and ecotones, because of their importance to wildlife. Policies in the Point Reyes Station Community Plan (Marin County Community Development Agency 2001) specifically identify "protection of Lagunitas Creek, specifically its water quality, coho salmon and steelhead populations, and other aquatic life." In addition to direct habitat conservation through these laws and policies, habitat protection comes indirectly from other legislation aimed at improving water quality through protection of wetlands and riparian habitat under Section 404 of the Clean Water Act, and LCP Zone II's policies regarding Streamside Conservation Areas and upland buffer areas around wetlands.

Federal and state agencies have moved to protect individual species under federal and state Endangered Species Acts (ESA). The federal ESA protects threatened and endangered species from unauthorized "take", and directs federal agencies to ensure that their actions do not jeopardize the continued existence of listed species. Even bird species that are not necessarily protected under federal or state ESA receive some protection under the Migratory Bird Treaty Act of 1918 (16 U.S.C. §703-712), which protects almost all migratory wild birds from "taking," which is defined as disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young). Park Service Management Policies (2006) require parks to preserve and restore the natural abundances, diversities, dynamics, and habitats of native animal populations and the communities and ecosystems in which they occur (NPS 2006; Section 4.4.1). The Park Service is also specifically urged to not only avoid impacts to threatened or endangered species, but to look for opportunities to restore and to strive to recover these species (NPS 2006; Section 4.4 and 4.4.2.3). A more detailed description of laws, regulations, and policies related to protection of species and wildlife habitats can be found under Fish and Wildlife Resources in Chapter 3.

Under DOI's NEPA significance criteria, actions that would be considered significant and require preparation of an EIS include potentially significant impacts on species listed or proposed for listing as threatened or endangered; Critical Habitat; or migratory birds; or actions that would contribute to the introduction, continued existence, spread, or range expansion of non-native species known to occur in the area. The County's CEQA significance criteria focus on the potential for reduction in the number or a substantial alteration of habitats of endangered and threatened fish, insect, and animal species and birds listed as special status by federal and state agencies. Specifically, under CEQA, mandatory findings of significance are required for actions that would cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate an animal community, or reduce the number or range of an endangered animal. Also, these criteria identify substantial changes in the diversity, number, or habitat of any species of animals currently present or likely to occur at any time throughout the year, as well as introduction of new animals into an area or alterations that would result in a barrier to migration, dispersal, or movement of animals.

General Assumptions and Methodologies:

- The purpose of the proposed project is to restore natural hydrologic and ecological processes and functions and processes, which includes habitat for and support of wildlife species within the Project Area and the larger watershed.
- Changes in wildlife habitat are evaluated using maps prepared that predict long-term vegetation community establishment based on changes in tidal hydrologic processes and the extent of tidal influence, as well as qualitative interpretation of the extent and strength of freshwater influences such as overbank flooding from creeks and surface flow from groundwater sources along the perimeter of the Project Area.



- For most of this document, the duration category, "Short-Term," refers to a short period post-project of two to three years that was created to represent dynamic, highly variable conditions expected to occur for a short period after construction that would not be representative of long-term conditions. However, for vegetation and wildlife habitat, which evolve over a longer time period, it is appropriate to lengthen this short-term post-project period to 10 years to reflect the longer timeframe over which vegetation changes would occur, particularly as most of the Project Area would not be bareground, but vegetated, and thereby require a longer transition period.

Described below are methodologies for impact indicators related to fish and wildlife resources, including specific assumptions or details on methodologies.

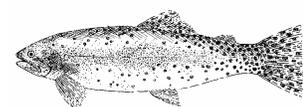
Changes in High Value Wildlife Habitat: Impact thresholds focus on change in high value wildlife habitat, specifically areal extent of habitats characterized as being of high value to wildlife species currently using the Project Area, as well as those expected to use the Project Area should the proposed project be implemented (Table 65). High value wildlife habitats are defined as those wetland and non-wetland habitats utilized by a high diversity and/or high number of wildlife species, including aquatic organisms such as benthic, planktonic, and macro-invertebrates and fish; amphibians; reptiles; mammals; and bird groups or guilds such as waterfowl, waterbirds, shorebirds, passerines, and raptors. High Value wildlife habitats include 1) Tidal Waters – Subtidal/Intertidal, 2) Non-Tidal Waters-Ponds; 3) Freshwater Marsh; 4) Tidal Salt Marsh (including High/Upland Ecotone), 5) Tidal Brackish Marsh; 6) Mesic Coastal Scrub; 7) Forested and Scrub Shrub Riparian; and 8) Seasonally Flooded-Ponded Pastures/Grasslands and Meadows. A list of high value habitats and some of the associated wildlife species can be found in Table 17 in Chapter 3. Evaluation of changes in cover or areal extent of wildlife habitat is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium or dynamic equilibrium conditions have been reached. For certain alternatives, a relatively short-term (≤ 10 years) post-construction period would be expected during which wildlife habitats would be in a transitional state prior to reaching to equilibrium conditions. Other types of high value wildlife habitat that have received regulatory designation such as Critical Habitat for steelhead and Essential Fish Habitat for coho salmon are discussed under the Changes in Special Status Wildlife Species section. Changes in overall extent of wetland and riparian habitats, which are very important for wildlife species, are addressed under Vegetation Resources.

TABLE 65. HIGH VALUE WILDLIFE HABITATS IN THE PROJECT AREA

Source: Endangered Species Act (federal, California), Migratory Bird Treaty Act, CDFG Lake and Streambed Alteration Agreement, Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Project Area Duration: Construction, Short-Term, Long-Term	
No Impact	There would be no potential for impact to wildlife habitats in the Project Area associated with the proposed project.
Negligible	There would be a negligible change (≤ 5 percent) in the areal extent of high value wildlife habitats in the Project Area.
Minor	There would be a minor change ($> 5 - \leq 10$ percent) in the areal extent of high value wildlife habitats in the Project Area.
Moderate	There would be a moderate change ($> 10 - \leq 25$ percent) in the areal extent of high value wildlife habitats in the Project Area.
Major or Substantial	There would be a substantial or major change (> 25 percent) in the areal extent of high value wildlife habitats in the Project Area.

Changes in Wildlife Use: Impact thresholds focus on potential changes in use of the Project Area by wildlife with implementation of the proposed project. Changes are analyzed by evaluating whether use by specific orders, guilds, or individual species or taxa would increase, decrease, or remain equivalent to use under existing or baseline conditions. The analysis targets not only species that currently use the Project Area, but those that occur in adjacent areas and might use the Project Area if the proposed project is implemented. Wildlife includes common, as well as special status species that are or are not already addressed by individual criteria. A list of orders, guilds, and individual species or taxa to be evaluated can be found in Table 18 in Chapter 3.

For each of the alternatives, the relative change in abundance of each order, guild, species, or taxa in Table



18 is evaluated relative to baseline conditions. Some weighting was incorporated such that entire guilds and orders or special status species received a higher score than common wildlife species. To some extent, this analysis also evaluated the relative ecological integrity of the wildlife community by giving non-native -- and particularly non-native, highly invasive species -- negative scores: highly invasive non-native species were scored lower or more negatively than those not considered to be highly invasive. This analysis also took into account whether the change would represent a new occurrence or simply an increase or decrease of an order, guild, species, or taxa that is already present under baseline conditions. For analysis purposes, the Project Area was split into Giacomini Ranch-East Pasture, Giacomini Ranch-West Pasture, Tomasini Creek, Lagunitas Creek, and Olema Marsh and then summed for each alternative. In general, this impact indicator focuses on the intensity of change without characterizing losses or gains of particular native orders, guilds, and taxa as beneficial or adverse. However, this indicator does assume the following: (1) the Project Area does not support the number of native wildlife species that it could under unmanaged conditions; (2) increases in the number or abundance of native wildlife species would be beneficial and enhance species diversity or richness; and (3) increases in the number of non-native species would not be beneficial, even if species diversity or richness was increased.

TABLE 66. GENERAL WILDLIFE USE OF THE PROJECT AREA

<p>Source: Endangered Species Act (federal and California), Migratory Bird Treaty Act, Marine Mammal Protection Act, CDFG Lake and Streambed Alteration Agreement (1600), Park Service Management Policies, CCC/LCP Zone II, Marin CWP</p> <p>Nature: Beneficial, Adverse</p> <p>Context: Project Area</p> <p>Duration: Construction, Short-Term, Long-Term</p>	
No Impact	There would be no potential for impact to wildlife use of the Project Area associated with the proposed project.
Negligible	There would be a negligible change (≤ 5 percent) in wildlife use of the Project Area.
Minor	There would be a minor change ($> 5 - \leq 10$ percent) in wildlife use of the Project Area.
Moderate	There would be a moderate change ($> 10 - \leq 25$ percent) in wildlife use of the Project Area.
Major or Substantial	There would be a substantial or major change (> 25 percent) in wildlife use of the Project Area.

Invasive Wildlife Species: Impact thresholds focus on change in non-native invasive wildlife species, specifically potential changes in the extent of area occupied or the number of occurrences. For purposes of this analysis, evaluation focuses on non-native invasive wildlife species identified by the Seashore, project planning team, or watershed groups as high priority species for management or eradication. The species of highest concern for the Project Area, watershed, or park are the green crab (*Carcinus maenas*; undiked marsh north of Giacomini Ranch), bullfrog (East Pasture, Tomasini Creek, Olema Marsh), and the red fox (*Vulpes vulpes*; Giacomini Ranch-East Pasture and dairy facility). Other non-native species of concern include the yellowfin goby (*Acanthogobius flavimanus*; in Lagunitas Creek), turkeys (*Meleagris gallopavo*; in the West Pasture), brackish water or Korean shrimp (*Palaemon macrodactylus*; in Lagunitas and Tomasini Creeks), mosquitofish (*Gambusia affinis*; in Giacomini Ranch East and West Pastures), and crayfish (Giacomini Ranch East and West Pastures).

Projects have the potential for affecting the extent of invasive wildlife species through 1) changes in habitat; 2) increasing disturbance, which can encourage expansion of species adapted to disturbance; 3) increasing hydraulic connectivity; and 4) changing physical conditions such that viability of existing occurrences and potential for establishment or expansion is affected, either positively or negatively. The analysis of the potential for an increase or decrease in invasive species takes into account, then, information on predicted changes in physical conditions and habitats obtained from hydraulic and hydrodynamic modeling (KHE 2006a) and future vegetation communities maps. Because the Project Area is already moderately to highly invaded, and because it is difficult even with the most well-designed wetland restoration project to avoid invasions by non-native aquatic species in the extremely highly invaded San Francisco Bay region, the impact thresholds for this threshold have been broadened to allow for the eventuality that restoration may not be able to be accomplished without invasion by at least some non-native aquatic organisms (Table 67).



TABLE 67. INVASIVE WILDLIFE SPECIES

Source: Park Service Management Policies, DOI Nature: Beneficial, Adverse Context: Project Area, Watershed, Regional (San Francisco Bay area) Duration: <i>Short-Term, Long-Term</i>	
No Impact	There would be no potential for change in the area occupied or the abundance of non-native invasive wildlife species associated with the proposed project.
Negligible	There would be a negligible change (≤ 10 percent) in the area occupied or abundance of non-native invasive species in the Watershed.
Minor	There would be a minor change (> 10 percent and ≤ 25 percent) in the area occupied or abundance of non-native invasive species in the Watershed.
Moderate	There would be a moderate change (> 25 percent and ≤ 50 percent) in the area occupied or abundance of non-native invasive species in the Watershed.
Major or Substantial	There would be a major and substantial change (> 50 percent) in the area occupied or abundance of non-native invasive species in the Watershed.

Potential for Wildlife in Watershed to be Affected by Proposed Project: While the proposed project has the potential to affect wildlife habitat and use within the Project Area, one of the most important functions of wetlands is the ability to support the larger wildlife community within a watershed or region. Wetlands provide a source of food through export of dissolved or particulate organic carbon, detritus, seeds, invertebrates, fish, and higher order animals that can to downstream water bodies for consumption by marine and estuarine wildlife species. In addition, wetlands provide alternate foraging and refugia habitat for marine and estuarine organisms that normally spend most of their time in the open waters of Tomales Bay or the Pacific Ocean. Many of these species represent occasional, incidental, or vagrant visitors to southern Tomales Bay that move higher into the estuary in search of food. Should contributions to the larger wildlife community be high enough, wetlands can actually influence the types or assemblages of species that frequent downstream habitats. The proposed project has the potential to affect both the opportunity and capacity of the Project Area to support the larger wildlife community within the watershed. Because of the difficulty in quantifying changes in wildlife conditions within the watershed from the proposed project, *impact thresholds qualitatively assess the potential for change under the various alternatives* (Table 68). Certain components related to opportunity (e.g., need for hydrologic connectivity to move food resources out and allow marine and estuarine organisms into wetlands) or capacity (e.g., potential for increase in prey items such as fish within wetlands) have already been addressed to some degree under Water Resources and Wildlife Resources – High Value Wildlife Habitats, respectively.

TABLE 68. POTENTIAL FOR WILDLIFE CONDITIONS IN WATERSHED TO BE AFFECTED BY PROPOSED PROJECT

Source: Park Service Management Policies, CCC/LCP Zone II, Marin CWP, Community Plan Nature: Beneficial, Adverse Context: Project Area Duration: Construction, Short-Term, Long-Term	
No Impact	There would be no potential for impact to wildlife and aquatic organisms in the Tomales Bay watershed associated with the proposed project.
Negligible	A barely detectable change in conditions for wildlife would be expected downstream of the Project Area based on changes in conditions in the Project Area, including changes in the rates of production and transport of food (i.e., carbon, prey items, etc) and availability of alternate foraging and refugia habitat for marine and estuarine organisms. Changes would be in the range of natural variability for conditions in natural wetlands in Tomales Bay and surrounding watersheds and would not result in any detectable effect on food resource conditions or species assemblages in southern Tomales Bay.
Minor	A measurable change in conditions for wildlife would be expected downstream of the Project Area based on changes in conditions in the Project Area, including changes in the rates of production and transport of food (i.e., carbon, prey items, etc) and availability of alternate foraging and refugia habitat for marine and estuarine organisms. Change might be expected to result in a barely detectable effect on food resource conditions in southern Tomales Bay, but no effect on species assemblages.
Moderate	An apparent and measurable change in conditions for aquatic organisms and wildlife would be expected downstream of the Project Area based on changes in conditions in the Project Area, including changes in the rates of production and transport of food (i.e., carbon, prey items, etc) and availability of alternate foraging and refugia habitat for marine and estuarine organisms. Change might be expected to result in a measurable effect

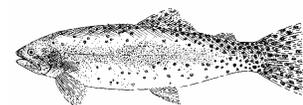


TABLE 68. POTENTIAL FOR WILDLIFE CONDITIONS IN WATERSHED TO BE AFFECTED BY PROPOSED PROJECT

	on food resources conditions in southern Tomales Bay and a barely detectable effect on species assemblages.
Major or Substantial	A substantial and major change in conditions for aquatic organisms and wildlife would be expected downstream of the Project Area based on changes in conditions in the Project Area, including changes in the rates of production and transport of food (i.e., carbon, prey items, etc) and availability of alternate foraging and refugia habitat for marine and estuarine organisms. Change might be expected to result in an appreciable effect on food resources conditions in southern Tomales Bay and a measurable effect on species assemblages.

Effect on Special Status Wildlife Species: Impact thresholds focus on effects of the proposed project on key special status wildlife species, specifically potential changes in areal extent of habitat relative to existing conditions. The proposed project could affect these species through both construction- and project-related actions. For purposes of this analysis, separate quantitative impact indicators were developed for each key special status species, but construction-related effects are evaluated for each species using the a single set of impact thresholds shown in Table 69. Construction-related effects take into account the extent to which standard Best Management Practices (BMPs) have been incorporated into the proposed project to minimize impacts of construction on wildlife. Most of these standard BMPs are discussed in Chapter 2; any other measures proposed to mitigate construction impacts are discussed in this section.

For project-related effects, the potential effect of the project on the extent and quality of habitat is considered. The analysis takes into account both impacts to existing habitat, as well as the potential for creation of new habitat. However, it errs on the conservative or cautious side by placing a higher value on maintenance of existing habitat than on creation of new habitat, which inherently poses more risk to viability of special status species population. Impact indicators deemphasize interpretation of impacts from changes in population size or number of individuals, because many species show wide interannual variability in numbers, use the Project Area for only a limited portion of their lifecycle, or are only sporadically present within the Project Area and vicinity (e.g., California clapper rail). Most of these impact indicators use another, broader context in addition to the Project Area one to help evaluate the intensity of impacts. This is because the proposed project's effect on distribution of regional subpopulations, extent of the species' range, or distribution or viability of the species as a whole may need to be considered to accurately assess its impact on a listed species. Analysis of changes in cover or areal extent of habitat for special status wildlife species is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium or dynamic equilibrium conditions have been reached. Assumptions used in evaluating the effects of the proposed project for key special status wildlife species are outlined below:

TABLE 69. SPECIAL STATUS WILDLIFE SPECIES – CONSTRUCTION-RELATED EFFECTS

<p>Source: Endangered Species Act (federal and California), Migratory Bird Treaty Act, CDFG Policy, Park Service Management Policies, CCC/LCP, Marin CWP Nature: Adverse Context: Project Area, Watershed (southern portion of Tomales Bay) Duration: Construction</p>	
No Impact	There would be no potential for impact to special status species associated with construction of the proposed project.
Negligible	Construction would have barely detectable effects on special status species. Construction would not impact breeding or non-breeding individuals or young. Construction activities would not directly impact habitats for the species. Indirect effects would be barely detectable.
Minor	Construction would have measurable effects on special status species. Construction would have no more than measurable effects on non-breeding individuals and no effects on breeding individuals or young. Construction activities would have a barely detectable direct effect on breeding habitats, although they might have a measurable effect on non-breeding habitats. Indirect effects may be measurable.
Moderate	Construction would have appreciable effects on special status species. Construction would have appreciable effects on non-breeding individuals and barely detectable effects on breeding individuals or young. Construction activities would have a measurable direct effect on breeding habitats and/or an appreciable effect on non-breeding habitats. Indirect effects may be appreciable.
Major or Substantial	Construction would have major or substantial effects on special status species. Construction would have major or substantial effects on non-breeding individuals and measurable to major or substantial effects on breeding individuals or young. Construction activities would have at least an appreciable direct effect on breeding habitats and/or a major or substantial effect on non-breeding habitats. Indirect effects may be major or substantial.

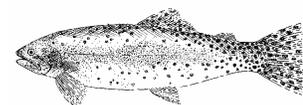


California red-legged frog (federally threatened)

- California red-legged frog (*Rana aurora draytonii*) is identified as a Critical Resource objective for the proposed project, although objectives emphasize preserving the total extent or amount of habitat rather than focusing on maintaining the existing habitat *in situ* or in place.
- The Project Area does not fall within Critical Habitat areas identified by the USFWS, however, the Seashore and adjoining West Marin lands are designated as the Point Reyes Peninsula Core Area. Core Areas represent areas where USFWS will concentrate their recovery actions, because the amount of protected area will allow for long-term viability of existing populations.
- Evaluation of potential impacts to California red-legged frog under the various alternatives focuses on two elements (Table 70). One of these elements assesses change in appropriate breeding habitat units in the Seashore-owned and managed portions of the Point Reyes Peninsula Core Area, with “appropriate” breeding habitat defined as meeting the following structural and non-structural criteria based on constituent elements identified as important in the USFWS Critical Habitat designation and information from Dr. Gary Fellers, Research Biologist, USGS:
 - *Breeding Habitat*: Seasonally flooded areas that are inundated through at July or August of most years, except during extreme drought, with a minimum deep water depth of 20 inches and within 660 to 3,300 feet of a permanent non-breeding water source (G. Fellers, USGS, *pers. comm.*); OR
 - Riparian and/or upland habitat surrounding or bordering seasonally flooded areas up to 300 feet from the water’s edge (USFWS);
 - *Water Salinity*: Breeding habitat should have waters with maximum salinities less than 4.5 ppt
 - *Predators*: While bullfrogs are predators of red-legged frog and are considered to be a deterrent to stable red-legged frog populations, the presence of bullfrog is not necessarily an indication that red-legged frog populations are in jeopardy (G. Fellers, USGS, *pers. comm.*). Seasonally flooded areas that draw down completely in the fall do tend to preclude bullfrogs, because bullfrog tadpoles require year-round inundation (S. Granholm, wildlife biologist, LSA Associates, *pers. comm.*).
 - *Documented Habitat in Recovery Unit*: Based on surveys conducted by the USGS, there are approximately 76 documented breeding habitat units in the Pastoral Zone of the Seashore (NPS 2004). The Pastoral Zone represents approximately one-third of the Seashore land area. A unit is defined as a discrete pond or other type of wetland or water feature in which frogs are known to breed or have been consistently observed and are believed to breed.
- The second element used for evaluation of changes to California red-legged frog under the various alternatives involves expected changes in distribution of the species within the Project Area and/or in the Seashore-owned or managed portions of the Point Reyes Peninsula Core Area.
- Under some alternatives, there is a potential for short-term impacts relating to the length of time that would be required for vegetation communities to undergo the transition from pasturelands to more unmanaged habitats, including establishment and development of any new freshwater marsh areas.

TABLE 70. SPECIAL STATUS WILDLIFE SPECIES - CALIFORNIA RED-LEGGED FROG

<p>Source: Endangered Species Act (federal and California), Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Project Area, Regional (Point Reyes Recovery Unit), Supra-Regional (Species Range) Duration: Short-Term(Temporary), Long-Term (Permanent)</p>	
No Impact	There would be no potential for impact to California red-legged frog associated with implementation of the proposed project.
Negligible	There would be a barely detectable effect (≤ 1 percent) expected on appropriate breeding habitat units in the Point Reyes Peninsula Core Area. Would be expected to have a barely detectable effect on Project Area distribution of species and no effect on distribution in the Point Reyes Peninsula Core Area.
Minor	There would be a measurable effect (> 1 percent and ≤ 2 percent) expected on appropriate breeding habitat units in the Point Reyes Peninsula Core Area. Would be expected to have a measurable effect on Project Area distribution of species, but no effect to a barely detectable effect on distribution in the Point Reyes Peninsula Core Area.
Moderate	There would be an appreciable effect (> 2 percent and ≤ 5 percent) expected on appropriate breeding habitat units in the Point Reyes Peninsula Core Area. Would be expected to have an appreciable effect on Project Area distribution of species and either a barely detectable or measurable effect on distribution in the Point Reyes Peninsula Core Area.
Major or Substantial	Would have a major or substantial effect on breeding habitat (> 5 percent) expected on appropriate breeding habitat units in the Point Reyes Peninsula Core Area. Would be expected to have a striking effect on Project Area distribution of species and a measurable or appreciable effect on distribution in the Point Reyes Peninsula Core Area.



Tidewater goby (federally endangered)

- Tidewater goby (*Eucylogobius newberryi*) is identified as a Critical Resource objective for the proposed project, although objectives emphasize preserving the total extent or amount of habitat rather than focusing on maintaining the existing habitat *in situ* or in place.
- The proposed project has the potential to affect tidewater goby through restoration of tidal and freshwater hydrologic processes.
- Restoration of freshwater hydrologic processes would also have the potential to affect gobies should actions increase flood scour or sedimentation that eliminates the preferred sandy substrates or eliminate sheltered, backwater habitat areas.
- The population in the Project Area represents a genetically distinct unit from the other nearest populations at Salmon Creek Marsh and Rodeo Lagoon, which are located outside the Tomales Bay watershed. Therefore, impacts to the Project Area population would have impacts on regional distribution.
- Analysis of potential impacts to tidewater goby habitat under the various alternatives focuses on changes in acreage of habitat, with “appropriate” habitat defined as meeting the following criteria based on information published in the Recovery Plan and discussed in other documents (Swift 2003):
 - Critical habitat is being proposed to be expanded to include northern California, as well as southern California, and would include portions of the Project Area, specifically Tomasini Creek, the West Pasture, and the undiked portions of Lagunitas Creek and the marshlands north of the Giacomini Ranch.
 - Brackish water portions of creeks or open water impoundments (e.g., lagoons) that maintain salinities in or below the 20 ppt range during the summer and fall;
 - Reduced flood scour OR backwater or sheltered areas along creeks subject to high flood scour that offer refugia during flood events;
 - Maintenance of some areas with permanent subtidal conditions in creeks or open water impoundments;
 - Presence of sandy substrate in some portion of creek or open water impoundment for burrows.
 - *Presence of predators:* Some of the documented freshwater and brackish water predators on goby include largemouth bass, green sunfish (*Lepomis cyanellus*), striped bass (*Morone saxatilis*), yellowfin goby, and shimofuri goby (*Tridentiger bifasciatus*; Swift 2003). Crayfish may disrupt nesting sites while digging for the eggs in the sand (Swift 2003). The native rainbow trout or steelhead, starry flounder, Pacific staghorn sculpin, and prickly sculpin have also been documented to feed on tidewater gobies in the lower Santa Ynez River and elsewhere (Swift 2003).
- Under some alternatives, there is a potential for short-term impacts relating to the length of time that would be required for the appropriate habitat to develop, including establishment and development of any new brackish water channels.

TABLE 71. SPECIAL STATUS WILDLIFE SPECIES – TIDEWATER GOBY

<p>Source: Endangered Species Act (federal and California), Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Project Area, Supra-Regional (central/northern California portion of population range) Duration: Short-Term(Temporary), Long-Term (Permanent)</p>	
No Impact	There would be no potential for impact to tidewater goby associated with implementation of the proposed project.
Negligible	There would be a barely detectable effect (≤ 1 percent) on the areal extent of appropriate habitat relative to the extent of areas currently supporting this species. Would have no detectable effect on Project Area distribution of species.
Minor	There would be a measurable effect (> 1 percent and ≤ 10 percent) on the areal extent of appropriate habitat relative to the extent of areas currently supporting this species. Would have a barely detectable effect on Project Area distribution of species.
Moderate	There would be an appreciable effect (> 10 percent and ≤ 25 percent) on the areal extent of appropriate habitat relative to the extent of areas currently supporting this species. Would have a measurable effect on Project Area distribution of species.
Major or Substantial	There would be a major or substantial effect (> 25 percent) on the areal extent of appropriate habitat relative to the extent of areas currently supporting this species. Would have an appreciable effect on Project Area distribution of species.



Central California coast steelhead Designated Population Segment (DPS), (federally threatened), coastal California Evolutionarily Significant Unit (ESU) Chinook salmon (federally threatened), and central California coast coho ESU salmon (State/federally endangered)

- Three federally protected salmonids occur within the Lagunitas Creek watershed: coast steelhead (*Oncorhynchus mykiss*), Chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisutch*). Salmonids are identified as a Critical Resource objective for the proposed project
- The Lagunitas Creek watershed, including Olema Creek, has been documented to support 10 percent of the CCCESU coho population (Brown et al. 1994). It represents one of the southernmost, stable populations of coho salmon within the CCCESU.
- The Project Area does not represent a potential breeding or spawning area for steelhead, coho or Chinook salmon. These types of salmonids typically breed in the upper portions of the watershed in medium- to high-gradient tributaries.
- The proposed Project Area represents important feeding habitat for salmonids as they migrate to the ocean. Smolts may spend days to weeks in estuarine habitat feeding in nutrient-rich areas and growing prior to heading to the open ocean. While this is a relatively short period of time, this transitional life stage may have direct implications on the ocean survival of smolts, as there is direct correlation between increased smolt weight lead to higher adult survivorship (Naiman et al. 2002), but improved water quality and stream access should improve spawning success.
- The proposed project has the potential to affect salmonids through restoration of tidal and freshwater hydrologic processes.
 - Migration of salmonids is inhibited by hydrologic infrastructure such as barriers (e.g., dams or tidegates); culvert installations that are poorly designed or in poor condition; creeks with poor hydraulic connectivity due to backwater effects; and lack of instream refugia (e.g., pools, large woody debris, overhanging or instream vegetation, etc.).
 - Rearing of salmonids in estuaries -- where that occurs -- can be limited by levees that eliminate tidal marshes and creeks where rearing can occur or eliminate access to marshes, as well as a lack of appropriate foraging and refugia habitat, a lack of appropriate prey such as mysid shrimp, and lack of access to marshplains at high tides. In addition, temperatures can be a prohibitive factor, although less so in the case of fish that move quickly through estuarine reaches.
- Because of the lack of information on salmonid use of estuarine areas in Tomales Bay, analysis of impacts to salmonid passage and estuarine rearing habitat under the various alternatives focuses on changes in opportunity -- specifically the amount of impediments or obstacles to passage and the amount of potential "appropriate" rearing habitat -- and capacity or quality of the available habitat. The analysis uses the following methodologies and assumptions (Table 72):
 - *Salmonid Passage/Refugia Opportunity and Capacity – Project-Related Effects:* The analysis of effects on salmonid passage and rearing potential uses a "checklist" approach, with hypothesized or known barriers to salmonid migration and/or rearing within the Project Area totaled for each subwatershed.
 - *Salmonid Rearing and Refugia Habitat Capacity– Project-Related Effects:* Analysis of salmonid rearing and foraging/refugia capacity is based on the total aquatic edge or linear perimeter of tidally connected creek available during daily high tides, which is an indicator or metric for salmonids used in functional assessment methodologies for wetlands (Simenstad et al. 2000). Total aquatic edge measures the outer perimeter of all tidal creeks influenced by daily high tides, with the assumption that juvenile salmonids spend much of their time adjacent to tidal creeks banks because of the refugia and foraging opportunities available in these edge habitats.
- While these impact indicators do not specifically address capacity issues such as water temperature and actual refugia habitat available from overhanging banks and vegetation and large woody debris, they do provide a semi-quantitative tool for assessing potential effects of the proposed project. Based on continuous water quality monitoring, water temperature does not appear to be an issue for salmonids in Lagunitas Creek during the typical outmigration period for salmonid smolts.
- Under some alternatives, there is a potential for short-term impacts relating to either development of new tidal creeks or disturbance conditions following creation of new tidal channels.

TABLE 72. SPECIAL STATUS WILDLIFE SPECIES - SALMONIDS

<p>Criteria: Effects on Opportunity for Salmonid Passage and Rearing</p> <p>Source: Endangered Species Act (federal and California), Magnuson-Stevens Fishery Conservation and Management Act, Park Service Management Policies, CCC/LCP Zone II, Marin CWP</p> <p>Nature: Beneficial, Adverse</p> <p>Context: Project Area, Watershed</p> <p>Duration: Long-Term</p>
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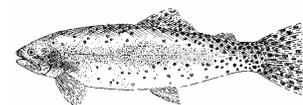


TABLE 72. SPECIAL STATUS WILDLIFE SPECIES - SALMONIDS

No Impact	There would be no potential for impact to salmonid passage and rearing opportunity associated with implementation of the proposed project.
Negligible	There would be a negligible change (± 10 percent) in the number of infrastructure facilities and management practices affecting opportunity for salmonid passage and rearing.
Minor	There would be a minor change ($\pm 11 - 25$ percent) in the number of infrastructure facilities and management practices affecting opportunity for salmonid passage and rearing.
Moderate	There would be a moderate change ($\pm 26 - 50$ percent) in the number of infrastructure facilities and management practices affecting opportunity for salmonid passage and rearing.
Major or Substantial	There would be a major or substantial change (> 50 percent) in the number of infrastructure facilities and management practices affecting opportunity for salmonid passage and rearing.
<p>Criteria: Areal Extent of Potential Rearing Habitat in Project Area Source: Endangered Species Act (federal and California), Magnuson-Stevens Fishery Conservation and Management Act, Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Watershed, Supra-Regional (central Coast ESU) Duration: Short-Term, Long-Term</p>	
No Impact	There would be no potential for impact to salmonid estuarine rearing habitat associated with implementation of the proposed project.
Negligible	There would be a barely detectable change (≤ 10 percent) expected in areal extent and connectivity of appropriate edge microhabitat in potential estuarine rearing areas relative to the extent of edge microhabitat currently existing. Would have no detectable effect on watershed population dynamics.
Minor	There would be a measurable change (> 10 percent and ≤ 25 percent) expected in the areal extent and connectivity of appropriate edge microhabitat in potential estuarine rearing areas relative to the extent currently existing. May have a detectable effect on watershed population dynamics.
Moderate	There would be an appreciable change (> 25 percent and ≤ 50 percent) expected in the areal extent and connectivity of appropriate edge microhabitat in potential estuarine rearing areas relative to the extent currently existing. May have a measurable effect on watershed population dynamics.
Major or Substantial	There would be a major or substantial change (> 50 percent) expected in the areal extent and connectivity of appropriate edge microhabitat in potential estuarine rearing areas relative to the extent currently existing. May have an appreciable effect on watershed population dynamics.

California black rail (state threatened) and California clapper rail (federally and state-listed endangered)

- Marsh and upland ecotone habitats are identified as Critical Resource objectives for the proposed project, in part because of their importance to these federally and state-listed bird species.
- The proposed project has the potential to affect rails, because of their affinity for tidal marsh habitat.
- Analysis of potential impacts during construction focuses on avoiding construction during the breeding period (February 1 through August 15) in areas with clapper rails or observing setbacks when there are no seasonal restrictions. Setback requirements developed by CDFG for black rails are 250 feet from occupied habitat.
- Because California clapper rails (*Rallus longirostris obsoletus*) have not been sighted in the Project Area since 2001 and did not appear to breed there even when present, this portion of the analysis focuses on California black rails (*Laterallus jamaicensis coturniculus*).
- Analysis of potential impacts to rail habitat under the various alternatives focuses on changes in acreage of habitat, with “appropriate” habitat defined as meeting the following criteria based on information in ARA et al. (2003). Acreage of areas that meet these criteria are calculated and summed under the various alternatives to semi-quantitatively assess potential habitat changes that would occur as part of the proposed project (Table 73).
 - *Breeding Habitat:* California black rails breed in Tidal Salt Marsh-High or high marsh habitat. They prefer fully tidal Mid- and High Tidal Salt Marsh “patches” with dense vegetation cover that are preferably larger in size, contiguous, and broader in configuration (Evens et al. 1989, Flores and Eddleman 1993, Evens et al. 1991, Evens and Nur 2002)
 - *Foraging Habitat:* Black rails forage in the high marsh plain (J. Evens, ARA, pers. comm.)
 - *High Tide Refugia:* During extreme high tides, these birds, which are relatively poor flyers, seek refuge in Upland Ecotone or higher elevation areas such as levees that are not submerged during some of the highest high tides (> 7 feet MLLW). The risk of predation increases when vegetation cover is sparse or of short height.



- *Protection from Predators:* Refugia needs to have little to no potential for access by predators such as red fox (*Vulpes vulpes*), feral cats, dogs, and other predatory mammals. The best areas have no levees, riprap, or upland areas bordering urban or rural residential areas that could allow egress of predatory mammals such as red fox, feral cats, and dogs or have buffers that protect rails from mammals and avian predators.
- Under some alternatives, there is a potential for short-term impacts relating to the length of time that would be required for vegetation communities to undergo the transition from pasturelands to more unmanaged habitats, including establishment and development of any new tidal marsh areas.

TABLE 73. SPECIAL STATUS WILDLIFE SPECIES - RAILS

Source: Endangered Species Act (federal and California), Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Project Area, Watershed (southern portion of Tomales Bay), Regional (San Francisco Bay region) Duration: Short-Term, Long-Term	
No Impact	There would be no potential for impact to rails associated with implementation of the proposed project.
Negligible	There would be a negligible change (≤ 1 percent) expected in the areal extent of appropriate habitat. Would have no detectable effect on Project Area, watershed, or regional distribution of species.
Minor	There would be a minor change (> 1 percent and ≤ 10 percent) expected in the areal extent of appropriate habitat. Would have a detectable effect on Project Area/watershed distribution of species, but not on regional distribution.
Moderate	There would be a moderate change (> 10 percent and ≤ 25 percent) expected in the areal extent of appropriate habitat. Would have a measurable effect on Project Area/watershed distribution of species and possibly a detectable effect on regional distribution.
Major or Substantial	There would be a major or substantial change (> 25 percent) expected in the areal extent of appropriate habitat. Would have a major or substantial effect on Project Area/watershed distribution of species and possibly a measurable effect on regional distribution.

Other Special Status Species

Most of the other federally and state-listed endangered and threatened species are only occasional visitors or vagrants to the Project Area, with the exception of peregrine falcon, a state endangered species and federally delisted species that has been regularly observed foraging over the Project Area. Analysis for these species focuses on how the proposed project would affect incidental use. These species include California freshwater shrimp (*Syncaris pacifica*, FE; common upstream in freshwater portions of Lagunitas Creek, rare in Project Area); California brown pelican (*Pelicanus occidentalis californicus*, FE; foraging on Lagunitas Creek shoreline); Least Bell's vireo (*Vireo bellii pusillus*, FE, SE; extremely rare vagrant in riparian habitat); green sturgeon (*Acipenser medirostris*, FT; forages rarely in Lagunitas Creek); peregrine falcon (*Falco peregrinus*, SE, former FD; regularly observed foraging over the Giacomini Ranch and undiked marsh); sandhill crane (*Grus canadensis*, ST; very rare visitor to wet pastures in Giacomini Ranch); and bank swallow (*Riparia riparia*, ST; rare transient over Giacomini Ranch in fall). In addition, analysis also includes species that are not federally or state-listed as endangered or threatened, but that have or have had during the planning process some listing status and are known to occur in the Project Area. These species include: northwestern pond turtle (*Clemmys marmorata marmorata*, former FSacSC), southwestern river otter (*Lontra canadensis sonorae*, CSC), and saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*, former FSacSC). Impact thresholds are based on qualitative evaluation of the potential for impact to use of the Project Area during both construction and post-construction phases under the various alternatives (Table 74).

TABLE 74. SPECIAL STATUS WILDLIFE SPECIES – OTHER SPECIES

Source: Endangered Species Act (federal and California), Migratory Bird Treaty Act, Park Service Management Policies, CCC/LCP Zone II, Marin CWP Nature: Beneficial, Adverse Context: Project Area, Watershed, Regional Duration: Short-Term, Long-Term	
No Impact	There would be no potential for impacts to use of the Project Area by other federally and state-listed special status species associated with construction or implementation of the proposed project.
Negligible	There would be a negligible potential for impacts to use of the Project Area by other federally and state-listed special status species associated with construction or implementation of the proposed project. Would have no measurable effect on use of Project Area or watershed.

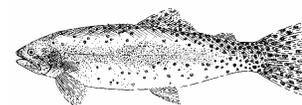


TABLE 74. SPECIAL STATUS WILDLIFE SPECIES – OTHER SPECIES

Minor	There would be a minor potential for impacts to use of the Project Area by other federally and state-listed special status species associated with construction or implementation of the proposed project. Would have a measurable effect on use of Project Area, but not on watershed use.
Moderate	There would be a moderate potential for impacts to use of the Project Area by other federally and state-listed special status species associated with construction or implementation of the proposed project. Would have an appreciable effect on use of Project Area and a detectable effect on use of the watershed.
Major or Substantial	There would be a substantial or major potential for impacts to use of the Project Area by other federally and state-listed special status species associated with construction or implementation of the proposed project. Would have a substantial effect on use of Project Area and a measurable effect on use of the watershed.

Impact Analysis

TABLE 75. INTENSITY, NATURE, TYPE, DURATION, AND CONTEXT OF IMPACTS FOR FISH AND WILDLIFE RESOURCES

	No Action	Alternative A	Alternative B	Alternative C	Alternative D	
Impact Indicator	Intensity, Nature, Type, Duration, and Context of Impact					
High Value Wildlife Habitats	Construction	Negligible Adverse	Negligible Adverse	Minor Adverse	Minor Adverse	Minor Adverse
	Short-Term	Negligible Adverse	Negligible Adverse	Negligible Adverse	Moderate Adverse	Moderate Adverse
	Long-Term	Minor Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial	Major Beneficial
Changes in Wildlife Use	Construction	Negligible Adverse	Negligible Adverse	Minor Adverse	Minor Adverse	Minor Adverse
	Short-Term	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Minor Adverse	Minor Adverse
	Long-Term	Negligible Beneficial	Minor Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial
Invasive Wildlife Species	Short-Term/Long-Term	Negligible Adverse	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
Wildlife Conditions in the Watershed	Short-Term	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial
	Long-Term	Negligible Beneficial	Minor Beneficial	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial
Special Status Species						
California Red-legged Frog	Construction	Negligible Adverse	Negligible Adverse	Minor Adverse	Minor Adverse	Minor Adverse
	Short-Term	Negligible/Minor Adverse	Negligible/Minor Adverse	Minor Adverse	Moderate Adverse	Moderate Adverse
	Long-Term	Minor Adverse	Minor Adverse	Negligible/Minor Adverse	Minor/Moderate Adverse	Minor/Moderate Adverse
Tidewater Goby	Construction	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
	Short-Term	Negligible Beneficial	Minor Beneficial	Moderate Beneficial	Moderate Adverse	Moderate Adverse
	Long-Term	Moderate Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial	Major Beneficial

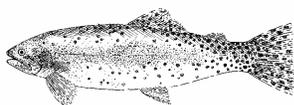


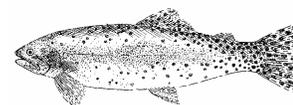
TABLE 75. INTENSITY, NATURE, TYPE, DURATION, AND CONTEXT OF IMPACTS FOR FISH AND WILDLIFE RESOURCES

	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Impact Indicator	Intensity, Nature, Type, Duration, and Context of Impact				
Salmonids					
Construction	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse	Negligible Adverse
Passage and Rearing Conditions	Negligible Beneficial	Minor Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial
Rearing Habitat Extent: Short-Term	Negligible Beneficial	Minor Beneficial	Minor Beneficial	Moderate Beneficial	Moderate Beneficial
Rearing Habitat Extent: Long-Term	Minor Beneficial	Moderate Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial
Black and Clapper Rail					
Construction	Negligible Adverse	Negligible Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Short-Term	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial	Negligible Beneficial
Long-Term	Minor Beneficial	Major Beneficial	Major Beneficial	Major Beneficial	Major Beneficial
Other Special Status Species					
Construction	Negligible Adverse/ No Impact	Negligible Beneficial/ Moderate Adverse			
Short-Term/Long-Term	Negligible Beneficial / Moderate Adverse	Minor Beneficial/ Moderate Adverse	Minor Beneficial/ Moderate Adverse	Minor Beneficial/ Moderate Adverse	Minor Beneficial/ Moderate Adverse

No Action Alternative

Analysis: The effects of the No Action Alternative on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to minor beneficial (Table 75). Under the No Action Alternative, levees, tidegates, and culverts in the Giacomini Ranch are not breached or removed, except for the 11-acre wetland restoration area in the northeastern corner of the East Pasture. The Park Service is required under its existing agreement with CalTrans to restore wetlands as mitigation for impacts caused by CalTrans to aquatic habitat from a road repair on State Route 1 in Marin County in exchange for the Park Service receiving monies to purchase and restore the Giacomini Ranch. The remainder of the levee would not be deconstructed, although there would be no levee maintenance. Olema Marsh is also not restored, and there would be no new public access facilities. Agricultural infrastructure would largely remain, although most agricultural management practices such as mowing, ditch dredging, and irrigation would be discontinued. There is a potential for leased grazing through a separate environmental review process. However, if such management were to be instituted the Seashore would impose setbacks from creeks, riparian areas, and certain wetland areas, as well as restrict the intensity, duration, and timing of grazing as to limit natural resource degradation.

Wildlife Habitats and General Wildlife Use – Project Implementation: Over the long-term, the No Action would be expected to have minor beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some very negligible adverse impacts during construction of the 11-acre wetland restoration/mitigation component. Under this alternative, the Giacomini Ranch would largely remain grassland, although it would change in nature due to the elimination of grazing or reduced grazing intensity and the elimination of intensive agricultural management practices. Depending upon a number of factors that would probably vary spatially (e.g., future grazing intensity, nutrient concentrations in soils, and influence of salts through surface waters or groundwater), a large proportion of the pastures could respond to reduced grazing and management with a rapid increase in vegetation biomass and plant height, particularly of weedy, ruderal species such as common velvet grass (*Holcus lanatus*) and milk thistle (*Silybum marianum*). This same phenomenon has been documented in other grazed areas where grazing has been removed, such as



vernal pool areas and a Seashore-owned ranch near Drake's Beach. At some point in the future, grasslands within the Project Area may change yet again to communities dominated by both native and non-native species once nutrient pools within soils are reduced to levels more characteristic of non-agricultural lands. However, with the exception of perhaps more saline areas, native grasslands would be unlikely to establish naturally in these types of wet conditions due to the overwhelming number of non-native grass species that dominate most grassy wetland areas in California.

The acreage of wetland and riparian habitats would increase in the Giacomini Ranch, because of the 11-acre wetland restoration component, the reduced grazing pressure on riparian habitat, and the expansion of Freshwater Marsh habitats with the elimination of frequent ditching to drain pastures. These factors would potentially cause a minor increase of approximately 6 percent in High Value Wildlife Habitats such as Tidal Waters, Forested and Scrub Shrub Riparian, Tidal Brackish Marsh, Tidal Salt Marsh, and Tidal Salt Marsh-High/Upland Ecotone relative to baseline conditions, despite the fact that most of the Giacomini Ranch would remain grassland and potentially convert into a less managed type of grassland that would offer less value to at least certain wildlife species. While, in general, discontinuation of agricultural management may benefit most High Value Wildlife Habitats, ultimately, the discontinuation of dredging could reduce Freshwater Marsh habitat in the East Pasture, because ditches might begin to fill in with sediments deposited during overbank flooding.

In Olema Marsh, where there is no agricultural use, conditions would be expected to remain fairly similar to baseline conditions. Currently, Open Water and Freshwater Marsh habitats appear to be expanding at the expense of Forested and Scrub Shrub Riparian habitats, because of steadily increasing water levels in the marsh that has resulted from poor drainage through the Levee Road culvert.

The small increase in High Value Wildlife Habitats would have a negligible beneficial effect over the long-term on use of the Project Area, with use by common and special status wildlife species potentially negligibly increasing. The largest beneficial effects in wildlife use under this alternative would be expected to come from increased use of expanded Forested and Scrub Shrub Riparian habitat by resident and Neotropical migrant passerines or riparian bird species.

Discontinuation or reduction of grazing under the No Action Alternative would increase the areal extent and structural complexity of riparian habitat along the edges of the Project Area. As riparian habitat expands following elimination of trimming and grazing, an increase in foraging and breeding habitat for riparian associates (residents and Neotropical migrants) would be expected. Riparian habitat provides structural refuge critical to passerine birds, including salt marsh common yellowthroat; mammals (southwestern river otter, dusky-footed woodrat, and black-tailed deer), and amphibians (California red-legged and Pacific tree frog). Many vertebrate species utilize tidal salt marsh and freshwater marsh habitats for foraging, but also require nearby high-quality riparian forest or scrub shrub habitat for resting and refuge.

In terms of acreage, the largest gain in High Value Wildlife Habitat under the No Action Alternative would occur as a result of the wetland mitigation/restoration component, which would restore 11.4 acres of Tidal Salt Marsh and Tidal Salt Marsh-High/Upland Ecotone, as well as Tidal Brackish Marsh and Tidal Open Water. These habitats primarily benefit salt marsh dependent bird species, such as California black rail, California clapper rail, and saltmarsh common yellowthroat, but would also benefit generalist waterbirds such as great egret, and generalist shorebirds such as willet, godwit, and greater yellowlegs. Salt marsh also provides foraging habitat for raptors species - such as short-eared owl, white-tailed kite, northern harrier, and peregrine falcon - drawn to the site by small vertebrates such as California voles, shrews, and garter snakes. However, the small size of this restoration component may limit its ability to attract new species or increase numbers of existing ones. Some species such as California clapper rail require larger expanses of unfragmented marsh habitat before they will colonize. Certain special status fish species such as tidewater goby and salmonids may use the tidally reconnected portion of the East Pasture Old Slough at times for refugia, but the size of this off-stream channel again minimizes its usefulness for many wildlife species.

Changes in management would also benefit avian and mammalian species associated with aquatic habitats. Foraging habitat for some waterfowl and marsh-associated passerines would increase as additional Freshwater Marsh and Wet Meadow habitats developed on the fringe where frequent ditching has precluded their presence. The seasonal abundance of migratory waterfowl in ditches, sloughs, and northeast corner of East Pasture would be expected to continue under the No Action Alternative, although discontinuation of dredging could affect attractiveness of this habitat over the long-term. The Muted Tidal Brackish Marsh - Mudflat/Panne in the southeastern portion of the East Pasture would continue to attract moderately high numbers of shorebirds and waterfowl during the winter and provide alternate habitat for these species during high tide



conditions within Tomales Bay. Southwestern river otter, which reappeared in the vicinity of the Project Area during the past several decades, would continue to expand its presence in the Project Area, moving between Lagunitas Creek, Giacomini Ranch, and Olema Marsh.

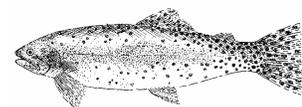
In the West Pasture freshwater marsh, the current conversion of the northern portion of the marsh from Freshwater Marsh to Muted Tidal Brackish Marsh would continue. In 2003, the culverts on Fish Hatchery Creek at the West Pasture north levee collapsed, allowing a greater range of tidal flows into the pasture. Following replacement of the culverts and installation of modified one-way tidegates, the tidal range within the West Pasture compressed, but still appears to be higher than prior to the culvert/tidegate failure. During higher high tides, particularly during the winter, saltwater can flow into the marsh, where it appears to pond for several months due to the poor drainage conditions. Since 2003, then, maximum and average salinities within the marsh have increased and have started to convert at least the lower elevation northern portions of the marsh to Muted Tidal Brackish Marsh. This conversion may have possibly already caused impacts to the California red-legged frog, as annual surveys since 2003 have yet to document the same high numbers as were observed during the baseline study year in 2001 (G. Fellers, USGS, unpub. data). Numbers of these frogs would be expected to continue to remain low under the No Action Alternative, because of the habitat conversion already occurring. This issue is discussed further under the Special Status Species portion of this section. While negatively affecting frogs, the conversion of this habitat would benefit passerine bird species, such as salt marsh common yellowthroat and red-winged blackbird, which use tall vegetation for nesting and resting habitat while maintaining close proximity to more open foraging habitat.

In general, amphibians and reptiles would be the most adversely affected by the No Action Alternative. These species are predominantly freshwater species that would be negatively affected by conversion of Freshwater Marsh to brackish or tidal habitats in the West Pasture and the discontinuation of agricultural management practices such as levee maintenance, dredging and irrigation that maintained Open Water areas in ditches in the East Pasture. In addition to the red-legged frog, another special status species, the Northwestern pond turtle, would be adversely affected by these changes, with barely detectable to measurable changes in habitat and numbers expected. These same factors would also, however, have a beneficial effect on the amphibian and reptile community by decreasing the extent of appropriate habitat for a non-native predator of the red-legged frog, the bullfrog, which occurs in the East Pasture, Tomasini Creek, and the West Pasture. Over the long-term, deterioration of levees would potentially increase tidal influence in the East and West Pastures and thereby increase impacts to the red-legged frog, pond turtle, and bullfrog populations.

Increasing water levels in Olema Marsh and the associated decline in riparian habitat would result in a decline in riparian-associated avian species (e.g. warbling vireo, Swainson's thrush, and Wilson's warbler) at the marsh, although there may be an increase in species (e.g. swallows) that nest in cavities in snags and forage over the expanding Freshwater Marsh. The increasing water levels and predicted subsequent expansion of Freshwater Marsh would continue to support marsh wrens, song sparrows, salt marsh common yellowthroat, and Virginia rails, as well as migratory waterfowl. The expansion of freshwater marsh may increase breeding potential for waterfowl species such as mallard, gadwall, and Canada goose in Olema Marsh. In addition, it could increase habitat for California red-legged frog and bullfrog, both of which currently occur in the marsh.

Overall, the elimination of intensive agricultural management may benefit avian species by resulting in increased grass heights and introduction of additional food resources. Higher grass heights would increase potential nesting habitat for certain ground nesting species, especially near water in ditches. Species that may benefit include waterfowl (e.g. mallard, gadwall) and passerines (e.g. song sparrows, marsh wrens). Other passerines, which are considered short-grass specialists such as savannah sparrows and western meadowlarks, would probably decrease in abundance with discontinuation of mowing and a reduction in grazing. Raptors such as northern harrier may have increased foraging opportunities with greater grass heights as small mammal populations respond to more cover. A change in vegetative species composition to non-native species, i.e. thistles, may also increase foraging opportunities for avian species such as American and lesser goldfinch. The increase in vegetative cover resulting from eliminating intensive agricultural management practices may also benefit California black rail by increasing upland refugia and providing cover from predators during high tides.

Wildlife Habitats and General Wildlife Use – Long-Term Changes: As discussed earlier, over the long-term, the weedy, more ruderal grassland that would develop either under reduced or no grazing conditions would be expected to convert into a less densely vegetated grassland that supports both native and non-native species. This conversion may be stymied by the steady deterioration or abrupt breaching of the levees on the East and West Pastures, which would not be maintained. With loss of the levees, grasslands would begin converting to



brackish and tidal marsh habitats, thereby attracting a different assemblage of wildlife species that might more closely resemble those expected for Alternatives A through D. These brackish and tidal marsh habitats would possibly continue to evolve in the future in response to sea level rise, which may be increasing at a much greater rate than was originally predicted (Overpeck et al. 2006). The projected rate of 3 feet of sea level rise by 2100 could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland habitats. This shift would attract specific avian species such as diving ducks, dabbling ducks, marsh-associated passerines, and other aquatic species.

As there would be no change in public access facilities under the No Action Alternative, no detectable change would be expected in terms of visitation and, consequently, the potential effects on visitors on wildlife use, success of breeding efforts, and other behavioral variables relative to baseline conditions.

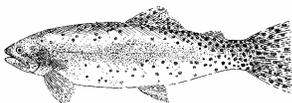
Wildlife Habitats and General Wildlife Use – Construction: Construction of the No Action Alternative would have only very negligible adverse effects, if any, on High Value Wildlife Habitats and use by common wildlife species, however, there could be minor to moderate adverse impacts on special status species such as tidewater goby. The area where the wetland mitigation/restoration component would be constructed currently has Non-Tidal Brackish Marsh and Pasture/Grassland habitats. Wildlife use of this area is generally low, although the East Pasture Old Slough pond that would be tidally reconnected supports low to moderate numbers of waterfowl, high numbers of estuarine fish species such as threespine stickleback, and, as of 2006, very low numbers of tidewater goby. Because of its proximity to the undiked marsh where California black rail occur, construction would not be implemented until after August 31. Potential mitigation measures are discussed in a separate sub-section below.

Invasive Wildlife Species: The No Action Alternative would have a negligible adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions. Under this alternative, most of the invasive species already present in the Project Area would be expected to remain, with a possible expansion into new areas by some of the species. The continued dominance of the Giacomini Ranch by grassland habitats would result in the No Action Alternative having little to no effect on terrestrial invasive species, such as red fox and wild turkey. These species would continue to access East and West Pasture for foraging, resting, and other purposes. In addition, because of the proximity of the Project Area to rural residential areas, maintenance of grassland conditions and levees would also encourage the presence of feral cats and dogs, as well as red fox, that could prey on both adult and young. Feral cats in particular have a documented and adverse effect on birds, amphibians and small mammals in native ecosystems (Winter and Wallace 2006, Liberg 1998). Red fox and feral cats, as well as Norway rats, have been implicated strongly in the decline of rail populations in San Francisco Bay. Monitoring throughout the Seashore for impacts of feral cats and dogs is ongoing (N. Gates, wildlife biologist, Seashore, *pers. comm.*). Should impacts on special status species or other species of concern in the Project Area be detected, removal of feral animals will be implemented as mandated by Park Service Management Policies (Section 4.4.2.1).

Most of the increase in numbers or number of invasive species would come from estuarine-dependent invasive species that would benefit from the very small increase in tidal and muted tidal habitats. Most of the Giacomini Ranch would remain leveed under this alternative, but approximately 11.4 acres would be converted to tidal habitats through a small wetland restoration/mitigation component. Species with potential to invade the restored habitat include animals already present within the Project Area and Tomales Bay watershed, as well as potentially animals not yet found in the watershed but that are likely to invade this estuary in the future because of their rapid spread within other regional estuaries such as San Francisco Bay.

Estuarine-dependent invasive species currently in the Project Area and watershed that could increase negligibly in numbers or areal extent from the No Action Alternative include: European green crab, present in large numbers just north of the Project Area and observed in Fish Hatchery Creek in the West Pasture; yellow-fin goby, currently inhabiting Lagunitas Creeks at low densities; and Korean shrimp, documented from both Lagunitas and Tomasini Creeks. The New Zealand burrowing isopod (*Sphaeroma quoyanum*) may also occur in intertidal creeks in the undiked marsh north of Giacomini Ranch, but it has not been positively identified.

The No Action Alternative would have some effect on freshwater and terrestrial invasive species, as well. Under the No Action Alternative, the northern half of the freshwater marsh in the West Pasture would continue to convert to Muted Tidal Brackish Marsh habitat. In addition to California red-legged frog and Pacific tree frog, this marsh also supports an unknown number of bullfrogs, which were sighted for the first time in 2006 (P. Kleeman, *USGS, pers. comm.*). Degradation of the levees over the long-term could increase saltwater intrusion into freshwater habitats and decrease the potential habitat available for this freshwater species.



Other invasive freshwater aquatic species include mosquitofish and crayfish, both of which are currently found within the Project Area. Mosquitofish have also been found in the more saline waters of Lagunitas Creek and the undiked marsh north of Giacomini Ranch (NPS, unpub. data), suggesting that this species can tolerate at least brackish conditions. While changes in some portions of the Giacomini Ranch might be detrimental to freshwater species, the current trend in Olema Marsh of conversion of riparian habitat to Freshwater Marsh and permanently flooded Open Water would be expected to continue, thereby maintaining or even increasing numbers of bullfrogs. Mosquitofish and crayfish have not been observed in this system, but the marsh is difficult to survey, so it is possible that at least mosquitofish occur there.

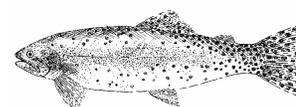
Wildlife Conditions in the Watershed: Only a very negligible beneficial effect would be expected in terms of support of wildlife species in southern portion of the Tomales Bay watershed, with most of the benefits over the short-term coming from discontinuation of agricultural management practices in the Project Area that affect conditions in Lagunitas and, ultimately, the bay. Retention of the levees would minimize potential export of sources of carbon to downstream water, as well as access by marine and estuarine organisms into the Giacomini Ranch interior. Watershed habitat quality would be improved by discontinuation of levee maintenance, withdrawal of water for irrigation, infrequent pumping of waters from the ranch into Lagunitas Creek, and crossing of Lagunitas Creek by cattle.

California red-legged frog: The No Action Alternative would have a negligible adverse effect on California red-legged frog breeding habitat units and distribution of the species in the Point Reyes Peninsula Core Area, but a minor adverse effect on distribution of red-legged frogs in the Project Area. Over the long-term, impacts could possibly increase to minor, because degradation of the levees and sea level rise could cause a measurable effect on breeding habitat units and regional distribution. Impacts during construction of the wetland mitigation/restoration component in the northern portion of the East Pasture where no breeding has been documented would be expected to be non-existent or very negligible.

Baseline studies documented two areas that provide breeding habitat for red-legged frog. The West Pasture freshwater marsh is approximately 7.25 acres in area and has supported reproduction in 4 of the last 5 years (no reproduction observed in winter 2002-03). Breeding also has sporadically occurred in Fish Hatchery Creek, creating another 1.0 acre of breeding habitat in the West Pasture. The Olema Marsh provides a complex and dense habitat known to support red-legged frog breeding habitat. The vegetation density and site complexity have made it impossible to conduct a survey to estimate use. Bullfrogs are also known to occur in large numbers within the pond. Breeding habitat within the Olema Marsh is assumed to comprise all of the areas with Freshwater Marsh and Open Water, which total 39 acres. There is no documented breeding habitat in the East Pasture, although a few adult frogs were observed during baseline surveys (Fellers and Guscio 2002).

Numbers of individuals within the West Pasture freshwater marsh has fluctuated sharply during the limited years of monitoring, potentially in response to the failure of the tidegate and the apparent increase in tidal influence even after the tidegate was repaired. This issue is discussed in more detail under Water Quality in Chapter 3. During 2001-2002, the year prior to the tidegate failure, egg masses totaled 45, and number of estimated adults totaled 90 (Fellers and Guscio 2002). Only a few adults and no egg masses or tadpoles were observed in the West Pasture freshwater marsh and Fish Hatchery Creek during the 2003-2004 season after the tidegate was repaired (G. Fellers, USGS, *pers. comm.*). Since then, frog numbers have rebounded slightly, but not to 2001-2002 levels (Table 19). In 2004-2005, approximately 10 adult red legged frogs were detected, but no egg masses were observed (G. Fellers and P. Kleeman, USGS, unpub. data). In January 2006, a survey following extensive flooding, including multiple breaches of the West Pasture levees found 12 adult frogs and 15 egg masses (G. Fellers and P. Kleeman, USGS, *pers. comm.*).

Under stable environmental conditions, numbers of individuals as measured by egg masses within established habitats such as Cemetery Pond have remained fairly stable from year to year, varying only by 25 percent during the years of monitoring, which suggests that, under optimal conditions, the range of natural variability might be fairly low (G. Fellers and P. Kleeman, USGS, wildlife biologists, *pers. comm.*). The amount of monitoring in the West Pasture freshwater marsh prior to the tidegate failure is limited (one year), so the ability to interpret the stability of the population prior to this event is reduced. No frogs were observed in this marsh during baseline studies conducted in 1993 as part of the feasibility study, when red-legged frog was first documented to be on the Giacomini Ranch (PWA et al. 1993). Certainly, the potential for red-legged frog was much lower prior to construction of the levees in the 1940s, with aerial photographs depicting this area as intertidal emergent marsh. Construction of the levees has created an artificial freshwater regime in what was historically a tidal marsh complex, although pockets of freshwater marsh have probably always existed on the



perimeter where abundant surface water and groundwater flow from the Inverness Ridge and Point Reyes Mesa have been present.

While 2001-2002 cannot be necessarily interpreted as baseline population numbers for this marsh due to the lack of consecutive years of survey, it is likely that the greater influx of saltwater into Fish Hatchery Creek and the freshwater marsh in the West Pasture that has occurred after the tidegate repair has had some effect on this population. Interestingly, saltwater intrusion into the West Pasture currently appears to be controlled by extreme high tide events and long residence time during winter months, not by evapotranspiration during the summer months, as might be expected. Based on continuous salinity monitoring within the marsh, most of this tidal influence appears to be during the winter when the extreme tides are highest, with salinities actually dropping during the spring and summer. Extreme high tides in Tomales Bay exceeding approximately 6.2 ft NAVD88 cause water levels within the muted tidal West Pasture to increase to 5.25 ft NAVD88, the uppermost part of the tidal range in the pasture, which then allows tidal waters to overbank flood and flow into the central and lowest elevations portions of the freshwater marsh. While salinities have not reached the levels recorded during the period that the tidegate had failed since its repair, red-legged frogs actually continue to breed in some of the highest salinity areas, which are the deepest portions of the depressional basin in which the freshwater marsh is located (P. Kleeman, USGS, *pers. comm.*). It is possible that frogs are taking advantage of stratification of freshwater over denser, saltier waters.

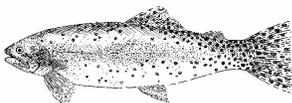
This pattern of saltwater intrusion is causing the northern half of the marsh to convert from Freshwater Marsh to Muted Tidal Brackish Marsh. The southern half does not appear to be affected by salinity intrusion, perhaps because elevations are slightly higher, which reduce the reach of tides, and because of high perennial freshwater inflow from the 1906 Drainage and groundwater flow from the Inverness Ridge. The Park Service is conducting a habitat enhancement project in 2006 that would slightly expand higher elevation Freshwater Marsh habitat in this area by excavating fill that has been placed directly adjacent to the Lucchesi residence. This project would expand Freshwater Marsh by approximately 0.4 acres. In addition, continued increases in water levels in Olema Marsh due to poor drainage would continue to convert Forested and Scrub Shrub Riparian habitat to Freshwater Marsh and Open Water habitat, perhaps providing a very negligible increase in breeding habitat for red-legged frog. Over the short-term, this alternative would be expected to have slightly beneficial effects on non-breeding habitat through maintenance of non-tidal grasslands and expansion of riparian habitat along the perimeter.

While the levees and infrastructure would remain under the No Action Alternative, discontinuation of levee maintenance would result in slow decay of levee and tidegate facilities. The slow decay or sudden breach during large storm events of these facilities would allow for greater tidal flooding and thereby further reduce viable red-legged frog breeding habitat in the West Pasture. Under full tidal conditions, an additional 1.5 acres of breeding habitat would be lost through conversion to brackish or saline habitats. This impact could be increased over the long-term by sea level rise, which may be rising at a much higher rate than originally predicted. If the levees decayed or abruptly breached, impacts on red-legged frog would be expected to be minor, with the exact effect dependent on a number of factors, including annual variability in rainfall and runoff conditions and possible passive creation of Freshwater Marsh in other areas through discontinuation of agricultural management.

Effects on red-legged frog during construction of the wetland restoration/mitigation component would be expected to be non-existent or very negligible. There is no breeding habitat in the northwestern corner of the East Pasture, and this area does not represent key non-breeding habitat, although adult frogs have been sighted in the East Pasture Old Slough Pond on occasion. Mitigation measures are discussed in a separate sub-section below.

Tidewater goby: The No Action Alternative would have very negligible beneficial effects on tidewater goby in the Project Area through a potential increase in quality of existing habitat, although, over the long term, slow decay or sudden breaching of levees could increase the benefits to tidewater goby by considerably increasing the amount of available habitat. Impacts during construction would be expected minor to moderate at most, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Within the Project Area, Acreage of existing tidewater goby habitat in the Giacomini Ranch totals 11.3 acres. This species occurs primarily in a section of Tomasini Creek that has been bermed to run against the base of Point Reyes Mesa until it drains into Tomales Bay. The creek supports both open water and vegetated sections. Most of the creek bottom is muddy or a combination of clay and silt (G. Kamman, KHE, *pers. comm.*). The flashboard dam and culvert structure is malfunctioning and allows modified two-way flow, such



that the creek is influenced by the full upper range of high tides, but does not drain completely during low tides. This maintains permanent ponding or subtidal conditions within the creek, which may have become intertidal mudflat during low tides if it had been allowed to drain completely. The tidegate, along with natural gravel bar features create residual brackish pool habitat that provides habitat for the tidewater goby, despite the fact that the substrate and flow conditions are probably not optimal.

In addition, tidewater goby has been documented in a diked slough in the West Pasture. This slough is not a fluvial or creek system such as Tomasini Creek, but rather appears to drain freshwater surface run-off from a seasonally flowing seep present on the Gradjanski property, as well as surface run-off from overbank flooding of the pasture by Fish Hatchery Creek. It receives tidal influence from Fish Hatchery Creek, which has muted tidal flows with lower amplitude than Tomasini Creek. As with Tomasini, substrate conditions are suboptimal, with the surface substrate being muddy or a combination of clay and silt.

In 2006, tidewater goby were also found in non-tidal portions of the East Pasture. During the December 2005 storm, these fish may have been washed into the East Pasture Old Slough from Tomasini Creek when the Tomasini Creek levee breached, or they may have entered the slough from the bay. During the storm, the entire northern portion of the East Pasture was flooded and connected through elevated surface waters with Lagunitas Creek and Tomales Bay. Tidewater goby have been found outside the mouth of Tomasini Creek. Lastly, these fish may have entered the East Pasture Old Slough Pond through the one-way tidegates if the tidegates were malfunctioning and allowing water in as well as out. During surveys, dead marine fish species were discovered in the pond, suggesting that gobies probably entered from the Lagunitas Creek side of the pond. The pond is bermed off from the rest of the East Pasture Old Slough, because the Giacomini once reputedly used this area for hunting. This pond consistently has brackish water salinities, probably because the tidegates leak. As with Tomasini Creek and the West Pasture Old Slough, substrate conditions are suboptimal, with the surface substrate being muddy or a combination of clay and silt.

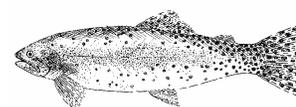
Numbers of tidewater goby in the Project Area have also been relatively low within each of these sites, ranging from five to 22 at most. These sites represent the only known occurrence of this species in the Tomales Bay watershed, as, prior to 2002, the species had last been sighted in the bay in 1953. Genetic analyses indicate that this population is genetically distinct from the nearest existing occurrences of tidewater goby at Salmon Creek Marsh and Rodeo Lagoon (Jacobs and Earl 2005).

Following project implementation, the No Action Alternative would result in negligible beneficial effects in the Project Area on tidewater goby by slightly improving the quality of existing habitats. Tidal reconnection would improve water quality within the East Pasture Old Slough Pond, which, based on observations of dead marine fish during the 2006 sampling, probably has at least periods of sub-optimal water quality. A reduction or removal of grazing would increase water quality within the West Pasture Old Slough, improving the quality of existing habitat for the group of fish first observed in 2005. This alternative would be expected to have only a very negligible to no effect on Tomasini Creek other than the discontinuation of any levee maintenance practices, although this levee has not been actively maintained for many decades.

Over the long-term, slow decay or abrupt breaching of the Giacomini Ranch levees would have the potential to increase habitat for tidewater goby through creation of more tidal channels and side channels in the East and West Pastures. This trend would be intensified by sea level rise, which may be increasing at a much higher rate than originally predicted. The projected rate of 3 feet of sea level rise by 2100 (Overpeck et al. 2006) could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland habitats.

Additional benefits from tidewater goby are expected to come from implementation of the captive propagation program in which tidewater goby would be caught, bred in captivity, and reestablished in new habitats within the southern portion of the Tomales Bay watershed. This program is described more in Chapter 2. Over the long-term, the likely reconnection of creeks with their floodplains through levee decay and breaching, combined with the captive propagation program, would increase benefits to a moderate level.

The tidal wetland restoration/mitigation component includes tidal reconnection of the East Pasture Old Slough Pond with Lagunitas Creek and Tomales Bay. As noted above, tidewater goby have recently been found in the East Pasture Old Slough Pond. Mitigation measures are discussed in a separate sub-section below.



Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The No Action Alternative would have a very negligible beneficial effect on salmonid rearing and passage habitat in the Project Area. No impacts to at the very most very negligible adverse effects to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration/mitigation component.

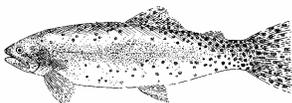
As discussed under Chapter 3 and the assumptions portion of this section, salmonids have been detected in several Project Area creeks despite the presence of levees, tidegates, and other hydrologic infrastructure and intensive agricultural management. The Project Area does not represent a potential breeding or spawning area for steelhead, coho or Chinook salmon. These types of salmonids typically breed in the upper portions of the watershed in medium- to high-gradient tributaries. The proposed Project Area represents important feeding habitat for salmonids as they migrate to the ocean. Previous investigations have shown that the Project Area is a primary production zone for neomysid shrimp (Bratovich and Kelly 1988, Pearson 2000) known to be an important food source for the outmigrating smolts in this watershed (Bratovich and Kelly 1988). Smolts may spend days to weeks in estuarine habitat feeding in nutrient-rich areas and growing prior to heading to the open ocean (Reimers 1973, Simenstad et al. 1982, Levy and Northcote 1982). While this is a relatively short period of time, this transitional life stage may have direct implications on the ocean survival of smolts, as there is direct correlation between increased smolt weight lead to higher adult survivorship (Naiman et al. 2002). The importance of estuarine habitats varies between salmonid species, with Chinook typically spending the most time in wetlands before outmigrating to the ocean (Simenstad et al. 1982, Aitkin 1998). The importance for coho salmon appears to be more geographically and temporally variable (Magnusson and Hilborn 2003; Miller and Sadro 2003). Park Service staff has documented the presence of steelhead and coho within the estuarine portions of Lagunitas and Tomasini Creek more than one month after the peak of smolt outmigration.

Steelhead has been documented several times in Fish Hatchery Creek, though no determination of anadromy could be conducted. Steelhead and coho have also been observed several times in Tomasini Creek within the leveed section of the creek. Information on anadromous species runs in Bear Valley Creek is poor, but smolt trapping by the Seashore upstream of Olema Marsh in 1999 netted 21 steelhead – five of which were classified as pre-smolts (Ketcham, *in prep.*). Coho salmon have not been observed, at least in recent times, in the Bear Valley Creek watershed (B. Ketcham, Seashore, *pers. comm.*). Fisheries surveys on the section of Lagunitas Creek Salmonid presence in these watersheds indicates that, while impediments, the levees and tidegate facilities are still allowing some degree of fish passage.

Current conditions limit salmonid habitat to Fish Hatchery Creek (accessed via modified one-way tide gate in West Pasture levee), Tomasini Creek (accessed via malfunctioning tidegates and flashboard dam structure on East Pasture levee), and Bear Valley Creek (accessed via undersized culverts in Levee Road). Fisheries monitoring within the Project Area, as well as within the Lagunitas/Olema Creek watershed, indicate that infrastructure in the Giacomini Ranch and Olema Marsh do not eliminate the potential for passage to the main spawning grounds in the upper watersheds, but likely limit the duration and timing of access to Fish Hatchery and Tomasini Creek. These same levees also eliminate most of the potential for off-channel rearing habitat on Tomasini Creek and Lagunitas Creek. Fish Hatchery Creek is not actually leveed within the West Pasture, although it is infrequently dredged. On Bear Valley Creek, Levee Road, Bear Valley Roads, and their culverts limit both passage and rearing potential, along with the indistinct flow path in Olema Marsh created by excessive impoundment of waters.

Under the No Action Alternative, all levees and hydrologic infrastructure would remain, although they would not be maintained. The largest benefit to salmonids under this alternative would come from improvements in habitat conditions through discontinuation of agricultural management practices such as levee maintenance, dredging, cattle crossing of Lagunitas Creek, pumping of creek water for irrigation, and other factors. This would have a negligible beneficial effect on passage and rearing conditions in the Project Area. The only change in areal extent of refugia habitat would be the tidal reconnection of the East Pasture Old Slough Pond to Lagunitas Creek and Tomales Bay, which would provide a negligible beneficial increase in refugia habitat or Total Aquatic Edge of approximately 3 percent relative to existing conditions over the short-term. There would be no change in Olema Marsh, other than water levels would be expected to continue their rise, which may further affect the ability of salmonids to reach upstream portions of the watershed.

Over the long-term, slow decay or abrupt breaching of the Giacomini Ranch levees would have the potential to increase habitat for salmonids through creation of more tidal channels and side channels in the East and West Pastures and thereby increase benefits for salmonids. While these channels could provide more refugia and foraging habitat for salmonids, levee failure could also create an ecological sink such that water could flood in,



but not flow out, causing extensive stranding of aquatic species. The potential for this scenario is greater in the West Pasture than the East Pasture. This trend toward tidal reconnection with levee failure would be intensified by sea level rise, which may be increasing at a much higher rate than originally predicted. The projected rate of 3 feet of sea level rise by 2100 (Overpeck et al. 2006) could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland habitats.

Construction would have either no impact or very negligible adverse effects on salmonids.

California black rail and California clapper rail: The No Action Alternative would have a minor beneficial effect on California black rail by causing a barely detectable increase in appropriate breeding, foraging, and refugia habitat with restoration of 11.4 acres of mid- and high Tidal Salt Marsh and the continued conversion of northern portions of the West Pasture to more brackish conditions. Impacts during construction would either be non-existent or very negligible, at most.

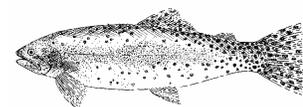
As of 1994, the undiked marsh north of the Giacomini Ranch appeared to support a breeding population of at least seven pairs of California black rails (Evens and Page 1986; Evens and Nur 2002). Breeding individuals have also been detected in intermittent years at Olema and Bear Valley Marshes, immediately south of the Giacomini Ranch (ARA 2002). During baseline surveys, black rails were detected in the Giacomini Ranch and in Olema Marsh (ARA 2002). Territorial black rails were calling on territories in May-June 2002 and were assumed breeding in the West Pasture freshwater marsh (ARA 2002). Small numbers (1-2 individuals) also occurred within the Project Area in brackish and freshwater marsh (ARA 2002). There is no recent information since 2001-2002 on the number of breeding pairs, although it is possible that numbers have decreased (J. Evens, ARA, *pers. comm.*).

In the early 1900s, when tidal marshes were more extensive, clapper rails were reported as occurring in Tomales Bay (Grinnell and Miller 1944). In 1980, one bird was heard in the portion of the East Pasture adjacent to Tomasini Creek (J. Evens, unpub. field notes). Since then, the species has been largely absent, although individuals were sighted for years in the undiked marsh north of the Giacomini Ranch during fall and winter between 1995 and 2001 (J. Evens, R. Stallcup, unpub. field notes). There are no recent breeding records, however. Except for the "intermittent presence of wandering or wintering birds," the population of clapper rails in Tomales Bay appears to be extirpated (ARA 2002).

Black rails both forage and nest in the mid- to high marsh plain, well above the low marsh and intertidal mudflats favored by clapper rails. During higher high tides, black rails move to higher elevations in marshes or adjacent upland areas to escape floodwaters, because rails are poor fliers and unable to fly long distances. Optimal high tide refugia habitat is not inundated, even during higher high tide water levels, and is well-vegetated with at least medium-sized plants to provide cover from predators that use high tides as an opportunity to prey on rails (J. Evens, ARA, *pers. comm.*). Unlike black rails, clapper rails prefer to forage in low marsh areas with sparse vegetation, mudflats, and tidal sloughs (ARA 2002). Higher marsh areas with dense vegetation are used for nesting and high-tide refugia (Albertson and Evens 2000).

Black rail habitat in the Project Area and adjacent undiked marsh to the north of the Giacomini Ranch currently totals 120 acres, with approximately 39 acres of refugia habitat, some of which is the Giacomini Ranch levees. Within the immediate Project Area, black rail habitat totals approximately 59.3 acres with 32.4 acres of high tide refugia. Clapper rail habitat occurs in the northern portion of the Project Area and the adjacent undiked marsh, totaling at least 116.8 acres of foraging and nesting habitat, in addition to the 39 acres of high tide refugia.

Under the No Action Alternative, approximately 11.0 acres of mid-marsh Tidal Salt Marsh habitat would be created, along with 0.4 acres of high marsh/upland ecotone. The restoration would provide benefits primarily to black rail, although clapper rail could receive negligible benefits from the lower elevation marsh portions, too. While rails do not currently use the East Pasture, the proximity of the restoration area to the undiked marsh makes it more likely that rails might expand into the East Pasture. In addition to the 0.4 acres of high marsh/upland ecotone habitat that would be created, rails could also avail themselves of the nearby Tomasini Creek levee or the newly created high tide refugia in the northeastern portion of the West Pasture during high tide conditions. The Park Service is currently planning a habitat enhancement project that would include approximately 1.0 acres of high tide refugia. This project involves widening and revegetation of the existing north levee of the West Pasture to enhance refugia conditions.



Another change that would benefit California black rail is the continued conversion of the northern portions of the West Pasture, including the freshwater marsh, to Muted Tidal Brackish Marsh. The conversion is discussed in more detail under General Wildlife and California red-legged frog.

In other areas, decreases in rail numbers might be expected from continuation of existing conditions. Potential occurrence of a non-native isopod in the undiked marsh north of Giacomini Ranch could threaten valuable high marsh habitat for black rails adjacent to tidal creeks, because of accelerated rates of bank slumping and creek widening. Also, under this alternative, the West Pasture north levee would not be removed. Rails often use these levees during storms and extreme high tide events. While the levees are well above most of the higher high tides, they are often poorly vegetated due to trampling from cattle and people and are subject to disturbance pressures from people using the existing informal trail to view the rails who may inadvertently flush them into the open where they are vulnerable to predation. In addition, steadily increasing water levels in Olema Marsh, which is causing conversion of riparian to Freshwater Marsh and Open Water habitat, would potentially decrease suitability of this habitat for black rail.

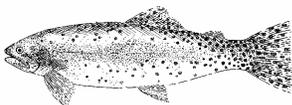
Over the long-term, slow decay or abrupt breaching of the Giacomini Ranch levees would have the potential to increase nesting, foraging, and roosting habitat for rails through creation of more low- and mid-marsh intertidal emergent marsh. This trend toward tidal reconnection with levee failure would be intensified by sea level rise, which may be increasing at a much higher rate than originally predicted. The projected rate of 3 feet of sea level rise by 2100 (Overpeck et al. 2006) could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland habitats. While this trend could increase available rail habitat in the Giacomini Ranch, it would potentially decrease habitat and numbers of black rails in Olema Marsh, because of a continued rise in water levels.

Loss of levees from decay or breaching would reduce the amount of high-tide refugia available. Other than the created high tide refugia in the northwestern and northeastern corners of the East and West Pastures, respectively, and possibly portions of the Tomasini Creek levee, most of the remaining refugia during high tides would come from riparian and upland habitat along Sir Francis Drake Boulevard, which might have more problems with disturbance due to the presence of peoples, pets, and other more urban factors. Depending upon the southernmost extent of intertidal marsh formed following levee failure, rails may begin using some of the higher elevation areas in the southern portions of the pastures that would generally be above higher high tides. These areas are also physically linked to road and trail corridors, which increase the potential for disturbance and predation by birds and mammals. However, the quality of high tide refugia under this alternative may not differ substantially from that under existing conditions, which, as noted earlier, consists of poorly vegetated and often highly trampled levees and muted tidal portions of ruderal pastures. Taking these factors into consideration, over the long term, the No Action Alternative would be expected to have at least a moderate beneficial effect on rail habitat and populations.

Creation of the 11-acre marsh at the northeastern corner of the property would require use of equipment within the vicinity of existing rail habitat in the undiked marsh across the Lagunitas Creek channel from the East Pasture. Mitigation measures are discussed in a separate sub-section below.

Other Special Status Species: The effects of the No Action Alternative would generally range from negligible beneficial effects to negligible to moderate adverse effects depending on the species. Impacts to these species during construction of the 11-acre wetland restoration/mitigation component would be non-existent to negligible adverse.

Species included in this category are federally or state-listed threatened and endangered species that are only occasional visitors or vagrants to the Project Area or were formerly listed as a Species of Concern by the Sacramento office of the USFWS. The discontinuation of agricultural management practices such as levee maintenance, ditching, and withdrawal of water for the purposes of irrigation would have negligible beneficial effects on species such as **California freshwater shrimp**, California brown pelican, green sturgeon, **southwestern river otter**, and **northwestern pond turtle**, because of the reduction in potential for impacts associated with these practices. Saltmarsh common yellowthroat would benefit at least negligibly from the reestablishment of riparian vegetation following removal of grazing pressure. The American peregrine falcon would also benefit negligibly under this alternative from an increase in the vole and mouse population with discontinuation of mowing and manure spreading and the reduction or elimination of grazing. Sandhill crane, which is a very rare visitor to wet pastures, would not be affected under the No Action Alternative.



Over the long-term, the slow decay or abrupt breaching of the levees anticipated under this alternative could change the nature of impacts for at least two of the species. With levee failure, grassland would be converted into tidal and brackish marsh. This shift could decrease the number of rodents in the Giacomini Ranch relative to baseline conditions and potentially have a negligible adverse effect on peregrine falcon numbers and use.

This change could have a moderate adverse impact on **northwestern pond turtle**. The increase in salinities, coupled with the loss of levees possibly used for aestivation, would have an appreciable effect on the use of the ranch by this species and would lead to a decrease in its numbers. In addition, the turtle may be adversely affected by reconnection of the East Pasture Old Slough Pond, although turtles have not been sighted in this area (Fellers and Guscio 2002): Mitigation measures for this portion of the proposed project are discussed in a separate sub-section below. The turtle may possibly move into Olema Marsh, which would actually have a small net increase in Freshwater Marsh habitat. It has not been documented currently in the marsh, although it occurs in nearby reaches of Lagunitas Creek, so it is possible that habitat conditions are not appropriate for this species (e.g., not enough basking or aestivation sites).

Possible Additional Mitigation Measures: Standard BMPs would be implemented to reduce impacts to special status species and wildlife habitats are discussed under Chapter 2. All construction and staging/stockpiling areas would be cleared by biologists prior to use to ensure that there are no nesting or breeding species within the vicinity of the Project Area or staging/stockpile areas prior to implementation. Measures specific to certain species are described below:

California red-legged frog: Construction activities would include removal of roads, fences, and ditches within the Project Area, and excavation of certain portions of the East Pasture Old Slough. Though not documented as supporting breeding habitat, the Old Slough and ditches may provide non-breeding habitat. Construction activities adjacent to or within California red-legged frog habitat documented as breeding habitat would not be conducted until August. Pre-construction surveys would be completed in all construction areas to confirm that no red-legged frogs are present. Frogs encountered would be relocated.

Tidewater goby: Construction would not occur in or directly adjacent to existing tidewater goby habitat during the typical season of reproduction for tidewater goby documented in the literature (late April – early summer; Swift 2003). Prior to construction in the East Pasture Old Slough Pond, extensive seining would be performed after some dewatering to lower water levels and to increase the efficiency of trapping. Minnow traps and dipnets may also be used to increase capture rates. Captured fish would be immediately relocated to Tomasini Creek.

California black rail and California clapper rail: The East Pasture is across Lagunitas Creek from established habitat for California black rail and California clapper rail, but is not currently identified as rail habitat. The project would comply with directives to not come within 250 feet of established rail habitat prior to August 31 by delaying construction in the northern portion of the East Pasture until September.

Northwestern pond turtle: Prior to construction in the ditches and East Pasture Old Slough, water levels would be lowered to the extent possible, and turtles would be trapped and relocated to appropriate habitat, either Lagunitas Creek or the Martinelli Ponds in the Martinelli Ranch directly to the north of the Giacomini Ranch.

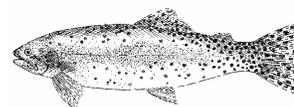
Effectiveness of Proposed Additional Mitigation Measures

California red-legged frog: The mitigation measures should reduce any potential impacts to negligible levels.

Tidewater goby: The mitigation measures would be expected to reduce impacts, but impacts cannot be eliminated. Even with extensive seining, some mortality of fish would be expected, because tidewater goby burrow in the mud, making it extremely difficult to trap all fish. Construction would, therefore, result in incidental take. The proposed mitigation measure would result in this alternative having moderate adverse impacts on tidewater goby during construction.

California black rail and California clapper rail: The mitigation measures should reduce any potential impacts to negligible levels.

Northwestern pond turtle: The mitigation measures would be expected to reduce impacts, but would not eliminate them. Even with dewatering of the channels and extensive trapping, some mortality of turtles would



be expected. The proposed mitigation measure would result in this alternative having moderate adverse impacts on turtles during construction.

Cumulative Impacts: Generally, the No Action Alternative would not result in major or substantial cumulative impacts on common or special status species wildlife habitat or use in the Project Area with other proposed projects or plans in the region. Cumulative effects for most species, if any effects exist, would be characterized as beneficial negligible.

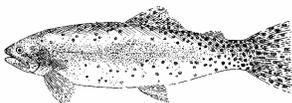
There are a number of projects in the Seashore and Marin County region that would have -- or have had -- effects on California red-legged frogs and red-legged frog breeding habitat. These projects include the Bear Valley Creek Watershed and Fishery Enhancement Project; Coastal Watershed Restoration – Drake's Estero Road Crossing; Coastal Watershed Restoration – Geomorphic Restoration Project; Horseshoe Pond Restoration Project; Wetland Restoration Project at Big Lagoon, and the County of Marin Culvert Cleaning project. The County of Marin is planning on cleaning out a ditch and culverts that convey flow from Silver Hills Creek to Lagunitas Creek along the perimeter of Olema Marsh, a documented red-legged frog breeding area, in either fall of 2007 or 2008. The Bear Valley Creek and Drake's Estero Road Crossing project would cause temporary impacts to non-breeding habitat. The Drake's Estero project is scheduled to be constructed in 2007, and there is no definitive timeframe for construction of the Bear Valley Creek project. The Geomorphic Restoration Project, which would also be constructed in 2007 and 2008, would have moderate impacts on red-legged frog breeding habitat, but these impacts are being mitigated to negligible or minor levels through a suite of pond creation, maintenance, and repair actions in the Seashore. The Horseshoe Pond Restoration Project has already been constructed and had at least moderate impacts on red-legged frog populations in this area, although some of the impacts have been mitigated through implemented or planned construction or enhancement of ponds in the upper watershed. Impacts to red-legged frog from implementation of the Big Lagoon project would potentially be major, but this project would not affect the same portion of the Core Area. Based on this range of impacts, cumulative effects from implementation of the No Action Alternative in combination with these constructed or proposed projects would remain negligible to minor adverse, because most of the impacts are being mitigated to negligible or minor levels.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of the No Action Alternative on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to minor beneficial (Table 75). Under the No Action Alternative, levees, tidegates, and culverts in the Giacomini Ranch are not breached or removed, except for the 11-acre wetland restoration area in the northeastern corner of the East Pasture. Construction of the No Action Alternative would have only very negligible adverse effects, if any, on High Value Wildlife Habitats and use by common wildlife species, however, there could be minor to moderate adverse impacts on special status species such as tidewater goby.

Over the long-term, the No Action would be expected to would have minor beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some very negligible adverse impacts during construction of the 11-acre wetland restoration/mitigation component. As there would be no change in public access facilities under the No Action Alternative, no detectable change would be expected in terms of visitation and, consequently, in the potential effects on visitors on wildlife use, success of breeding efforts, and other behavioral variables relative to baseline conditions.

Under this alternative, the Giacomini Ranch would largely remain grassland, although it would change in nature due to the elimination of grazing or reduced grazing intensity and the elimination of intensive agricultural management practices. The acreage of wetland and riparian habitats would increase in the Giacomini Ranch, because of the 11-acre wetland restoration component, the reduced grazing pressure on riparian habitat, and the expansion of Freshwater Marsh habitats with the elimination of frequent ditching to drain pastures. These factors would potentially cause a minor increase of approximately 6 percent in High Value Wildlife Habitats. Over time, with slow decay or abrupt breaching of levees, grasslands would begin converting to brackish and tidal marsh habitats, thereby attracting a different assemblage of wildlife species. These brackish and tidal marsh habitats would possibly continue to evolve in the future in response to sea level rise, which may be increasing at a much greater rate than was originally predicted (Overpeck et al. 2006).



The small increase in High Value Wildlife Habitats would have a negligible beneficial effect over the long-term on use of the Project Area, with use by common and special status wildlife species potentially increasing by as much as 3 percent. The largest changes in wildlife use under this alternative would be expected to come from increased use of expanded Forested and Scrub Shrub Riparian habitat by resident and Neotropical migrant passerines or riparian bird species. In general, amphibians and reptiles would be the most adversely affected by the No Action Alternative. The No Action Alternative would have a negligible adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions. Only a negligible beneficial would be expected in terms of support of wildlife species in southern portion of the Tomales Bay watershed, with most of the benefits coming from discontinuation of agricultural management practices in the Project Area that affect conditions in Lagunitas and, ultimately, the bay.

California red-legged frog: The No Action Alternative would have a negligible adverse effect on California red-legged frog breeding habitat units and distribution of the species in the Point Reyes Peninsula Core Area, but a minor adverse effect on distribution of red-legged frogs in the Project Area. Over the long-term, impacts could possibly increase to minor, because degradation of the levees and sea level rise could cause a measurable effect on breeding habitat units and regional distribution. Impacts during construction of the wetland mitigation/restoration component in the northern portion of the East Pasture where no breeding has been documented would be expected to be non-existent or very negligible. There is a potential for cumulative impacts with other projects proposed in the Seashore or Marin County region, but, based on evaluation of impacts and proposed mitigation measures for those projects, impacts under this alternative would still be characterized as negligible to minor adverse.

Tidewater goby: The No Action Alternative would have very negligible beneficial effects on tidewater goby in the Project Area through a potential increase in quality of existing habitat, although, over the long term, slow decay or sudden breaching of levees could increase the benefits to tidewater goby by increasing the amount of available habitat. Impacts during construction would be expected minor to moderate at most, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Salmonids: The No Action Alternative would have a very negligible beneficial effect on salmonid rearing and passage habitat in the Project Area. No impacts to at the very most very negligible effects on salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration/mitigation component

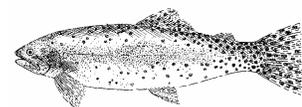
California black rail/California clapper rail: The No Action Alternative would have a negligible beneficial effect on California black rail by causing a barely detectable increase in appropriate breeding, foraging, and refugia habitat with restoration of 11.4 acres of mid- and high Tidal Salt Marsh. Impacts during construction would either be non-existent or very negligible, at most.

Other Special Status Species: The effects of the No Action Alternative would generally range from negligible beneficial effects to negligible to moderate adverse effects depending on the species. Impacts to these species during construction of the 11-acre wetland restoration/mitigation component would be non-existent to negligible adverse.

Alternative A

Analysis: The effects of Alternative A on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to major beneficial. Under Alternative A, the East Pasture would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. There would be no restoration or construction of new public access facilities in the West Pasture or Olema Marsh, except for the potential future extension of the southern perimeter trail to Inverness Park. The levees along and tidegate/culvert in the West Pasture and Tomasini Creek would be retained, but not maintained. In the East Pasture, restoration would involve breaching of levees in the East Pasture along Lagunitas Creek, and excavation of new tidal channels. The southwestern corner of the creek bank would be regraded to a more stable profile and actively revegetated with riparian vegetation. Most of the actions under this alternative focus on removal or restoration of agricultural infrastructure such as filling of ditches, ripping of compacted roads, fence removal, and removal of pumps, pipelines, and concrete spillways.

Wildlife Habitats and General Wildlife Use – Project Implementation: Over the long-term, the Alternative A would be expected to have moderate beneficial effects on High Value Wildlife Habitats in the Project Area,



although there may be some minor adverse impacts during construction in the East Pasture. The largest single change under this alternative relative to the No Action Alternative would come from the substantial conversion of grassland to salt and brackish marsh through breaching of the East Pasture levee, removal of agricultural infrastructure, and tidal reconnection and expansion of the historic tidal slough. Through these actions, more than two-thirds of the East Pasture would be expected to shift from grassland to marsh. A transitional period would be expected over the short-term during which, as pasturelands slowly convert through exposure to saline conditions to marsh, restored areas would be dominated by a mix of non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions such as brass buttons, annual beard-grass, loosestrife, birdfoot trefoil, curly dock, and others. During this period, impacts to High Value Wildlife habitats would be negligible adverse, because much of the habitat being disturbed consists of highly managed pasturelands: while these type of habitats provide value, they are of lower value than many other unmanaged or less managed habitats.

The moderate increase in High Value Wildlife Habitats would have a minor beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species measurably increasing. Some of the largest changes in wildlife use under this alternative would be expected to come from increased use of expanded marsh and riparian habitats by waterbirds such as California black rail, marsh passerines, and resident and Neotropical migrant passerines or riparian bird species. Abundance and areal extent of fish and invertebrate species would increase, as well. As with the No Action Alternative, however, amphibians and reptiles would be the taxa most adversely affected by implementation of this alternative.

Under Alternative A, Tidal Salt Marsh, a High Value Wildlife Habitat, would increase more than 350 percent relative to both baseline conditions and the No Action Alternative. Tidal Brackish Marsh could increase almost 50 percent through expansion of tidal reconnection of the East Pasture and the East Pasture Old Slough and limited creation of new tidal channels. The conversion of agricultural lands to Tidal Salt Marsh would decrease abundance of some species, but increase abundance of others. Grassland-associated species such as western meadowlarks, savannah sparrows, and grasshopper sparrows would dwindle in numbers, as would voles and other ground-based mammals that are prey for raptor species. Use by certain waterfowl and shorebirds that utilize open, ponded pasture such as yellowlegs and green-winged teal would also decrease, although preservation of the shallowly flooded and sparsely vegetated flats in the northeastern corner of the East Pasture would continue to provide alternate high tide habitats for waterfowl and shorebirds during the winter as it does now.

However, the conversion to marsh would benefit six special-status bird species: California black rail, great egret, saltmarsh common yellowthroat, short-eared owl, and peregrine falcon, by expanding foraging, nesting and/or rearing, and refuge habitat. These habitats would also benefit generalist waterbirds such as great egret and generalist shorebirds such as willet, godwit, and greater yellowlegs. Salt marsh also provides foraging habitat for raptor species - such as short-eared owl, white-tailed kite, northern harrier, and peregrine falcon - drawn to the site by small vertebrates such as California voles, shrews, and garter snakes. Other species also use marshes for foraging, including small mammals, passerine birds, and shorebirds. The Muted Tidal Brackish Marsh - Mudflat/Panne in the southeastern portion of the East Pasture would continue to attract moderately high numbers of shorebirds and waterfowl during the winter and provide alternate habitat for these species during high tide conditions within Tomales Bay.

In addition to substantially expanding the areal extent of tidal salt marsh habitat, Alternative A would improve the quality of existing salt marsh habitat through cessation of agricultural practices: removal of irrigation infrastructure and elimination of active grazing would lead to an increase in structural complexity and the percentage of native plant species in the salt marsh community, which would result in a greater diversity of habitat patches and an increase in high-quality edge habitat. The value of the newly created Tidal Salt Marsh and Tidal Brackish Marsh habitats to wildlife would be promoted by the presence of a large tract of undiked tidal salt and brackish marsh habitats immediately adjacent to the East Pasture in the undiked marsh. While not physically contiguous, this proximity between areas encourages a synergistic effect in which wildlife numbers would be higher together than they would have been separately, because of the affinity of many species for unfragmented, larger habitats.

Under Alternative A, Tidal Salt Marsh-High/Upland Ecotone habitat would almost triple, with this higher elevation habitat establishing in the southern portion of the East Pasture where tidal influence is restricted to higher high and extreme storm tides. This habitat provides refuge for salt marsh species such as California clapper rail, California black rail during high tides and winter flood events. The salt marsh upland ecotone habitat also provides resting and cover habitat for those species that travel frequently between open water,



marsh, riparian forest, and grassland habitats, including the saltmarsh common yellowthroat, song sparrow, savannah sparrow, wrentit, and other passerine birds.

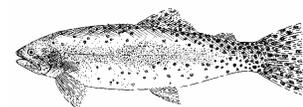
Grazing removal would favor natural expansion of riparian habitat along Fish Hatchery Creek and the western perimeter where groundwater flow creates optimal conditions for riparian vegetation. Riparian habitat, on the other hand, would continue to potentially decrease in Olema Marsh in response to what appears to be increasing water levels caused by poor drainage from undersized culverts and other factors. Open water and Freshwater Marsh communities would increase as a result. Overall, Forested and Scrub Shrub Riparian Habitat could increase more than 10 percent from removal of grazing and agricultural management, although some riparian habitat would be eliminated to create the through-trail component for the eastern perimeter trail and possibly also the potential future extension of the southern perimeter trail to Inverness Park.

The eastern perimeter trail would result in a permanent loss of 0.54 acres of riparian habitat and another 0.34 acres of temporary loss from trimming or limb removal. Trimmed vegetation would regrow relatively quickly, but, even with rapid regrowth, the trail would still represent a disturbance factor and would fragment the already narrow Tomasini Creek east bank riparian corridor. This fragmentation could affect the relative abundance and success of breeding for species observed to breed in this riparian thicket, including saltmarsh common yellowthroat and Swainson's thrush (J. Evens, ARA, pers. comm.). Construction of the southern perimeter trail and the possible extension of that trail to Inverness Park could also affect common yellowthroat, which is known to breed in the general vicinity of both of those areas. Construction of the southern perimeter trail would involve only limited removal of vegetation for the bridge, but one of the two possible options for extending the southern perimeter trail to Inverness Park includes widening of the Sir Francis Drake Boulevard road berm through placement of fill in wetlands and removal of a considerable amount of riparian revegetation. The other option would involve a boardwalk through the West Pasture and would have much less direct impacts to wildlife habitat. Riparian habitat provides structural refuge critical to passerine birds, including saltmarsh common yellowthroat; mammals, such as southwestern river otter, dusky-footed woodrat, and black-tailed deer; and amphibians, including California red-legged, and Pacific tree frog. Many vertebrate species utilize tidal salt marsh and freshwater marsh habitats for foraging, but also require nearby high-quality riparian forest or scrub shrub habitat for resting and refuge.

Under Alternative A, the extent of subtidal and intertidal channels in the Project Area would increase more than 10 percent relative to existing conditions. This change would result from removal of the levees between Lagunitas Creek and the East Pasture and reconnection and expansion of the historic slough (East Pasture Old Slough). Breaching of the levees would allow for saline and brackish waters to inundate existing channels and the existing Old Duck Pond. The increase in sub- and intertidal waters in the East Pasture would benefit species such as the southwestern river otter, waterfowl and waterbirds, fish-eating raptors, and estuarine fish and invertebrates. This increase in tidally driven subtidal and intertidal habitats would account for the corresponding loss in non-tidal freshwater pond and channel habitat due to the expansion of tidal influence into the historic slough channels and the Old Duck Pond in the East Pasture. Expansion of these lower energy subtidal and intertidal habitats could provide new habitat for numerous estuarine and brackish aquatic species, including tidewater and arrow goby. Tidal channel creation would be limited in the northeastern corner of the East Pasture to preserve the shallow shorebird area where prolonged ponding has created sparsely vegetated flats that attract waterfowl and shorebirds during the winter, particularly when tides are high in Lagunitas Creek and the adjacent undiked marshlands.

As discussed under the No Action Alternative, the current conversion of approximately half of the West Pasture freshwater marsh from Freshwater Marsh to Muted Tidal Brackish Marsh would continue. Since repair of the failed tidegates in 2003, tidal waters have flowed into the marsh during the higher high tides in winter and have remained ponded there for several months due to poor drainage conditions. This saltwater intrusion has increased maximum and average salinities within the marsh and started to convert at least the lower-elevation northern portions of the Freshwater Marsh habitat to Muted Tidal Brackish Marsh. This conversion may have already caused impacts to the California red-legged frog population, as abundance has not rebounded since the initial baseline study documented relatively high numbers in 2001 (G. Fellers, USGS, unpub. data). Numbers of these frogs would be expected to continue to remain low under Alternative A.

In addition to the red-legged frog, another special status species, the Northwestern pond turtle, would be adversely affected by these changes, with barely detectable to measurable changes in habitat and numbers expected. These same factors would also, however, have a beneficial effect on the amphibian and reptile community by decreasing the extent of appropriate habitat for a non-native predator of the red-legged frog, the bullfrog, which occurs in the East Pasture, Tomasini Creek, and the West Pasture. Some of the adverse



impacts to native amphibian and reptile species from loss of a portion of this marsh may be countered to some degree by increases in Freshwater Marsh habitat on the perimeter of the Giacomini Ranch where groundwater influence is strong because of the lack of draining and ditching activities. This issue is discussed further under the Special Status Species portion of this section. While negatively affecting frogs, the conversion of this habitat would benefit passerine bird species, such as salt marsh common yellowthroat and red-winged blackbird, which use tall vegetation for nesting and resting habitat while maintaining close proximity to more open foraging habitat.

As discussed under the No Action Alternative, increasing water levels in Olema Marsh and the associated decline in riparian habitat would result in a decline in riparian-associated avian species (e.g. warbling vireo, Swainson's thrush, and Wilson's warbler) at the marsh, although there may be an increase in species (e.g. swallows) that nest in cavities in snags and forage over the expanding Freshwater Marsh. The increasing water levels and predicted subsequent expansion of Freshwater Marsh would continue to support marsh wrens, song sparrows, salt marsh common yellowthroat, and Virginia rails, as well as migratory waterfowl. The expansion of freshwater marsh may increase breeding potential for waterfowl species such as mallard, gadwall, and Canada goose in Olema Marsh. In addition, it could increase habitat for California red-legged frog and bullfrog, both of which currently occur in the marsh.

Wildlife Habitats and General Wildlife Use – Long-Term Changes: The brackish and tidal marsh habitats described above would eventually develop after a short-term (~ 10 years) transitional period in which grassland is converted into marsh. These habitats would possibly continue to evolve in the future in response to sea level rise, which may be increasing at a much greater rate than was originally predicted (Overpeck et al. 2006). The projected rate of 3 feet of sea level rise by 2100 could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions to intertidal emergent wetland habitats. This shift would attract specific avian species such as diving ducks, dabbling ducks, marsh-associated passerines, and other aquatic species.

Over the long-term, the increase in public access facilities relative to existing conditions could increase disturbance of wildlife through causing wildlife to avoid highly trafficked areas, flushing wildlife repeatedly, and decreasing reproductive success through damage to eggs from trampling or nest abandonment. While results of some studies are equivocal on the effects of public access on wildlife (Sokale and Truljio 2000), most studies point to public access as not only causing immediate adverse responses such as flushing or death, but more indirect or long-term responses such as altered behavior, reduced health and productivity, and changes in abundance or species composition (BCDC 2001). Construction of the southern perimeter trail would greatly increase wildlife viewing opportunities on this reach of Lagunitas Creek and could increase adverse effects on wildlife, depending on visitation numbers. However, this area already receives a considerable amount of disturbance from users of the existing informal path, Giacomini Ranch maintenance, users of the Green Bridge and White House Pool County parks, and residents along Levee Road. In this context, impacts relative to existing conditions would be expected to be only negligible adverse.

Conversely, the eastern perimeter trail area is currently not used as a trail nor regularly maintained, and adjacent homes are some distance above on the Point Reyes Mesa bluff. The eastern perimeter trail would not only directly affect riparian habitat through permanent and temporary construction-related loss, but would lessen the quality of the remaining riparian habitat for breeding birds and other wildlife species. It is possible that this trail would also cause decreases in use of the shallow shorebird area in the eastern portion of the East Pasture, which is frequented by shorebirds and ducks in mid-winter to early spring. However, the shallow shorebird area would be separated from the trail by Tomasini Creek and its berm, so only a considerable amount of noise and activity from visitors would probably have an effect. Relative to existing conditions, this trail would be expected to have minor and at the most moderate adverse impacts on wildlife use.

In addition, under Alternative A, the informal path on the Giacomini Ranch north levee would remain. While usually used only infrequently, this trail attracts large numbers of birdwatchers during the winter and spring high tide events to see California black rails, which are less secretive and easier to spot during these conditions. The levee on which the trail has developed is used by these relatively poor fliers during high water events, because of the lack of other suitable upland habitat adjacent to the marsh. Use of the levee during these periods flushes rails from their refugia and may increase their risk of predation. An increase in marsh habitat and elimination of the dairy could encourage more birdwatchers to use this trail and, thereby, increase impacts to this special status species.



Wildlife Habitats and General Wildlife Use – Construction: Construction of Alternative A would generally have only negligible adverse effects on High Value Wildlife Habitats and use by common wildlife species. Special status species are discussed individually.

Three of the proposed construction activities would have the highest potential to affect both common and special status wildlife species. These activities are regrading of the southwestern levee in the East Pasture and creek bank to a more stable profile, filling of drainage ditches, and tidal reconnection of the East Pasture Old Slough Pond. Grading of the southwestern levee in the East Pasture has the potential to negatively affect aquatic organisms in the White House Pool reach such as California freshwater shrimp through incidental sediment discharge during earthmoving and removal of willows that provide overhanging shade and habitat complexity in surface waters. Similar impacts could occur in areas where the levee is breached.

During removal of agricultural infrastructure, a portion of the drainage ditch system would be plugged with a dense clay material, filled to surrounding elevation grades, and finely graded. This 0.27 acres of ditch system supports a relatively depauperate aquatic community, comprised only of a few hardy invertebrates, mosquitofish, threespine stickleback, arrow goby, and crayfish. However, in 2006, tidewater goby were discovered in the East Pasture Old Slough Pond, the northernmost remnant of a historic slough system that has been leveed, dredged, and, in many areas, straightened to be part of the ditch system. Because this area is not tidally connected or connected to existing muted tidal habitats, this fish must have established either during the period when the East Pasture was completely flooded in December 2005-January 2006 or through access of the pond via a leaking set of tidegates. The ditches also support northwestern pond turtle and very low numbers of adult red-legged frog. The pond, adjacent portions of the ditch system, and a shoal on the outboard side of the levee would be shallowly excavated to improve hydraulic connection of the East Pasture Old Slough with Tomales Bay. Some tall emergent vegetation within the ditch would be removed. These actions have the potential to impact wildlife either through direct mortality or through disruption of the breeding cycle. Non-resident species such as waterfowl, waterbirds, and southwestern river otter would not be impacted unless nesting or breeding was occurring: as noted earlier, pre-construction surveys would be conducted prior to initiating construction to ensure that construction activities do not disrupt breeding, nesting, or fledging/rearing.

Based on the scale and timing of construction activities that could affect High Value Wildlife Habitats and use by common wildlife species, the impacts of construction are characterized as negligible adverse. The intensity of construction impacts on special status species is addressed separately below. Mitigation measures are discussed in a separate sub-section below.

Invasive Wildlife Species: Alternative A would have a minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions. Under this alternative, most of the invasive species already present in the Project Area would be expected to remain, with a possible establishment into or expansion of numbers or extent within the fully tidal East Pasture and the muted tidal West Pasture by some of the aquatic invasive species such as European green crab, Korean shrimp, and possibly the New Zealand burrowing isopod and yellowfin goby. These species represent animals already present within the Project Area and Tomales Bay watershed.

There is a potential for future invasion as well by animals that are not yet found in the watershed, but that are likely to invade this estuary in the future because of their rapid spread within other regional estuaries such as San Francisco Bay. Some of the most highly invasive taxa within estuarine habitats are fish and invertebrates. Recent studies on restored and natural marshes of varying age in the Sacramento Delta and northern San Francisco Bay have found that the invertebrate community is dominated by non-native polychaetes, crustaceans, and bivalves, some of which are having profound effects on the Bay-Delta ecosystem (Simenstad and Bollens 2002). Among these species are Asian clam (*Potamocorbula amurensis*), which is a highly invasive species currently found in very high densities in northern San Francisco Bay sediments, and Chinese mitten crab (*Eriocheir sinensis*), which was introduced into San Pablo Bay sometime before 1994 and has subsequently spread throughout the South Bay and Bay-Delta areas. The Asian clam and some of its counterparts have been strongly linked with large-scale reductions in phytoplankton biomass that have changed over the past few decades the food chain dynamics of the Bay-Delta ecosystem.

As with the No Action Alternative, Alternative A would have some effect on freshwater and terrestrial invasive species, as well. Under both the No Action Alternative and Alternative A, the northern half of the freshwater marsh in the West Pasture would continue to convert to Muted Tidal Brackish Marsh habitat. In addition to California red-legged frog and Pacific tree frog, this marsh also supports an unknown number of bullfrogs,



which were sighted for the first time in 2006 (P. Kleeman, *USGS, pers. comm.*). Other invasive freshwater aquatic species include mosquitofish and crayfish, both of which are currently found within the Project Area. Reintroduction of tidal action to the East Pasture, combined with filling of a portion of the drainage ditches, would decrease numbers and areal extent of these species, although mosquitofish have also occur in more saline waters in undiked areas (NPS, unpub. data), suggesting that this species can tolerate brackish conditions.

Over the long-term, then, numbers and areal extent of these species would contract in response to increased tidal inundation, but they would be likely to persist in creeks and fringe habitats along the ranch perimeter where conditions are more appropriate. While changes in some portions of the Giacomini Ranch might be detrimental to freshwater species, the current trend in Olema Marsh of conversion of riparian habitat to Freshwater Marsh and permanently flooded Open Water would be expected to continue, thereby maintaining or even increasing numbers of bullfrogs. Mosquitofish and crayfish have not been observed in this system, but the marsh is difficult to survey, so it is possible that at least mosquitofish occur there.

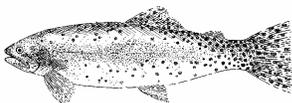
The large-scale conversion of grassland to marsh habitats would reduce at least the areal extent of potential habitat for red fox and wild turkey and possibly for feral cats and dogs, as well. These species, however, are somewhat opportunistic and would be expected to persist along the edges of the Giacomini Ranch where conditions are appropriate. These species would continue to access East and West Pasture grassland areas for foraging, resting, and other purposes. Red fox and feral cats, as well as Norway rats, have been implicated strongly in the decline of rail populations in San Francisco Bay. Monitoring throughout the Seashore for impacts of feral cats and dogs is ongoing (N. Gates, wildlife biologist, Seashore, *pers. comm.*). Should impacts on special status species or other species of concern in the Project Area be detected, removal of feral animals will be implemented as mandated by Park Service Management Policies (NPS 2006, Section 4.4.2.1).

Wildlife Conditions in the Watershed: Tidal reconnection of the 350-acre East Pasture to Lagunitas Creek would have a minor beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. Tidal reconnection would increase considerably the potential for export of sources of carbon such as dissolved and particulate organic carbon, phytoplankton, seeds and other plant matter, and aquatic organisms to the bay. In addition, marine and estuarine species that wander into the southern portion of the bay in search of food would be able to access the East Pasture through the newly reconnected East Pasture Old Slough. This tidal channel network would provide not only access to food sources, but refugia. In addition, as with the No Action Alternative, discontinuation of agricultural management practices in the Project Area would also affect conditions in Lagunitas and, ultimately, the bay. Watershed habitat quality would be improved by discontinuation of levee maintenance, withdrawal of water for irrigation, infrequent pumping of waters from the ranch into Lagunitas Creek, and crossing of Lagunitas Creek by cattle.

California red-legged frog: Similar to the No Action Alternative, Alternative A would have a negligible adverse effect on California red-legged frog breeding habitat units and distribution of the species in the Point Reyes Peninsula Core Area, but a minor adverse effect on distribution of red-legged frogs in the Project Area. Over the long-term, impacts could possibly increase to minor, because degradation of the levees in the West Pasture and sea level rise could cause a measurable effect on breeding habitat units and regional distribution. Impacts during construction of the wetland mitigation/restoration component in the northern portion of the East Pasture where no breeding has been documented would be expected to be non-existent or very negligible.

Baseline studies documented two general areas that provide breeding habitat for red-legged frog. The largest of these is the West Pasture freshwater marsh. Breeding also has sporadically occurred in adjacent Fish Hatchery Creek, creating another 1.0 acre of breeding habitat in the West Pasture. The second breeding habitat is in the Olema Marsh and is assumed to comprise all of the areas with Freshwater Marsh and Open Water, which total 39 acres. There is no documented breeding habitat in the East Pasture, although a few adult frogs were observed during baseline surveys (Fellers and Guscio 2002).

As discussed under the No Action Alternative, the pattern of saltwater intrusion converting the northern half of the West Pasture freshwater marsh to brackish marsh would continue. The southern half would still not be affected by salinity intrusion, perhaps because of slightly higher elevations, which reduce the reach of tides, and high perennial freshwater inflow from the 1906 Drainage and Inverness Ridge groundwater. The Park Service is conducting a habitat enhancement project in 2006 that would slightly expand higher elevation Freshwater Marsh habitat by approximately 0.4 acres. In addition, continued increases in water levels in Olema Marsh due to poor drainage would continue to convert Forested and Scrub Shrub Riparian habitat to Freshwater Marsh and Open Water habitat, perhaps providing a very negligible increase in breeding habitat for



red-legged frog. Because breeding frogs are currently located in the West Pasture, across Lagunitas Creek from the East Pasture, the large-scale conversion of grassland to marsh in the East Pasture is characterized as a minor adverse impact to non-breeding habitat.

While the West Pasture levees and infrastructure would remain under Alternative A, discontinuation of levee maintenance would result in slow decay of levee and tidegate facilities. The slow decay or sudden breach during large storm events of these facilities would allow for greater tidal flooding and thereby further reduce viable red-legged frog breeding habitat in the West Pasture. Under full tidal conditions, an additional 1.5 acres of breeding habitat would be lost through conversion to brackish or saline habitats. This impact could be increased over the long-term by sea level rise, which may be rising at a much higher rate than originally predicted. If the levees decayed or abruptly breached, impacts on red-legged frog in the Project Area and Point Reyes Peninsula Core Area would be characterized as minor, with the exact effect dependent on a number of factors, including annual variability in rainfall and runoff conditions and possible passive creation of Freshwater Marsh in other areas through discontinuation of agricultural management.

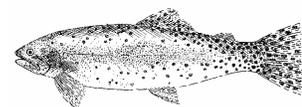
Impacts on red-legged frog during construction of the East Pasture restoration component would be expected to be negligible. There is no breeding habitat in the East Pasture, and only a few adult frogs have been occasionally sighted in the East Pasture. Construction activities expected to have the most effect would be filling in of the drainage ditches, tidal reconnection of the East Pasture Old Slough and excavation, and construction of the eastern perimeter trail in the riparian habitat adjacent to Tomasini Creek. Possible mitigation measures are discussed in a separate sub-section below.

Tidewater goby: Alternative A would have minor to eventually moderate beneficial effects on tidewater goby in the Project Area after implementation through a potential increase in the areal extent of East Pasture habitat and quality of other existing habitats in Tomasini Creek and the West Pasture. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Within the Project Area, Acreage of existing tidewater goby habitat in the Giacomini Ranch totals 11.3 acres. This species occurs primarily in three areas within the Giacomini Ranch: Tomasini Creek, the West Pasture Old Slough and possibly Fish Hatchery Creek, and the non-tidal East Pasture Old Slough Pond. A detailed description of these areas can be found under the No Action Alternative. Numbers of tidewater goby in the Project Area have also been relatively low within each of these sites, ranging from five to 22 at most. These sites represent the only known occurrence of this species in the Tomales Bay watershed, as, prior to 2002, the species had last been sighted in the bay in 1953. Genetic analyses indicate that this population is genetically distinct from the nearest existing occurrences of tidewater goby at Salmon Creek Marsh and Rodeo Lagoon (Jacobs and Earl 2005).

Similar to the No Action Alternative, construction of the East Pasture restoration component includes the captive propagation program described in Chapter 2 and tidal reconnection of the East Pasture Old Slough Pond with Lagunitas Creek and Tomales Bay. Under this alternative, the pond, the diked portion of slough adjacent to the pond, and a shoal on the outboard side of the levee would also be shallowly excavated to improve hydraulic connectivity of the reconnected slough with Lagunitas Creek. While approximately 0.3 acres of ditches would be filled in as part of the elimination of agricultural infrastructure under Alternative A, there would be approximately 1.0 acre of new tidal channel creation. Possible mitigation measures are discussed in a separate sub-section below.

Following project implementation, Alternative A would result in minor to eventually moderate beneficial effects on tidewater goby by increasing areal extent of habitat within the East Pasture through tidal reconnection of the East Pasture Old Slough and creation of new tidal channels. These effects would remain relatively minor over the short-term until marsh conditions become better established within the East Pasture. During this transitional phase, existing habitat conditions would be maintained in the West Pasture Old Slough and Tomasini Creek through retention of the tidegates and associated hydrologic infrastructure: tidal influence in the West Pasture Old Slough is controlled via a tidegate on Fish Hatchery Creek. While tidegates are intended to either eliminate or minimize tidal influence, tidegates on Tomasini Creek and Fish Hatchery Creek allow either a moderately reduced (Fish Hatchery) or the full range (Tomasini Creek) of high tides. In the case of Tomasini Creek, and possibly Fish Hatchery Creek, the tidegates appear to have more of an effect on tidewater goby by preventing complete drainage during low tides. This maintains permanent ponding or subtidal conditions within the creek, which may have become intertidal mudflat during low tides if it had been allowed to drain completely. The tidegate, along with natural gravel bar features create residual brackish pool



habitat that provides habitat for the tidewater goby, despite the fact that the substrate and flow conditions are probably not optimal.

The only potential impacts to existing habitat in Tomasini Creek under this alternative would occur in conjunction with construction of the eastern perimeter trail and use. This trail would be constructed along the former railroad grade directly adjacent to Tomasini Creek and the primary tidewater goby habitat in the Project Area. Existing dense willow and blackberry (riparian) thickets that would be permanently or temporarily lost during construction provide cover for the creek. Perennial seeps on the Point Reyes Mesa appear to contribute substantially to maintenance of brackish conditions in the creek, which is subject to the full range of high tides. A brackish water species, tidewater goby is sensitive to higher salinity waters approaching marine salinities (~34 ppt), preferring salinities in the 12 ppt, although a wide range of salinities can be tolerated from 0.5 ppt up to at least 25 ppt (Swift 2003). As part of this trail component, a culverted berm would be used to construct the trail, which may adversely affect at least the surface-flow contribution of seeps from the mesa to Tomasini Creek.

In addition to creating new habitat and maintaining existing conditions in old habitat, tidal reconnection and discontinuation of agricultural management would also improve water quality within the East Pasture Old Slough, Tomasini Creek, and the Wet Pasture Old Slough. Based on observations of dead marine fish during the 2006 sampling, the East Pasture Old Slough Pond probably has at least short periods of sub-optimal water quality. A reduction or removal of grazing, manure spreading, levee maintenance, and ditch dredging would increase water quality within waters of these habitats, improving the quality of existing habitat for tidewater goby.

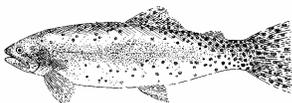
Over the long-term, the effects of Alternative A on tidewater goby habitat would increase slightly relative to short-term conditions, because of a maturation of tidal and brackish habitats following a transitional phase of development. In addition, slow decay or abrupt breaching of the Giacomini Ranch West Pasture levees -- which would be retained, but not maintained -- would have the potential to increase habitat for tidewater goby through creation of more tidal channels and side channels in the West Pasture. The trend of conversion of grassland to brackish and tidal marsh habitats would be intensified by sea level rise, which may be increasing at a much higher rate than originally predicted. The projected rate of 3 feet of sea level rise by 2100 (Overpeck et al. 2006) could lead to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88, converting lower elevation portions of the pasture to subtidal and intertidal unvegetated habitats and higher elevations portions that would have developed into high marsh or remained grassland.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The effects of Alternative A on salmonid rearing and passage habitat in the Project Area would be minor beneficial. Negligible adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration/mitigation component.

As discussed under the No Action Alternative, the Project Area does not represent a potential breeding or spawning area for steelhead, coho or Chinook salmon, but rather important feeding, resting, and refugia habitat for salmonids as they migrate to the ocean or move upstream to spawning grounds. The importance of estuarine habitats varies between salmonid species: Chinook typically spend the most time in wetlands before outmigrating to the ocean (Simenstad et al. 1982, Aitkin 1998), although estuaries are important for some coho populations, as well (Magnusson and Hilborn 2003; Miller and Sadro 2003).

Steelhead has recently been found in Fish Hatchery Creek, Tomasini Creek, the section of Lagunitas Creek in the Project Area, and in Bear Valley Creek upstream of Olema Marsh. Coho occur in Lagunitas Creek and in Tomasini Creek. Chinook has been documented in upstream portions of Lagunitas Creek, but they have not been captured as yet in the Project Area. Salmonid presence in these watersheds indicates that, while impediments, the levees and tidegate facilities are still allowing some degree of fish passage. The levees severely constrain the potential for development of off-channel or rearing habitat on Tomasini Creek and Lagunitas Creek. Fish Hatchery Creek is not leveed within the West Pasture, although it is infrequently dredged. On Bear Valley Creek, Levee Road, Bear Valley Roads, and their culverts limit both passage and rearing potential, along with the indistinct flow path in Olema Marsh created by excessive impoundment of waters.

The largest benefit to salmonids under this alternative would come from the minor increase in potential rearing habitat from tidal reconnection of the East Pasture Old Slough Pond with Lagunitas Creek. Aquatic edge habitat would increase approximately 13 percent relative to existing conditions, with edge habitat in the Project Area climbing from approximately 15 miles under existing conditions to 17 miles under Alternative A.



While approximately 0.3 acres of ditches would be eliminated, another 1.0 acre of new tidal channels would be created. In addition, as with the No Action Alternative, discontinuation of agricultural management practices would measurably improve passage and rearing conditions for salmonids not only in the East Pasture, but in Lagunitas Creek. These management practices include levee maintenance, dredging, cattle crossing of Lagunitas Creek, pumping of creek water for irrigation, and other factors. There would be no change in Olema Marsh, other than water levels would be expected to continue their rise, which may further affect the ability of salmonids to reach upstream portions of the watershed.

Over the long-term, slow decay or abrupt breaching of the Giacomini Ranch West Pasture levee would have the potential to increase habitat for salmonids through creation of more tidal channels and side channels in the West Pasture. While these channels could provide more refugia and foraging habitat for salmonids, levee failure could also create an ecological sink such that water could flood in, but not flow out, causing extensive stranding of aquatic species. The potential for this scenario is greater in the West Pasture than the East Pasture. This trend toward tidal reconnection with levee failure would be intensified by sea level rise, which may be increasing at a much higher rate than originally predicted.

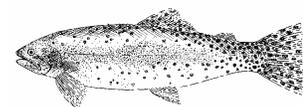
Construction would have only the potential for negligible adverse impacts associated with grading of the southwestern portion of the Giacomini Ranch levee on Lagunitas Creek and possible removal of riparian vegetation, although every effort would be made to retain as much of the established vegetation as possible. Construction would be scheduled to ensure that grading does not begin before July 15, which is the end of the typical period for smolt outmigration.

California black rail and California clapper rail: Over the long-term, Alternative A would have a major beneficial effect on California black rail and California clapper rail by substantially increasing appropriate breeding, foraging, and refugia habitat with restoration of more than 250 acres of low-, mid- and high Tidal Salt Marsh adjacent to existing rail habitat. During the transitional period following construction, however, only negligible to minor beneficial effects would be expected, as grassland begins the process of converting to brackish and tidal marsh, leading to temporary establishment of a more weedy, ruderal habitat that would have less benefits for rails. Impacts during construction to existing rail habitat in the undiked marsh across Lagunitas Creek from the undiked marsh would either be non-existent or negligible, at most.

As discussed under the No Action Alternative, breeding populations of California black rail have primarily occur in the undiked marsh north of the Giacomini Ranch and in Olema and Bear Valley marshes in intermittent years (ARA 2002). Small numbers (1-2 individuals) also occurred within the Project Area in brackish and freshwater marsh, with possible breeding one year in the West Pasture freshwater marsh (ARA 2002). Clapper rail historically occurred in Tomales Bay, and individuals were sighted in the undiked marsh north of the Giacomini Ranch during fall and winter between 1995 and 2001 (J. Evens, R. Stallcup, unpub. field notes). There have been no sightings since then, however, and there are no recent breeding records either from the bay.

Under Alternative A, habitat for the black rail in the Project Area and adjacent undiked marsh to the north of the Giacomini Ranch would almost triple from approximately 120 acres to more than 250 acres with restoration of the East Pasture. The restoration would provide benefits primarily to black rail, although clapper rail could benefit substantially, as well, from establishment of low and high Tidal Salt Marsh habitats. While rails do not currently use the East Pasture, the proximity of the restoration area to the undiked marsh makes it more likely that rails would expand into the East Pasture and use the newly created habitat. Almost 80 percent of the habitat created (> 200 acres) would be mid-marsh habitat, which is suitable for breeding, nesting, and foraging by black rails. The remainder would be high marsh/upland ecotone habitat, which would serve as refugia for rails during high tide and storm tide conditions. Most of the high marsh/upland ecotone habitat would occur on the nearby Tomasini Creek levee, the newly created high tide refugia in the northeastern portion of the West Pasture, and the higher intertidal elevations areas in the southern portion of the East Pasture. Increases in high marsh habitat in Giacomini Ranch could, at least temporarily, offset any decreases in this habitat in the undiked marsh habitat north of the ranch from accelerated rates of bank slumping and channel widening that might be potentially being caused by a non-native isopod. This isopod would be likely to move south into the Giacomini Ranch once tidal connection and habitats are restored.

In other areas, decreases in rail numbers might be expected from continuation of existing conditions. Under this alternative, the West Pasture north levee would not be removed. Rails often use these levees during storms and extreme high tide events. While the levees are well above most of the higher high tides, they are often poorly vegetated due to trampling from cattle and people and are subject to disturbance pressures from



people using the existing informal trail to view the rails who may inadvertently flush them into the open where they are vulnerable to predation. In addition, steadily increasing water levels in Olema Marsh, which is causing conversion of riparian to Freshwater Marsh and Open Water habitat, would potentially decrease suitability of this habitat for black rail.

Over the long-term, slow decay or abrupt breaching of the Giacomini Ranch West Pasture levee would have the potential to increase nesting, foraging, and roosting habitat for rails through creation of more low- and mid-marsh intertidal emergent marsh. This trend would be intensified by sea level rise, with the recently projected rate of 3 feet of sea level rise by 2100 (Overpeck et al. 2006) leading to regular inundation of large portions of the East and West Pastures below 4 ft NAVD88. While this trend could increase available rail habitat in the Giacomini Ranch, it would potentially decrease habitat and numbers of black rails in Olema Marsh, because of a continued rise in water levels. Loss of the West Pasture levee from decay or breaching would reduce the amount of high-tide refugia available. However, this loss would be offset to a large degree by creation of high tide refugia in the northeastern corner of the West Pasture through a 2006 habitat enhancement, the continued presence of the Tomasini Creek levee and higher elevations areas in the West Pasture, and restoration of high marsh/upland ecotone areas in the southern portion of the East Pasture. As with the existing levees, some of these areas may be subject to disturbance or predation pressures from birds and mammals with the exception of the created high tide refugia in the West Pasture.

Construction would be expected to have only negligible adverse effects, if any, on rails, because it would not affect existing rail habitat and would be conducted outside of the documented breeding season (February through August 31).

Other Special Status Species: The effects of Alternative A on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East Pasture restoration component would range from beneficial negligible to moderate adverse.

Species included in this category are federally or state-listed threatened and endangered species that are only occasional visitors or vagrants to the Project Area or were formerly listed as a Species of Concern by the Sacramento office of the USFWS. In general, restoration of the East Pasture and conversion of grassland to marsh, combined with discontinuation of agricultural management, would have negligible to minor beneficial effects over the long-term for most of these species. **California freshwater shrimp** would benefit from discontinuation of levee maintenance and grading and revegetation of the East Pasture southern levee through an increase in overhanging riparian vegetation that would provide sources of food and protection. California brown pelican, green sturgeon, Least Bell's vireo, and **southwestern river otter** would directly benefit from the absence of maintenance and management practices that have the potential to inadvertently affect individuals or populations or to decrease important habitat such as riparian forest and scrub-shrub.

Conversely, negligible to moderate adverse effects would be expected for certain freshwater- and grassland-associated special status species. The American peregrine falcon may benefit negligibly under this alternative during construction from the "flushing" of voles and other rodents, but, over the long-term, loss of grassland habitat would decrease, if not eliminate, rodent numbers and have a negligible adverse effect on this raptor. Species such as sandhill crane and bank swallow may also respond negatively to grassland conversion.

Saltmarsh common yellowthroat could be adversely impacted by permanent or temporary removal of riparian habitat for construction of the eastern perimeter trail, southern perimeter trail, and the possible future extension of the southern perimeter trail to Inverness Park. Common yellowthroat is known to breed in the first two areas and also breeds in the riparian habitat along Sir Francis Drake Boulevard, but north of where the possible trail extension would occur.

California freshwater shrimp primarily occurs considerably upstream of the Project Area on Lagunitas and Olema Creeks, although it occasionally moves downstream on Lagunitas Creek into the White House Pool reach of Lagunitas Creek. The frequency of occurrence within the Project Area probably depends to a large degree on flow and salinity conditions in this highly variable estuarine zone of the Lagunitas Creek delta. Minor adverse effects would be primarily associated with construction from actions such as levee removal, creek bank grading, and removal of riparian vegetation along the southern portion of the East Pasture, although every effort would be made to preserve as much riparian vegetation as possible. Over the long-term, negligible beneficial effects would be expected from discontinuation of agricultural management practices in Lagunitas Creek.



The largest impact would come from the loss of freshwater habitat for the **northwestern pond turtle**, which would lead to moderate adverse impacts during both construction and project implementation. Construction activities expected to have the most effect would be filling in of the drainage ditches, tidal reconnection of the East Pasture Old Slough and excavation, and construction of the eastern perimeter trail in the riparian habitat adjacent to Tomasini Creek. Following implementation, turtles may become restricted to freshwater portions of Tomasini Creek and pockets of freshwater marsh in the East Pasture along the ranch periphery, although much of the levee system possibly used for aestivation would remain. Over the long-term, the slow decay or abrupt breaching of the West Pasture levees could increase impacts for this species by affecting individuals in the West Pasture, as well as the East Pasture, through conversion of grassland to tidal and brackish marsh. The turtle may possibly move into Olema Marsh, which would have a small net increase in Freshwater Marsh habitat. It has not been documented currently in the marsh, although it occurs in nearby reaches of Lagunitas Creek, so it is possible that habitat conditions are not appropriate for this species (e.g., not enough basking or aestivation sites).

Proposed Additional Mitigation Measures: Standard BMPs would be implemented to reduce construction-related impacts to special status species and wildlife habitats are discussed under Chapter 2. All construction and staging/stockpiling areas would be cleared by biologists prior to use to ensure that there are no nesting or breeding species within the vicinity of the Project Area or staging/stockpile areas prior to implementation. Measures specific to certain species are described below:

California red-legged frog: Construction activities would include removal of roads, fences, and ditches within the Project Area, and excavation of certain portions of the East Pasture Old Slough. Though not documented as supporting breeding habitat, the Old Slough and ditches may provide non-breeding habitat. Construction activities adjacent to or within California red-legged frog habitat documented as breeding habitat would not be conducted until August. Pre-construction surveys would be completed in all construction areas to confirm that no red-legged frogs are present. Frogs encountered would be relocated.

Tidewater goby: Construction would not occur in or directly adjacent to existing tidewater goby habitat during the typical season of reproduction for tidewater goby documented in the literature (late April – early summer; Swift 2003). Prior to construction in the East Pasture Old Slough Pond and ditches, extensive seining would be performed after some dewatering to lower water levels and increase the efficiency of trapping. Minnow traps and dip nets may also be used to increase capture rates. Captured fish would be immediately relocated to Tomasini Creek.

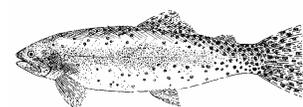
Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: Work affecting Lagunitas Creek would be conducted after July 15 during low flow periods to minimize impacts to salmonids and other aquatic organisms. BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, construction of the eastern perimeter trail, and installation of a pre-fabricated bridge. In addition to these BMPs, other actions would be taken to minimize impacts, including use of an excavator rather than a bulldozer to remove fill and excavation in sensitive creek areas during periods when construction area is exposed to the extent possible.

California black rail and California clapper rail: The East Pasture is across Lagunitas Creek from established habitat for California black rail and California clapper rail, but is not currently identified as rail habitat. The project would comply with directives to not come within 250 feet of established rail habitat prior to August 31 by delaying construction in the northern portion of the East Pasture until September.

California freshwater shrimp: Construction conducted in the White House Pool reach would comply with BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, and installation of a pre-fabricated bridge. Pre-construction surveys would be conducted, and any shrimp found would be relocated upstream outside of the construction zone.

Northwestern pond turtle: Prior to construction in the ditches and East Pasture Old Slough, water levels would be lowered to the extent possible, and turtles would be trapped and relocated to appropriate habitat, either Lagunitas Creek or the Martinelli Ponds in the Martinelli Ranch directly to the north of the Giacomini Ranch.

Saltmarsh common yellowthroat: Prior to construction of the southern perimeter trail, the eastern perimeter trail, or the possible future extension of the southern perimeter trail to Inverness Park, pre-construction



surveys would be conducted to ensure that no active nests are present or that nesting and fledging have been completed prior to construction being conducted within or in the immediate vicinity (< 100 feet) of riparian habitat that is either known to support or believed capable of supporting common yellowthroat.

Effectiveness of Proposed Additional Mitigation Measures

California red-legged frog: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Tidewater goby: The proposed mitigation measures would be expected to reduce impacts, but impacts cannot be eliminated. Even with extensive seining, some mortality of fish would be expected, because tidewater goby burrow in the mud, making it extremely difficult to trap all fish. Construction would, therefore, result in incidental take. The proposed mitigation measure would result in this alternative having moderate adverse impacts on tidewater goby during construction.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: The proposed mitigation measures should reduce any potential impacts to negligible levels.

California black rail and California clapper rail: The proposed mitigation measures should reduce any potential impacts to negligible levels.

California freshwater shrimp: The proposed mitigation measures should reduce any potential impacts to negligible levels.

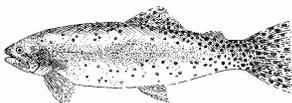
Northwestern pond turtle: The proposed mitigation measures would be expected to reduce impacts, but would not eliminate them. Even with dewatering of the channels and extensive trapping, some mortality of turtles would be expected. The proposed mitigation measure would result in this alternative having moderate adverse impacts on turtles during construction.

Saltmarsh common yellowthroat: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Cumulative Impacts: Based on the similarity in impacts for California red-legged frog between the No Action Alternative and Alternative A, cumulative impacts would be the same as described under the No Action Alternative for California red-legged frog.

Expansion of tidal marsh habitats in the historic wetlands of the Giacomini Ranch—including low-marsh, mid-marsh, high-marsh, and high-marsh/upland ecotone habitats -- would also have a cumulatively beneficial effect with the large number of proposed and ongoing wetland restoration projects in greater San Francisco Bay on California black and clapper rail regional populations. A list of some of these projects can be found at the beginning of this chapter and include Hamilton Wetland Restoration Project, Napa-Sonoma Marsh Restoration Project, and the South Bay Salt Pond Restoration Project. Some winters, when conditions are right, numbers of black rails in Tomales Bay swell with immigrants arriving from San Francisco Bay, some of which remain to breed here (J. Evens, ARA, *pers. comm.*). In addition, California clapper rails from San Francisco Bay occasionally end up in Tomales Bay in fall and early-winter, although their presence here is usually short-lived. (J. Evens, ARA, *pers. comm.*). The increase in marsh area and elevational diversity in both Tomales and San Francisco Bay will increase the amount of breeding habitat and make a significant contribution to reproductive success of the California black rail. The viability of California clapper rail meta-populations will increase with the increase in available habitat, and the overall number of rails is likely to increase. While Tomales Bay will always hold fewer birds than San Francisco Bay marshlands, it will provide -- particularly with restoration of the Project Area -- an important alternative to San Francisco Bay that may help long-term viability of regional meta-populations by buffering them from threats arising from stochastic events such as floods or oil spills. With expanded habitat opportunities, Tomales Bay has the potential to be a population source for both species should occurrences elsewhere be drastically affected by stochastic events.

Similar connectivity between San Francisco Bay and Tomales Bay exists in terms of many aquatic species, including shorebirds and waterfowl during both migratory and non-migratory periods (J. Takekawa, USGS, *pers. comm.*). Significant exchange of migratory bird populations occur between these two estuaries, particularly for species such as dunlin (*Calidris alpina*), canvasback (*Aythya valisineria*), greater scaup (*Aythya marila*), and surf scoter (*Melanitta perspicillata*; Warnock et al. 1995, J. Takekawa, USGS, unpub. data).



Tomales Bay often represents an initial stopover area during spring migration (J. Takekawa, USGS, *pers. comm.*). The direct and indirect implications of implementation of several large restoration projects in both San Francisco and Tomales Bay on these waterbirds are less clear than for rails. Depending upon which restoration approach the salt pond projects adopt in terms of emphasizing tidal marsh versus managed salt pond and the indirect impacts of these projects on external mudflats, these projects could alternately have either adverse or beneficial impacts on shorebird and waterfowl numbers in general and on specific shorebird and duck species in particular. Also, the impacts could be mixed, benefiting some species but adversely affecting others. It is important to remember that, for fish, birds, and some marine mammals, the estuarine wetlands of the greater San Francisco Bay area, including Tomales Bay, function as an interactive mosaic of habitats; estuarine dependent animals may shift from one site to another as conditions change (J. Evens, ARA, *pers. comm.*).

Because many of the San Francisco Bay restoration projects are still being developed or are just being implemented, it is difficult to anticipate how the mosaic of different wetland habitats being created or restored will function in concert with one another and thereby affect viability and population dynamics of shorebirds and waterfowl in general and individual avian species in particular. In general, the proposed project in Tomales Bay, in combination with other restoration projects in San Francisco Bay, would be expected to 1) have a cumulatively beneficial effect to most estuarine dependent species, 2) partially offset and/or complement the effects of projects in San Francisco Bay, OR 3) have no impact at all depending upon the species in question.

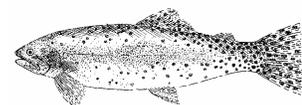
Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative A on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to major beneficial. Under Alternative A, the East Pasture would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. Over the long-term, Alternative A would be expected to have moderate beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some minor adverse impacts during construction in the East Pasture. The largest single change under this alternative relative to the No Action Alternative would come from the substantial conversion of grassland to salt and brackish marsh through breaching of the East Pasture levee, removal of agricultural infrastructure, and tidal reconnection and expansion of the historic tidal slough. Through these actions, more than two-thirds of the East Pasture would be expected to shift from grassland to marsh after a relatively short-term transitional period where weedy, ruderal species may temporarily establish.

The moderate increase in High Value Wildlife Habitats would have a minor beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species potentially increasing measurably. The largest changes in wildlife use under this alternative would be expected to come from increased use of expanded marsh and riparian habitats by waterbirds such as California black rail, and marsh passerines, and of expanded riparian habitats by resident and Neotropical migrant passerines or riparian bird species. As with the No Action Alternative, amphibians and reptiles would be the taxa most adversely affected by implementation of this alternative. Increases in visitation with expanded public access facilities would be expected to have negligible to minor adverse effects on wildlife use, particularly along the White House Pool reach of Lagunitas Creek, the eastern perimeter of the Giacomini Ranch near Tomasini Creek, and the Giacomini Ranch north levee trail.

Alternative A would also have a minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions. Construction of Alternative A would generally have only negligible adverse effects on High Value Wildlife Habitats and on use by common wildlife species. Only a negligible beneficial effect would be expected in terms of support of wildlife species in southern portion of the Tomales Bay watershed and in terms of regional population-level effects on species such as rails, shorebirds, and waterfowl from cumulative interactions with other proposed and ongoing projects in San Francisco Bay.

California red-legged frog: Similar to the No Action Alternative, Alternative A would have a negligible adverse effect on California red-legged frog breeding habitat units and distribution of the species in the Point Reyes Peninsula Core Area, but a minor adverse effect on distribution of red-legged frogs in the Project Area. Over the long-term, impacts could possibly increase to minor, because degradation of the levees in the West Pasture and sea level rise could cause a measurable effect on breeding habitat units and regional distribution.



Impacts during construction of the wetland mitigation/restoration component in the northern portion of the East Pasture where no breeding has been documented would be expected to be non-existent or very negligible. There is a potential for cumulative impacts with other projects proposed in the Seashore or Marin County region, but, based on evaluation of impacts and proposed mitigation measures for those projects, impacts under this alternative would still be characterized as negligible to minor adverse.

Tidewater goby: Alternative A would have very minor to eventually moderate negligible beneficial effects on tidewater goby in the Project Area after implementation through a potential increase in the areal extent of East Pasture habitat and quality of other existing habitats in Tomasini Creek and the West Pasture, although, over the long term, slow decay or sudden breaching of levees could increase the benefits to tidewater goby by increasing the amount of available habitat. Impacts during construction would be expected to be minor to moderate at most, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The effects of Alternative A on salmonid rearing and passage habitat in the Project Area would be beneficial minor. Negligible adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration/mitigation component. Standard BMPs and other measures would be used to reduce impacts to negligible levels.

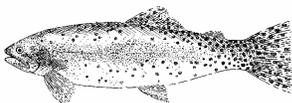
California black rail and California clapper rail: Over the long-term, Alternative A would have a major beneficial effect on California black rail and California clapper rail by substantially increasing appropriate breeding, foraging, and refugia habitat with restoration of more than 250 acres of low-, mid- and high Tidal Salt Marsh adjacent to existing rail habitat. During the transitional period following construction when grassland converts to marsh, however, only negligible to minor beneficial effects would be expected. Impacts during construction to existing rail habitat in the undiked marsh across Lagunitas Creek from the undiked marsh would either be non-existent or negligible, at most, particularly with implementation of proposed mitigation measures.

Other Special Status Species: The effects of Alternative A on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East Pasture restoration component would range from beneficial negligible to moderate adverse. Mitigation measures are proposed where appropriate to reduce impacts to the extent possible.

Alternative B

Analysis: The effects of Alternative B on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to major beneficial (Table 75). Under Alternative B, the East and West Pastures would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. In the West Pasture, existing informal trail on the West Pasture north levee would be removed, although there would still be the potential for future extension of the southern perimeter trail to Inverness Park. There would be no restoration in Olema Marsh. The levees along and tidegate/culvert in Tomasini Creek would be retained, but not maintained. In the Giacomini Ranch, restoration would involve complete removal of levees in the East Pasture along Lagunitas Creek and breaching of levees in the West Pasture. Relative to Alternative A, more tidal channels would be excavated. A freshwater marsh component would be constructed in the Tomasini Triangle in the East Pasture just north of the Giacomini dairy facility to offset increased loss of freshwater marsh in the West Pasture with removal of the Fish Hatchery Creek tidegate and the north levee. The entire southern levee of the East Pasture would be removed and regraded in areas to a more stable profile and actively revegetated with riparian vegetation.

Wildlife Habitats and General Wildlife Use – Project Implementation: Over the long-term, the Alternative B would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some minor adverse impacts during construction in the East and West Pastures. As with Alternative A, the largest change under this alternative relative to existing conditions would come from the substantial conversion of grassland or pasture to salt and brackish marsh through removal or breaching of the East and West Pasture levees, removal of agricultural infrastructure such as tidegates, and reconnection and expansion of the tidal channel network in the East Pasture. Through these actions, more than two-thirds of the East Pasture and one-third of the West Pasture would be expected to shift from grassland to tidal or brackish marsh. A transitional period would be expected over the short-term during which, as pasturelands slowly convert through exposure to saline conditions to marsh, restored areas would be dominated by a mix of



non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions such as brass buttons, annual beard-grass, loosestrife, birdfoot trefoil, curly dock, and others. During this period, impacts to High Value Wildlife habitats would be negligible adverse, because much of the habitat being disturbed consists of highly managed pasturelands: while these types of habitats provide value, they are of lower value than many other unmanaged or less managed habitats.

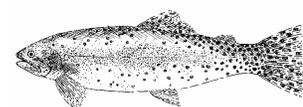
The major increase in High Value Wildlife Habitats would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. Some of the largest changes in wildlife use under this alternative relative to Alternative A would be expected to come from increased use of expanded marsh and riparian habitats in the West Pasture. While restoration efforts in the East Pasture would increase, general wildlife use patterns would be relatively similar to those under Alternative A, although High Value Wildlife Habitats in the East Pasture would increase measurably relative to Alternative A.

Under Alternative B, Tidal Salt Marsh, a High Value Wildlife Habitat, would increase more than 40 percent relative to Alternative A. However, the largest increase in High Value Wildlife Habitats under this alternative comes from Tidal Salt Marsh-High/Upland Ecotone. This change results from several factors, including the fact that elevations are generally higher in the West Pasture than in the East Pasture. These elevations, combined with the strong influence from groundwater and drainages flowing from or off of the Inverness Ridge, would maintain many of the Freshwater Marsh, Wet Meadow, and Seasonally Flooded-Ponded Pasture/Grassland habitats that currently exist on the western and southern boundaries of the West Pasture. Tidal Salt Marsh and Tidal Brackish would establish primarily in the lower elevation northern and eastern portions of the West Pasture. The value of the newly created Tidal Salt Marsh and Tidal Brackish Marsh habitats to wildlife would be promoted by the presence of a large tract of undiked tidal salt and brackish marsh habitats immediately adjacent to the East Pasture in the undiked marsh. While not physically contiguous, this proximity between areas encourages a synergistic effect in which wildlife numbers would be higher together than they would have been separately, because of the affinity of many species for unfragmented, larger habitats. In addition, preservation of the shallowly flooded and sparsely vegetated flats in the northeastern corner of the East Pasture would continue to provide alternate high tide habitats for waterfowl and shorebirds during the winter as it does now.

Removal of the Fish Hatchery Creek tidegate would magnify the effects of saltwater intrusion on the West Pasture freshwater marsh, leading to loss of another 1.5 acres relative to the current trend in marsh loss and conditions described under the No Action Alternative and Alternative A. This loss would be offset to some degree by creation of a 5.4-acre freshwater marsh in the Tomasini Triangle portion of the East Pasture, which is above the range of most tides except extreme tides. To preclude influence by even extreme tides, a low berm would be constructed that would also function as high water refugia for wildlife during flooding. While negatively affecting frogs, the conversion of this habitat would benefit passerine bird species, such as salt marsh common yellowthroat, California black rails, and red-winged blackbird, which use tall vegetation for nesting and resting habitat while maintaining close proximity to more open foraging habitat.

In general, acreage of Forested and Scrub Shrub Riparian habitat continues to expand under Alternative B from passive and active revegetation efforts. While the culverted berm through-trail component of the eastern perimeter trail would be replaced with a boardwalk under this alternative, direct impacts to riparian habitat would remain similar to those described under Alternative A. Impacts to groundwater flow from the Point Reyes Mesa would be reduced, however, with a boardwalk, which could have positive effects on the tidewater goby population in Tomasini Creek, as well as on aquatic organisms. The effects of the southern perimeter trail and the possible future extension of that trail to Inverness Park would be identical to those described under Alternative A. There would also be identical adverse effects on riparian habitat and associated species in Olema Marsh from increasing water levels caused by poor drainage from undersized culverts and other factors. Open water and Freshwater Marsh communities would increase as a result.

Habitat changes with restoration in the West Pasture would attract higher numbers of waterbirds such as California black rail, marsh passerines, and resident and Neotropical migrant passerines or riparian bird species. The restored habitats would also benefit generalist waterbirds such as great egret and generalist shorebirds such as willet, godwit, and greater yellowlegs. Salt marsh also provides foraging habitat for raptors species - such as short-eared owl, white-tailed kite, northern harrier, and peregrine falcon - drawn to the site by small vertebrates such as California voles, shrews, and garter snakes. Abundance of raptors such as peregrine falcons would decrease relative to existing conditions, because numbers of rodents would be expected to be lower. Grassland-associated species such as western meadowlarks, savannah sparrows, and



grasshopper sparrows would dwindle in numbers. Conversely, use by species such as osprey could increase, because of the higher abundance of fish and invertebrates in restored West Pasture and East Pasture channels. Abundance and areal extent of fish and invertebrate species would increase in the West Pasture, as well. While filling of the borrow ditch north of the West Pasture north levee would decrease subtidal/intertidal habitat, creation of a new tidal channel linking the undiked marsh to the West Pasture would increase use by aquatic organisms.

As with the No Action Alternative and Alternative A, amphibians and reptiles would be the taxa most adversely affected by implementation of this alternative. Red-legged frog and northwestern pond turtle numbers would drop in the West Pasture with increased tidal influence, but the Tomasini Triangle freshwater marsh may buffer frogs and turtles in the East Pasture from some of the adverse effects of increased tidal inundation in that pasture.

Wildlife Habitats and General Wildlife Use – Long-Term Changes: As described under Alternative A, the brackish and tidal marsh habitats described above would eventually develop after a short-term (~ 10 years) transitional period in which grassland is converted into marsh. These habitats would possibly continue to evolve in the future in response to sea level rise, which could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88 should sea level rise at the currently projected rate of 3 feet by 2100 (Overpeck et al. 2006). This shift would benefit aquatic organisms such as fish and invertebrates, as well as specific avian species such as diving ducks, dabbling ducks, marsh-associated passerines, and other waterbirds.

The long-term effects of Alternative B on wildlife use because of increased visitation would be expected to be very similar to that of Alternative A, with the exception of the removal of the informal path on the Giacomini Ranch north levee. Elimination of this trail would decrease disturbance to wildlife, particularly California black rails that often use the levee on which the trail is built as high tide refugia during storms. While usually only infrequently used, this trail attracts large numbers of birdwatchers during the winter and early spring high tide events who come to see rails. This creates a conflict between these relatively poor-flying birds and visitors such that rails are often flushed from their only refuge, which may increase predation rates relative to areas where access is not allowed or feasible.

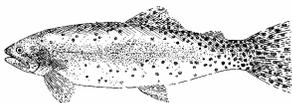
Wildlife Habitats and General Wildlife Use – Construction: Construction of Alternative B would generally have minor adverse effects on High Value Wildlife Habitats and use by common wildlife species. Special status species are discussed individually.

Six of the proposed construction activities would have the highest potential to affect both common and special status wildlife species. These activities are regrading of the southern levee in the East Pasture and creek bank to a more stable profile; filling of drainage ditches; tidal reconnection of the East Pasture Old Slough Pond; removal and breaching of levees; removal of the Fish Hatchery Creek tidegate; and filling of the borrow ditch in the undiked marsh north of the West Pasture. Potential impacts to wildlife of changes to ditches and the East Pasture Old Slough are described in detail under Alternative A. Grading of the levee and creek banks and levee removal have the potential to negatively affect aquatic organisms such as California freshwater shrimp, salmonids, southwestern river otter, northwestern pond turtle, and other species through incidental sediment discharge during earthmoving and removal of willows that provide overhanging shade and habitat complexity in surface waters.

Under Alternative B, the borrow ditch in the undiked marsh would be filled, and a new tidal channel created that connects a tidal channel in the undiked marsh with the West Pasture. The Fish Hatchery Creek tidegate and the West Pasture levee would be totally removed. These actions have the potential to negatively affect resident and non-resident aquatic organisms in the creek and borrow ditch such as fish and macroinvertebrates, as well as southwestern river otter and California black rail, through either direct mortality or disruption of the breeding cycle. Non-resident species such as waterfowl, waterbirds, southwestern river otter, and rails would not be impacted unless nesting or breeding was occurring.

Based on the scale and timing of construction activities that could affect High Value Wildlife Habitats and use by common wildlife species, the impacts of construction are characterized as minor adverse. The intensity of construction impacts on special status species is addressed separately below.

Invasive Wildlife Species: Alternative B would have very similar minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions as Alternative A, with increases in numbers and extent of aquatic invasives expected in the West Pasture. The large-scale



conversion of grassland to marsh habitats in the West Pasture would reduce the areal extent of potential habitat for red fox, wild turkey, and feral cats. These species, however, are somewhat opportunistic and would be expected to persist along the edges of the Giacomini Ranch where conditions are appropriate. These species would continue to access East and West Pasture grassland areas for foraging, resting, and other purposes. Monitoring throughout the Seashore for impacts of feral cats and dogs is ongoing (N. Gates, wildlife biologist, Seashore, *pers. comm.*). Should impacts on special status species or other species of concern in the Project Area be detected, removal of feral animals will be implemented as mandated by Park Service Management Policies (NPS 2006, Section 4.4.2.1).

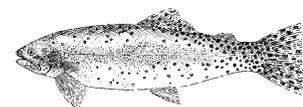
Wildlife Conditions in the Watershed: Tidal reconnection of the 350-acre East Pasture and 200-acre West Pasture to Lagunitas Creek would have a moderate beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. As described under Alternative A, tidal reconnection would not only increase the potential for export of sources of carbon such as dissolved and particulate organic carbon, phytoplankton, seeds and other plant matter, and aquatic organisms to the bay, but for access by marine and estuarine species in search of food and refugia. In addition, watershed habitat quality would be improved by discontinuation of levee maintenance, withdrawal of water for irrigation, infrequent pumping of waters from the ranch into Lagunitas Creek, and crossing of Lagunitas Creek by cattle.

California red-legged frog: While freshwater marsh acreage would increase due to creation of freshwater marsh in the East Pasture, Alternative B would still be characterized as having a minor adverse effect on California red-legged frog breeding habitat units in the Point Reyes Peninsula Core Area, at least over the short-term, through further reductions in existing breeding habitat in the West Pasture freshwater marsh. This would have a measurable effect on distribution of the species in the Project Area over the short-term. Over the long-term, however, freshwater marsh creation efforts in the East Pasture would eventually reduce impacts to breeding habitat units and distribution of the species in the Core Area to negligible. This alternative would still have a measurable effect on distribution of species in the Project Area, because the primary breeding habitat available in the Giacomini Ranch would be shifted from the West Pasture to the East Pasture, where breeding has not been documented. Impacts during construction would generally remain negligible despite the increase in the extent of restoration, because most of the heavy construction would occur in the East Pasture, which does not have breeding habitat.

Baseline studies documented two general areas that provide breeding habitat for red-legged frog. The largest of these is the West Pasture freshwater marsh. Breeding also has sporadically occurred in adjacent Fish Hatchery Creek, creating another 1.0 acre of breeding habitat in the West Pasture. The second breeding habitat is in the Olema Marsh and is assumed to comprise all of the areas with Freshwater Marsh and Open Water, which total 39 acres. There is no documented breeding habitat in the East Pasture, although a few adult frogs were observed during baseline surveys (Fellers and Guscio 2002).

Under Alternative B, saltwater intrusion into the West Pasture freshwater marsh would increase, leading to loss of an additional 1.5 acres relative to the No Action Alternative and Alternative A. Over the long-term, this impact could be intensified by sea level rise, which may be rising at a much higher rate than originally predicted. However, at least in the near-term future, the southern one-third of the marsh would still not be affected by salinity intrusion, because of higher elevations and high perennial freshwater inflow from the 1906 Drainage and Inverness Ridge groundwater. As noted under Alternative A, the Park Service is conducting a habitat enhancement project in 2006 that would slightly expand higher elevation Freshwater Marsh habitat in this area by approximately 0.4 acres. Restoration of the West Pasture would also affect non-breeding habitat in the West Pasture. However, under this alternative, most of the tidal and brackish marsh would be concentrated on the eastern and northern boundaries of the pasture, leaving much of the western and southern portions as they exist currently. Riparian habitat along Sir Francis Drake Boulevard would also increase slightly. Therefore, impacts to non-breeding habitat are characterized as minor adverse, at most.

Some of the loss of breeding habitat in the West Pasture freshwater marsh would be offset by creation of the 5.4-acre Tomasini Triangle freshwater marsh in the East Pasture. As described earlier, this marsh would generally be above the extent of high tides, but a low berm would be constructed to preclude tidal influence, as well as promote ponding within the marsh. The berm would also serve as refugia for wildlife during high tides. The marsh was designed based on a water budget developed by the hydrologists (KHE 2006a) to ensure that marsh was appropriately sized to maintain ponded conditions within the deepest portions of the marsh through at least July or August of each year, except perhaps during extreme drought years. Drawdown or drying up of the marsh in the fall would benefit red-legged frogs, because it would discourage successful establishment by bullfrogs, which can be predators of red-legged frog. Bullfrog tadpoles require permanent



ponding. Hydrologic sources for this marsh would principally come from surface run-off generated by the 10-acre rural/lightly urbanized subwatershed to the southeast of the Tomasini Triangle and groundwater inflow from the Point Reyes Mesa. In addition to the Tomasini Triangle, continued increases in water levels in Olema Marsh due to poor drainage would continue to convert Forested and Scrub Shrub Riparian habitat to Freshwater Marsh and Open Water habitat, perhaps providing a very negligible increase in breeding habitat for red-legged frog.

Impacts on red-legged frog during construction would continue to be negligible despite the increase in size of the proposed project. There is no breeding habitat in the East Pasture, and only a few adult frogs have been occasionally been sighted in the East Pasture. Construction activities expected to have the most effect would be filling in of the drainage ditches, tidal reconnection of the East Pasture Old Slough and excavation, and construction of the eastern perimeter trail in the riparian habitat adjacent to Tomasini Creek. Possible mitigation measures are discussed in a separate sub-section below.

Tidewater goby: Alternative B would have moderate to eventually major beneficial effects on tidewater goby in the Project Area after implementation through a potential increase in the areal extent of East and West Pasture habitat and the quality of existing habitats in Tomasini Creek. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Within the Project Area, Acreage of existing tidewater goby habitat in the Giacomini Ranch totals 11.3 acres. This species occurs primarily in three areas within the Giacomini Ranch: Tomasini Creek, the West Pasture Old Slough and possibly Fish Hatchery Creek, and the non-tidal East Pasture Old Slough Pond. A detailed description of these areas can be found under the No Action Alternative. Numbers of tidewater goby in the Project Area have also been relatively low within each of these sites, ranging from five to 22 at most. These sites represent the only known occurrence of this species in the Tomales Bay watershed, as, prior to 2002, the species had last been sighted in the bay in 1953. Genetic analyses indicate that this population is genetically distinct from the nearest existing occurrences of tidewater goby at Salmon Creek Marsh and Rodeo Lagoon (Jacobs and Earl 2005).

Similar to Alternative A, construction of the East Pasture restoration component includes tidal reconnection of the East Pasture Old Slough Pond with Lagunitas Creek and Tomales Bay, with shallow excavation of a portion of the slough to improve hydraulic connectivity of the reconnected slough with Lagunitas Creek. While approximately 0.3 acres of ditches would be filled in as part of the elimination of agricultural infrastructure under Alternative A, the extent of tidal channel creation would increase under Alternative B, creating approximately 9.3 acres of habitat for tidewater goby. Over the long-term, the effects of Alternative A on tidewater goby habitat would increase slightly relative to short-term conditions, because of a maturation of tidal and brackish habitats following a transitional phase of development. The beneficial effects over the long-term could be intensified by sea level rise, which would increase the extent of area subject to regular inundation by tides.

During the transitional phase, existing habitat conditions would be maintained in Tomasini Creek through retention of the tidegates and associated hydrologic infrastructure. Retention of the tidegates and flashboard dam structure on Tomasini Creek would maintain existing subtidal habitat conditions in the channel, as the structure prevents complete drainage during low tides. The tidegate, along with natural gravel bar features create residual brackish pool habitat that provides habitat for the tidewater goby, despite the fact that the substrate and flow conditions are probably not optimal. Relative to Alternative A, impacts to Tomasini Creek would be reduced by replacement of the culverted berm through-trail component of the eastern perimeter trail with a boardwalk that would improve flow conditions from seeps on the Point Reyes Mesa into the creek. These seeps may play a considerable role in reducing salinities in this reach of the creek and thereby creating appropriate habitat conditions for the tidewater goby. A brackish water species, tidewater goby is sensitive to higher salinity waters approaching marine salinities (~34 ppt), preferring salinities in the 12 ppt range (Swift 2003).

Restoration would also increase the areal extent of habitat and quality of existing tidewater goby habitat in the West Pasture. The primary restoration actions in the West Pasture involve breaching or removal of levees and tidegates. No tidal channel creation would be performed, but tidal channels would be expected to form naturally in response to increased tidal inundation, particularly in areas where remnant sloughs are still visible.

Because construction in the West Pasture would not directly affect tidewater goby habitat, impacts during



construction would still be characterized as moderate adverse due to direct impacts of the East Pasture Old Slough Pond. Possible mitigation measures are discussed in a separate sub-section below.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The effects of Alternative B on salmonid rearing and passage habitat in the Project Area would be beneficial moderate. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component due to removal of the Fish Hatchery Creek tidegate and filling of the borrow ditch adjacent to the West Pasture north levee.

As discussed under the No Action Alternative, the Project Area does not represent a potential breeding or spawning area for steelhead, coho or Chinook salmon, but rather important feeding, resting, and refugia habitat for salmonids as they migrate to the ocean or move upstream to spawning grounds. Steelhead has recently been found in Fish Hatchery Creek, Tomasini Creek, the section of Lagunitas Creek in the Project Area, and in Bear Valley Creek upstream of Olema Marsh. Coho occur in Lagunitas Creek and in Tomasini Creek. Chinook has been documented in upstream portions of Lagunitas Creek, but they have not been captured as yet in the Project Area. Salmonid presence in these watersheds indicates that, while impediments, the levees and tidegate facilities are still allowing some degree of fish passage. The levees severely constrain the potential for development of off-channel or rearing habitat on Tomasini Creek and Lagunitas Creek. Fish Hatchery Creek is not leveed within the West Pasture, although it is infrequently dredged. On Bear Valley Creek, Levee Road, Bear Valley Roads, and their culverts limit both passage and rearing potential, along with the indistinct flow path in Olema Marsh created by excessive impoundment of waters.

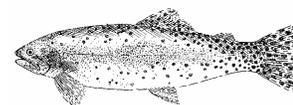
The largest benefit to salmonids under this alternative would come from the appreciable increase in potential rearing habitat from full tidal reconnection of the East and West Pastures with Lagunitas Creek. Aquatic edge habitat would increase approximately 28 percent relative to existing conditions, with edge habitat in the Project Area climbing from approximately 15 miles under existing conditions to 19 miles under Alternative B. While approximately 0.3 acres of ditches would be eliminated, a total of 9.3 acres of new and restored tidal channel would be created in the East Pasture Old Slough.

This alternative would also have moderate beneficial effects on passage and rearing conditions. Breaching of the levees and removal of the Fish Hatchery Creek tidegate would improve quality and accessibility of another 4.6 acres of tidally influenced channel. In addition, removal of the Fish Hatchery tidegate could increase the potential for passage for steelhead, which have been observed in the creek. There would be no change in Olema Marsh, other than water levels would be expected to continue rising, which may further affect the ability of salmonids to reach upstream portions of the watershed.

Construction would have the potential for only minor adverse impacts associated removal of the Fish Hatchery Creek tidegate, filling in of the borrow ditch, and grading and removal of levees and creek banks. The latter could potentially impact salmonids and other aquatic organisms though incidental sediment discharge and possible removal of riparian vegetation, although every effort would be made to retain as much of the established vegetation as possible. Construction would be scheduled to ensure that grading does not begin before July 15, which is the end of the typical period for smolt outmigration. Possible mitigation measures are discussed in a separate sub-section below.

California black rail and California clapper rail: Alternative B would have very similar major beneficial effects to Alternative A in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh adjacent to existing rail habitat. During the transitional period following construction, only negligible to minor beneficial effects would be expected, as grassland begins the process of converting to brackish and tidal marsh, leading to temporary establishment of a more weedy, ruderal habitat that would have less benefits for rails. Relative to Alternative A, impacts during construction would increase to moderate adverse, because of construction actions on and near the north levee in the West Pasture.

As discussed under the No Action Alternative, breeding populations of California black rail have primarily occur in the undiked marsh north of the Giacomini Ranch and in Olema and Bear Valley marshes in intermittent years (ARA 2002). Small numbers (1-2 individuals) also occurred within the Project Area in brackish and freshwater marsh, with possible breeding one year in the West Pasture freshwater marsh (ARA 2002). Clapper rail historically occurred in Tomales Bay, and individuals were sighted in the undiked marsh north of



the Giacomini Ranch during fall and winter between 1995 and 2001 (J. Evens, R. Stallcup, unpub. field notes). There have been no sightings since then, however, and there are no recent breeding records either from the bay.

Under Alternative B, habitat for the black rail in the Project Area and adjacent undiked marsh to the north of the Giacomini Ranch would almost triple from approximately 120 acres to more than 350 acres with restoration of the East and West Pastures. The restoration would provide benefits primarily to black rail, although clapper rail could benefit substantially, as well, from establishment of low and high Tidal Salt Marsh habitats. While rails do not currently use the East Pasture, the proximity of the restoration area to the undiked marsh makes it more likely that rails would expand into the East Pasture and use the newly created habitat. As with Alternative A, steadily increasing water levels in Olema Marsh would potentially decrease suitability of this habitat for black rail by converting riparian habitat to Freshwater Marsh and Open Water habitat,

As noted earlier, this alternative greatly increases the amount of high marsh/upland ecotone habitat relative to Alternative A. This change probably results from the generally higher elevations present in the West Pasture compared to the East Pasture, although some portion of that gain in ecotone habitat would come from the East Pasture. Mid-marsh habitats would be concentrated primarily in the lower elevation northern and eastern portions of the West Pasture, with ecotonal habitats fringing these areas to the south and west. Through filling of the borrow ditch, connectivity of these new mid-marsh and high marsh/upland ecotone habitats to existing habitat in the undiked marsh north of Giacomini Ranch would be greatly enhanced and would strongly increase the potential for establishment of restored habitats in the West Pasture by rails. Increases in high marsh habitat in Giacomini Ranch could, at least temporarily, offset any decreases in this habitat in the undiked marsh habitat north of the ranch from accelerated rates of bank slumping and channel widening that might be potentially being caused by a non-native isopod. This isopod would be likely to move south into the Giacomini Ranch once tidal connection and habitats are restored.

High tide refugia rails would continue to exist in the refugia created in the northeastern corner of the West Pasture through a separate enhancement project conducted in 2006; on the Tomasini Creek levees; and in the higher elevation portions of the East and West Pasture. This alternative would also incorporate a component that would link the created refugia in the West Pasture with the alluvial levees in the undiked marsh to improve habitat connectivity. While removal of the north levee in the West Pasture could be viewed as a potential impact in terms of reducing high tide refugia, these levees do not provide optimal refugia habitat, because they poorly vegetated due to trampling from cattle and people and subject to disturbance pressures from people using the existing informal trail to view the rails who often inadvertently flushed them into the open where they are vulnerable to predation. Under Alternative B, removal of the levees would result in removal of this trail, which would be replaced with a viewing area near the road pull-out.

Construction would be expected to have potential moderate adverse effects on rails. While construction would be conducted outside of the documented breeding season for clapper rails (February through August 31), the filling of the borrow ditch and extension of the tidal channel in the undiked marsh into the West Pasture could negatively affect rails through temporary impacts to habitat and disturbance from noise. Possible mitigation measures are discussed in a separate sub-section below.

Other Special Status Species: The effects of Alternative B on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East and West Pasture restoration components would range from beneficial negligible to moderate adverse. Proposed mitigation measures proposed for some of these species are described in a separate sub-section below.

Species included in this category are federally or state-listed threatened and endangered species that are only occasional visitors or vagrants to the Project Area or were formerly listed as a Species of Concern by the Sacramento office of the USFWS. These species include **California freshwater shrimp**, California brown pelican, green sturgeon, Least Bell's vireo, American peregrine falcon, sandhill crane, bank swallow, **northwestern pond turtle**, **southwestern river otter**, and **saltmarsh common yellowthroat**. Impacts from implementation of this alternative would be beneficial or only have negligible to minor adverse effects from conversion in habitat type for most of these species, except northwestern pond turtle, which is characterized as having moderate adverse effects. A detailed description of effects can be found under Alternative A.



California freshwater shrimp primarily occurs considerably upstream of the Project Area on Lagunitas and Olema Creeks, although it occasionally moves downstream on Lagunitas Creek into the White House Pool reach of Lagunitas Creek. The frequency of occurrence within the Project Area probably depends to a large degree on flow and salinity conditions in this highly variable estuarine zone of the Lagunitas Creek delta. Minor adverse effects would be primarily associated with construction from actions such as levee removal, creek bank grading, and removal of riparian vegetation along the southern portion of the East Pasture, although every effort would be made to preserve as much riparian vegetation as possible. Over the long-term, negligible beneficial effects would be expected from discontinuation of agricultural management practices in Lagunitas Creek.

Similar to red-legged frog, **northwestern pond turtles** would be negatively affected by conversion of grassland and freshwater marsh habitats to tidal and brackish marsh habitats in both the East and the West Pastures. Construction activities expected to have the most effect would be filling in of the drainage ditches, tidal reconnection of the East Pasture Old Slough and excavation, construction of the eastern perimeter trail along Tomasini Creek, and removal of the Fish Hatchery Creek tidegate. Following implementation, turtles may become restricted to freshwater portions of Tomasini Creek and Fish Hatchery Creek and pockets of freshwater marsh along the ranch periphery. In the East Pasture, the Tomasini Creek levee would remain, which could maintain aestivation habitat.

As with Alternative A, **saltmarsh common yellowthroat** could be adversely impacted by permanent or temporary removal of riparian habitat for construction of the eastern perimeter trail, southern perimeter trail, and the possible future extension of the southern perimeter trail to Inverness Park. Common yellowthroat is known to breed in the first two areas and also breeds in the riparian habitat along Sir Francis Drake Boulevard, but north of where the possible trail extension would occur.

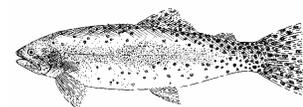
Proposed Additional Mitigation Measures: Standard BMPs would be implemented to reduce impacts to special status species and wildlife habitats are discussed under Chapter 2. All construction and staging/stockpiling areas would be cleared by biologists prior to use to ensure that there are no nesting or breeding species within the vicinity of the Project Area or staging/stockpile areas prior to implementation. Measures specific to certain species are described below:

California red-legged frog: Construction activities would include removal of ditches excavation of certain portions of the East Pasture Old Slough. Though not documented as supporting breeding habitat, the Old Slough and ditches and other areas within the East and West Pastures may provide non-breeding habitat. Construction activities adjacent to or within California red-legged frog habitat documented as breeding habitat would not be conducted until August. Pre-construction surveys would be completed in all construction areas to confirm that no red-legged frogs are present. Frogs encountered would be relocated.

Tidewater goby: Construction would not occur in or directly adjacent to existing tidewater goby habitat during the typical season of reproduction for tidewater goby documented in the literature (late April – early summer; Swift 2003). Prior to construction in the East Pasture Old Slough Pond, ditches, and Fish Hatchery Creek for removal of the tidegate, extensive seining would be performed after some dewatering to lower water levels and increase the efficiency of trapping. Minnow traps and dip nets may also be used to increase capture rates. Captured fish would be immediately relocated to Tomasini Creek, the West Pasture Old Slough, or other appropriate habitat.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: Work affecting Lagunitas Creek and Fish Hatchery Creek would be conducted after July 15 to minimize impacts to salmonids. BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, construction of the eastern perimeter trail, and installation of a pre-fabricated bridge. In addition to these BMPs, other actions would be taken to minimize impacts, including use of an excavator rather than a bulldozer to remove fill and excavation in sensitive creek areas during periods when construction area is exposed to the extent possible. During removal of the tidegate on Fish Hatchery Creek, water levels within the construction zone would be lowered, and extensive seining would be performed to remove any salmonids prior to construction. Captured fish would be relocated to appropriate upstream habitats.

California black rail and California clapper rail: The proposed project would comply with directives to not come within 250 feet of established rail habitat prior to August 31 by delaying construction in the northern portion of the East Pasture until September.



California freshwater shrimp: Construction conducted in the White House Pool reach would comply with BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, and installation of a pre-fabricated bridge. Pre-construction surveys would be conducted, and any shrimp found would be relocated upstream outside of the construction zone.

Northwestern pond turtle: Prior to construction in the ditches, East Pasture Old Slough, and Fish Hatchery Creek, water levels would be lowered to the extent possible, and turtles would be trapped and relocated to appropriate habitat, either Lagunitas Creek or the Martinelli Ponds in the Martinelli Ranch directly to the north of the Giacomini Ranch.

Saltmarsh common yellowthroat: Prior to construction of the southern perimeter trail, the eastern perimeter trail, or the possible future extension of the southern perimeter trail to Inverness Park, pre-construction surveys would be conducted to ensure that no active nests are present or that nesting and fledging have been completed prior to construction being conducted within or in the immediate vicinity (< 100 feet) of riparian habitat that is either known to support or believed capable of supporting common yellowthroat.

Effectiveness of Proposed Additional Mitigation Measures

California red-legged frog: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Tidewater goby: The mitigation measures would be expected to reduce impacts, but impacts cannot be eliminated. Even with extensive seining, some mortality of fish would be expected, because tidewater goby burrow in the mud, making it extremely difficult to trap all fish. Construction would, therefore, result in incidental take. The proposed mitigation measures would result in this alternative having moderate adverse impacts on tidewater goby during construction.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: The proposed mitigation measures should reduce any potential impacts to minor levels.

California black rail and California clapper rail: The proposed mitigation measures should result in no more than moderate adverse impacts on rails during construction.

California freshwater shrimp: The proposed mitigation measures should reduce any potential impacts to negligible levels.

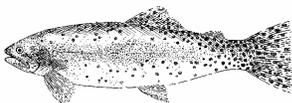
Northwestern pond turtle: The mitigation measures would be expected to reduce impacts, but would not eliminate them. Even with dewatering of the channels and extensive trapping, some mortality of turtles would be expected. The proposed mitigation measures would result in this alternative having moderate adverse impacts on turtles during construction.

Saltmarsh common yellowthroat: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Cumulative Impacts: Cumulative impacts would be the same as the No Action Alternative for the California red-legged frog and Alternative A for California black rails, California clapper rails, shorebirds, and waterfowl.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative B on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from moderate adverse to major beneficial. Under Alternative B, the East and West Pastures would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. Over the long-term, Alternative B would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some minor adverse impacts during construction in the East and West Pastures. As with Alternative A, the largest change under this alternative relative to existing conditions would come from the substantial conversion of



grassland or pasture to salt and brackish marsh through removal or breaching of the East and West Pasture levees, removal of agricultural infrastructure such as tidegates, and reconnection and expansion of the tidal channel network in the East Pasture. Through these actions, more than two-thirds of the East Pasture and one-third of the West Pasture would be expected to shift from grassland to tidal or brackish marsh. A transitional period would be expected over the short-term during which, as pasturelands slowly convert through exposure to saline conditions to marsh. These habitats would possibly continue to evolve in the future in response to sea level rise, which could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88 should sea level rise at the currently projected rate of 3 feet by 2100 (Overpeck et al. 2006).

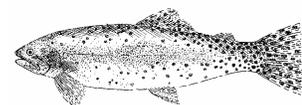
The major increase in High Value Wildlife Habitats would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. Some of the largest changes in wildlife use under this alternative relative to Alternative A would be expected to come from increased use of expanded marsh and riparian habitats in the West Pasture. While restoration efforts in the East Pasture would increase, general wildlife use patterns would be relatively similar to those under Alternative A. Construction of Alternative B would generally have minor adverse effects on High Value Wildlife Habitats and use by common wildlife species: effects on special status species is summarized below. Increases in visitation with expanded public access facilities would be expected to have negligible to minor adverse effects on wildlife use, particularly along the White House Pool reach of Lagunitas Creek and the eastern perimeter of the Giacomini Ranch near Tomasini Creek, although elimination of the Giacomini Ranch north levee trail would have a beneficial effect on special status species such as California black rails.

Alternative B would have very similar minor adverse effects as Alternative A on the number of non-native invasive wildlife species that would be present, with increases in numbers and extent of aquatic invasives expected from restoration of the West Pasture. Tidal reconnection of the 350-acre East Pasture and 200-acre West Pasture to Lagunitas Creek would have a moderate beneficial effect in terms of support of wildlife species in the southern portion of the Tomales Bay watershed. For the San Francisco Bay region in general, the proposed project, in combination with other proposed and ongoing restoration projects, would be expected to generally have a cumulatively negligible beneficial effect on regional populations of California black rails, California clapper rails, waterfowl, and shorebirds.

California red-legged frog: While freshwater marsh acreage would increase due to creation of freshwater marsh in the East Pasture, Alternative B would still be characterized as having a minor adverse effect on California red-legged frog breeding habitat units in the Point Reyes Peninsula Core Area, at least over the short-term, through further reductions in existing breeding habitat in the West Pasture freshwater marsh. This would have a measurable effect on distribution of the species in the Project Area over the short-term. Over the long-term, however, freshwater marsh creation efforts in the East Pasture would eventually reduce impacts to breeding habitat units and distribution of the species in the Core Area to negligible. This alternative would still have a measurable effect on distribution of species in the Project Area, because the primary breeding habitat available in the Giacomini Ranch would be shifted from the West Pasture to the East Pasture, where breeding has not been documented. Impacts during construction would generally remain negligible despite the increase in the extent of restoration, because most of the heavy construction would occur in the East Pasture, which does not have breeding habitat. There is a potential for cumulative impacts with other projects proposed in the Seashore or Marin County region, but, based on evaluation of impacts and proposed mitigation measures for those projects, impacts under this alternative would still be characterized as negligible to minor adverse.

Tidewater goby: Alternative B would have moderate to eventually major beneficial effects on tidewater goby in the Project Area after implementation through a potential increase in the areal extent of East and West Pasture habitat and the quality of existing habitats in Tomasini Creek. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The effects of Alternative B on salmonid rearing and passage habitat in the Project Area would be beneficial moderate. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component due to removal of the Fish Hatchery Creek and filling of the borrow ditch adjacent to the West Pasture north levee.



California black rail and California clapper rail: Alternative B would have very similar major beneficial effects to Alternative A in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh adjacent to existing rail habitat. During the transitional period following construction, only negligible to minor beneficial effects would be expected, as grassland begins the process of converting to brackish and tidal marsh, leading to temporary establishment of a more weedy, ruderal habitat that would have less benefits for rails. Relative to Alternative A, impacts during construction would increase to moderate adverse, because of construction actions on and near the north levee in the West Pasture.

Other Special Status Species: The effects of Alternative B on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East and West Pasture restoration components would range from beneficial negligible to moderate adverse.

Alternative C

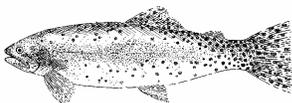
Analysis: The effects of Alternative C on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from major adverse to major beneficial (Table 75). As with Alternative B, the East and West Pastures would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. However, under this alternative, there would also be restoration of Olema Marsh. Some of the other major changes under Alternative C that would affect wildlife would be the partial realignment of Tomasini Creek into one of its historic alignments, native grass revegetation efforts at higher elevations of the East Pasture grasslands, and complete removal of levees from the West Pasture. Relative to Alternative B, tidal channel excavation, revegetation, and non-native invasive plant removal efforts in the East and West Pastures would be increased.

It should be noted that the Olema Marsh, and the ponded conditions that maintain habitat described above for the red-legged frog, also represents the barrier to steelhead and potentially salmon access to Bear Valley Creek. The physical conditions necessary to support breeding habitat of the red-legged frog are the same conditions which limit or eliminate potential salmonid access to the watershed. Evaluation of these potentially conflicting conditions warrants the extended discussion below.

Wildlife Habitats and General Wildlife Use – Project Implementation: Over the long-term, Alternative C would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some moderate adverse impacts during construction in the Project Area. Under this alternative, the dramatic rate of gain in High Value Wildlife Habitats between each of the alternatives would slow considerably. While Alternative B represented an almost 40 percent increase in High Value Wildlife Habitats from Alternative A, Alternative C would only increase the acreage of High Value Wildlife Habitats relative to Alternative B by 3 percent.

As with Alternative B, the largest change under this alternative relative to existing conditions would come from the substantial conversion of grassland or pasture to salt and brackish marsh through removal or breaching of the East and West Pasture levees, removal of agricultural infrastructure such as tidegates, and reconnection and expansion of the tidal channel network in the East Pasture. Through these actions, more than two-thirds of the East Pasture and one-third of the West Pasture would be expected to shift from grassland to tidal or brackish marsh or to remain shallowly flooded, sparsely vegetated flats such as the existing shallow shorebird area in the East Pasture. A transitional period would be expected over the short-term during which, as pasturelands slowly convert through exposure to saline conditions to marsh, restored areas would be dominated by a mix of non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions such as brass buttons, annual beard-grass, loosestrife, birdfoot trefoil, curly dock, and others. During this period, impacts to High Value Wildlife habitats in the Giacomini Ranch would be considered negligible adverse, because much of the habitat disturbed consists of highly managed pasturelands: while these types of habitats provide value, they are of lower value than many other unmanaged or less managed habitats.

Most of the gain in High Value Wildlife Habitat under Alternative C would come from restoration of Olema Marsh. While active native grass revegetation efforts in the Giacomini Ranch would more than quadruple the extent of this habitat relative to Alternative B, this habitat was considered to have a lower priority in an estuarine context than many of the other aquatic wildlife habitats, although it would serve an important role as refugia for aquatic species and home to many terrestrial species.



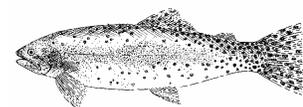
The major increase in High Value Wildlife Habitats would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. In general, the trends in wildlife use predicted under Alternative B would continue under Alternative C. Some of the largest changes in wildlife use under this alternative relative to Alternative B would be expected to come from increased use of expanded marsh and riparian habitats in Olema Marsh and Tomasini Creek. While restoration efforts in the East Pasture and the West Pasture would increase, general wildlife use patterns would be relatively similar to those under Alternative B, probably due to the small increase between Alternatives B and C in acreage of High Value Wildlife Habitats in the Giacomini Ranch.

Currently, impoundment of waters within Olema Marsh precludes tidal influence. Removal of a small berm that is limiting outflow of waters from the marsh would improve hydraulic connectivity with Lagunitas Creek. The dewatering expected with removal of the berm and possible replacement of the Levee and Bear Valley Road culverts would dramatically lower water surface levels in Olema Marsh by as much as 1- to 4 feet or more. In addition, replacement of the Levee Road culvert would lower the tidal threshold such tides lower than the current threshold of 4.5 feet MLLW would be able to flow into the marsh. These changes, combined with subsidence or lowering of ground surface elevations in response to dewatering (see discussion under Geologic Resources), would greatly increase the extent of area that is tidally influenced within the marsh to approximately between 10 and 20 acres (KHE 2006a). However, strong permanent sources of freshwater flow to Olema Marsh from Bear Valley Creek and Inverness Ridge in the form of groundwater and small drainages would likely further reduce the salinity of tidal waters flowing into the marsh from Lagunitas Creek. Salinities in Lagunitas Creek at its confluence with Bear Valley Creek already typically fall within the brackish range (0.5 – 20 ppt), because of where the marsh is located along the salinity gradient in the estuary.

These changes would have profound implications for the mix of High Value Wildlife Habitats that would develop over the long-term. Under Alternative C, acreage of Tidal Salt Marsh, a High Value Wildlife Habitat, would remain very similar to that under Alternative B. However, Tidal Brackish Marsh would increase more than 100 percent relative to Alternative B, because of increased tidal influence in Olema Marsh. Forested and Scrub Shrub Riparian Habitat would increase by as much as 16 percent, due in large part to lowered water surface levels in Olema Marsh. Under existing conditions, riparian habitat along the fringe of the Freshwater Marsh was essentially being drowned by the steady increases in water surface levels that appeared to be occurring over the last decade. Ultimately, these increases in riparian habitat would offset negligible losses (~0.05 acres) associated with widening of the Bear Valley Creek outlet channel when and if the Levee Road culvert is replaced. Increases in Tidal Brackish Marsh and Forested and Scrub Shrub Riparian habitats would come at the expense of decreases in Freshwater Marsh habitat, which would drop by as much as 10- 20 percent under Alternative C.

As with the Giacomini Ranch, a relatively short-term (~10 years) period would be expected to occur in which the marsh adjusts to these altered conditions. During this period, considerable die-back of Freshwater Marsh vegetation would take place, leaving dead stands of tall emergents and larger expanses of open water areas. Decomposition of vegetation, combined with other chemical changes in the soils related to dewatering and subsidence, would potentially cause short-term water quality problems, specifically increases in nutrients and acidity and possibly decreases in dissolved oxygen. Because of the buffering influence of flow from Bear Valley Creek and Inverness Ridge groundwater and drainage flow during this period, problems with acidity would be temporary and transient in nature. These trends in vegetation die-back and water quality would continue until equilibrium with changed conditions is reached at which point vegetation would begin to reestablish, creating the new mix of vegetation communities predicted over the long-term. While water levels would drop under Alternative C relative to existing conditions, the marsh would continue to be permanently ponded due to the strong amount of permanent freshwater inflow from Bear Valley Creek, Inverness Ridge groundwater and drainages, and, to some extent, Lagunitas Creek. Total water depths would simply be lower, and there may be more pockets of seasonally flooded habitats on the perimeter. Some changes may also occur in Bear Valley Marsh, because of the indirect effect that lowering of water surface levels in Olema Marsh would have on upstream water levels in Bear Valley Creek. Changes in this marsh would not be expected to be as dramatic. Overall these conditions would result in moderate adverse impacts to High Value Habitat in the short-term, though in the long-term, these conditions would stabilize, resulting in long-term major beneficial effects on High Value Habitat as natural processes are restored.

From a wildlife perspective, the short-term effects of these changes in Olema Marsh would generally range from minor to moderate adverse. Resident and Neotropical migrant birds and other animals associated with riparian habitat would probably continue to use the fringing riparian habitat, most of which would not be



directly affected by the expected changes. Some birds would also continue to nest in emergent vegetation, even as it dies back, while standing water remains in marsh (e.g. marsh wrens, red-winged blackbirds). As water levels decline, a decrease in the presence of migratory waterfowl may be observed, particularly those species that forage at greater depths. Shallower water depths may benefit aerial foragers (e.g. swallows) over Olema Marsh by increasing insect populations. Aquatic species such as threespine stickleback and invertebrates would be adversely affected as water quality conditions reach equilibrium. Amphibians such as California red-legged frog, Pacific tree frog, and northwestern pond turtle would likely leave the marsh during this period, perhaps moving into adjacent riparian habitat, Bear Valley Creek Marsh, or into the Olema Creek watershed less than 0.5 miles away. Some mortality of these species may occur, although construction itself is expected to have minor to moderate adverse impacts. Abundance of opportunistic species such as southwestern river otter and certain bird species may increase temporarily within the marsh in response to the sudden increase in food availability.

Over the long-term, as brackish vegetation and freshwater marsh habitat rebounds in Olema Marsh, a recovery of freshwater marsh-associated species (e.g. marsh wrens, red-winged blackbirds, rails) would be expected. There is potential for more waterfowl nesting by species such as mallard and gadwall as vegetative cover reestablishes around the edges and in Olema Marsh. Abundance of certain waterbirds such as California black rail may increase. An increase in riparian-associated bird species abundance and diversity would be expected over the long-term due to expansion of riparian habitat as water levels within the marsh drop. Species such as warbling vireo, Swainson's thrush, and Wilson's warbler would be expected to benefit as structure complexity returns to riparian habitat at Olema Marsh.

One of the other actions under Alternative C is partial realignment of Tomasini Creek into one its historic flow paths. Under this alternative, the existing Tomasini Creek channel would remain, as would the tidegates and flashboard dam structure, but the old channel would be leveed off from the new one. This change would convert the old Tomasini Creek channel into more of a backwater slough that would continue to receive freshwater influence from groundwater flowing off the Point Reyes Mesa, as well as occasional overbank flooding from Tomasini Creek during large storm events. This change would increase the areal extent of Muted and Tidal Subtidal/Intertidal habitats within the East Pasture. Abundance and areal extent of fish and invertebrate species would be expected to increase, as a result. Salmonids such as steelhead and coho would now be moving through the East Pasture on their way to or from spawning grounds in the upper watershed and would be better able to take advantage of the larger extent of aquatic edge or potential refugia habitat provided by the enhanced tidal channel network in the East Pasture. A similar beneficial effect would be expected over the long-term for tidewater goby. The old Tomasini Creek channel would continue to provide habitat for salmonids and tidewater goby, with the tidegate/flashboard still maintaining permanent subtidal conditions.

In addition, under this alternative, the through-trail component of the eastern perimeter trail would be eliminated in favor of constructing two spur trails. This would decrease potential impacts to the Tomasini backwater slough from erosion and permanent and temporary removal of riparian vegetation. It would also benefit riparian associates such as Swainson's thrush and saltmarsh common yellowthroat that uses the riparian vegetation and Mesic Coastal Scrub habitats on the Point Reyes Mesa through decreasing impacts from construction- and project-related habitat loss and possible disturbance from trail users.

Wildlife Habitats and General Wildlife Use – Long-Term Changes: As discussed under Alternative A for Giacomini Ranch, the brackish, tidal marsh, and riparian habitats described would eventually develop after a short-term (~ 10 years) transitional period in which grassland is converted into marsh. In addition, Olema Marsh would also respond to dramatic changes in physical conditions with a short-term transitional period in which existing vegetation would die-back considerably and create more expanses of open water until equilibrium is reached at which point new habitats would begin to develop. Over the long-term, these habitats would possibly continue to evolve in response to sea level rise, which could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88 should sea level rise at the currently projected rate of 3 feet by 2100 (Overpeck et al. 2006). This change would also affect Olema Marsh, as impoundment would no longer preclude inflow from Lagunitas Creek. However, predicting the magnitude of this change is difficult given the adaptive restoration approach proposed for this component of the proposed project. In general, sea level rise would intensify the conversion of Freshwater Marsh to Tidal Brackish Marsh.

Relative to Alternative B, long-term impacts related to disturbance of wildlife by visitors would decrease somewhat, because the eastern perimeter trail would be converted from a through-trail to two (2) spur trails. Construction of the southern perimeter trail would greatly increase wildlife viewing opportunities on this reach of Lagunitas Creek and could increase adverse effects on wildlife, depending on visitation numbers. However,



this area already receives a considerable amount of disturbance from users of the existing informal path, Giacomini Ranch maintenance, users of the Green Bridge and White House Pool County parks, and residents along Levee Road. In this context, impacts relative to existing conditions would be expected to be only negligible adverse. Under Alternative C, spur trails would be retained on the eastern perimeter – an extension of the Tomales Bay spur trail and the Mesa Road spur trail. Because of the disturbed nature of the Mesa Road spur trail area (e.g., ranch housing, heavy vehicle traffic for ranch maintenance, use of the Giacomini Hunt Lodge, and gardening operations), the impact of this public access element on wildlife use within the highly disturbed riparian corridor would be negligible, at most.

Wildlife Habitats and General Wildlife Use – Construction: Construction of Alternative C would generally have minor adverse effects on High Value Wildlife Habitats and use by common wildlife species. Special status species are discussed individually.

Nine of the proposed construction activities would have the highest potential to affect both common and special status wildlife species. These activities are regrading of the southern levee in the East Pasture and creek bank to a more stable profile; filling of drainage ditches; tidal reconnection of the East Pasture Old Slough Pond; removal and breaching of levees; removal of the Fish Hatchery Creek tidegate; filling of the borrow ditch in the undiked marsh north of the West Pasture; partial realignment of Tomasini Creek; shallow excavation of Bear Valley Creek, and possible replacement of the Levee Road and Bear Valley Road culverts. Potential impacts to wildlife from most of these construction activities are discussed under Alternatives A and B. As described in Chapter 2, standard BMPs would be employed to minimize sediment discharge, and efforts would be made to preserve larger willows and other riparian trees during regrading of the creek bank.

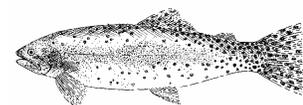
Under Alternative C, the Bear Valley Creek channel would be shallowly excavated using either an excavator working from adjacent uplands or a dragline. Culverts on Bear Valley Creek at Bear Valley Road and Levee Road may also be replaced with new culverts or bridges, and the channel bottom, excavated to improve hydraulic conveyance. Tomasini Creek would be partially realigned into one of its historic alignments. These construction activities have the potential to negatively affect aquatic organisms such as fish (e.g., salmonids) and potentially macroinvertebrates, as well as amphibians and reptiles. Non-resident species such as waterfowl, waterbirds, southwestern river otter, and rails would not be impacted unless nesting or breeding was occurring.

Based on the scale and timing of construction activities that could affect High Value Wildlife Habitats and use by common wildlife species, the impacts of construction are characterized as minor to moderate adverse. The intensity of construction impacts on special status species is addressed separately below.

Invasive Wildlife Species: Alternative C would have a very similar minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions as Alternatives A and B, with increases in numbers and extent of aquatic invasives expected in Olema Marsh.

Wildlife Conditions in the Watershed: Tidal reconnection of the Giacomini Ranch and Olema Marsh to Lagunitas Creek would have a moderate beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. As described under Alternative A, tidal reconnection of the Giacomini Ranch and, under this alternative, Olema Marsh would not only increase the potential for export of sources of carbon such as dissolved and particulate organic carbon, phytoplankton, seeds and other plant matter, and aquatic organisms to the bay, but for access by marine and estuarine species in search of food and refugia. In addition, watershed habitat quality would be improved by rerouting of the Tomasini Creek and its associated sediment, pathogen, and contaminant load into the East Pasture than into Tomales Bay. These benefits would complement those achieved under Alternative A from discontinuation of agricultural management practices in the Giacomini Ranch and the portion of Lagunitas Creek in the Project Area such as levee maintenance, withdrawal of water for irrigation, infrequent pumping of waters from the ranch into Lagunitas Creek, and crossing of Lagunitas Creek by cattle.

California red-legged frog: Alternative C would result in appreciable or moderate adverse impacts over the short-term to California red-legged frog breeding habitat units in the Seashore-owned and managed-portions of the Point Reyes Peninsula Core Area, as well as on distribution of red-legged frogs in the Project Area. These impacts would occur principally because of proposed activities in the Olema Marsh and the expected conversion of a large portion of the West Pasture freshwater marsh to tidal brackish marsh. However, over the long-term, impacts to California red-legged frog breeding habitat units would be reduced to minor, as freshwater marsh reestablishes within the Olema Marsh, and mitigation habitats in the East Pasture and the



Olema Creek become established. There would still be appreciable effects on distribution of the species within the Project Area, because appropriate breeding habitat would be relocated to areas not expected to be affected by salinity intrusion. Impacts during construction would be characterized as minor adverse, because excavation would be performed in the Olema Marsh.

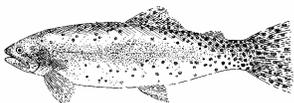
Baseline studies documented two general areas that provide breeding habitat for red-legged frog. The largest of these is the West Pasture freshwater marsh. Breeding also has sporadically occurred in adjacent Fish Hatchery Creek, creating another 1.0 acre of breeding habitat in the West Pasture. The second breeding habitat is in the Olema Marsh and is assumed to comprise all of the areas with Freshwater Marsh and Open Water, which total 39 acres. There is no documented breeding habitat in the East Pasture, although a few adult frogs were observed during baseline surveys (Fellers and Guscio 2002).

The effects of Alternative C on red-legged frog breeding and non-breeding habitat in the East and West Pasture would be similar to Alternative B. Changes to the West Pasture freshwater marsh and non-breeding habitat with restoration would be identical to those described under Alternative B, with approximately two-thirds of the 7.2-acre marsh converted to brackish marsh with saltwater intrusion. The non-saline portion would be expanded by 0.4 acres by habitat enhancement efforts scheduled in 2006. As with Alternative B, some of the loss of breeding habitat in the West Pasture freshwater marsh would be offset by creation of the 5.4-acre Tomasini Triangle freshwater marsh in the East Pasture. There are no breeding individuals believed to be using the East Pasture currently, but low numbers of adult individuals have been sighted (Fellers and Guscio 2002). Effects on non-breeding habitat for red-legged frog in the East Pasture would still be characterized as moderate adverse due to the large-scale conversion of grassland to brackish and salt marsh, loss of drainage ditches through filling, and, under this alternative, partial realignment of Tomasini Creek and revegetation in the southern portion of the East Pasture. The latter two components would only be expected to have only short-term effects until vegetation becomes established.

The largest impact under Alternative C would come with restoration of Olema Marsh. While California red-legged frogs are known to occur in the Olema Marsh, along with bullfrogs, conditions within the area did not allow for an effective assessment of red-legged frog use. Over the short-term, the dramatic physical and water quality changes that would occur in Olema Marsh with a decrease in impoundment conditions described earlier under this alternative would have temporary adverse effects on red-legged frog breeding habitat as the system moves towards equilibrium. Extensive vegetation die-back would occur due to lowering of water surface levels, leading to larger expanses of open water. In the summer as stream flow drops, temporary drops in pH may occur, although these episodes would be expected to be relatively short-lived. Nutrient pulses and instability and dissolved oxygen conditions within marsh waters would be more persistent and would continue until the marsh began to come into equilibrium with changed conditions. The majority of these conditions would initially occur in the early fall after breeding and metamorphosis is typically complete, however, it is possible that water quality fluctuations may persist into the following breeding season.

Some of the short-term impacts to red-legged frog would be offset by creation of approximately 2 acres of freshwater ponds in the adjacent Olema Creek watershed less than 0.5 miles from Olema Marsh. The lower reaches of this watershed just above its confluence with Lagunitas Creek recently began supporting breeding red-legged frogs after the creek reestablished connectivity with its historic eastern floodplains and converted pasture to a complex marsh system with both permanently and seasonally flooded habitats. Several ponds would be created on the west side of Olema Creek several years prior to implementation of restoration in Olema Marsh to ensure that additional habitat is available. These ponds would be excavated to varying depths to provide both shallow water and deep water aquatic and emergent habitat for frogs. Ponds would be designed to remain inundated from waters received from Olema Creek flood overflow and surface runoff until late July or August using a similar construction approach to that described under Chapter 2 for the created freshwater marsh in the Tomasini Triangle (Alternative B) such as stockpiling excavated topsoil and mixing topsoil with a material such as bentonite.

Over the long-term, conditions for red-legged frogs in Olema Marsh would improve. Once the marsh has adjusted to changes in water surface levels, marsh vegetation is expected to reestablish. As described earlier, the areal extent of Tidal Brackish Marsh would increase considerably in Olema Marsh under Alternative C, because of increases in tidal influence caused by decreases in marsh impoundment conditions and possibly lowering of the Bear Valley Road culvert elevation through replacement with a bridge. Acreage of Tidal Brackish Marsh is expected to increase to between 10 and 20 acres under this alternative, depending upon the adaptive restoration components implemented, degree of marsh subsidence, and other factors (KHE 2006a). Freshwater Marsh would re-establish elsewhere in the marsh, due in large part to the continued strong permanent freshwater influence from Bear Valley Creek and the Inverness Ridge drainages and groundwater.



While water levels would not be as deep as under existing conditions, the marsh would continue to be fully inundated, with the exception of perhaps some pockets along the marsh perimeter that would be more seasonal in nature. These conditions could change somewhat in future because of sea level rise, which may increase the extent of tidal influence and Tidal Brackish Marsh habitats in the marsh.

Impacts on red-legged frog during construction would be minor adverse. In the Giacomini Ranch, construction activities would be expected to have only negligible adverse effects, because most of the heavy construction occurs in the East Pasture, and there is no breeding habitat in the East Pasture, and only a few adult frogs have been sighted. These impacts are discussed in more detail under Alternative B. With restoration of Olema Marsh, the intensity of potential impacts to breeding habitat would increase, principally because of the shallow channel excavation that would be performed in the Olema Marsh portion of Bear Valley Creek. While construction would occur outside the breeding season and critical periods for tadpoles (after July), non-breeding adults and young could still be harmed or disturbed through construction. Possible mitigation measures are discussed in a separate sub-section below.

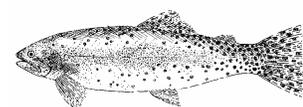
Tidewater goby: Alternative C would have minor to moderate adverse effects on tidewater goby and tidewater goby habitat in the Project Area over the short-term, but would have major beneficial effects over the long-term through an increase in extent of potential habitat and an improvement in quality for most of the existing habitats. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take.

Within the Project Area, Acreage of existing tidewater goby habitat in the Giacomini Ranch totals 11.3 acres. This species occurs primarily in three areas within the Giacomini Ranch: Tomasini Creek, the West Pasture Old Slough and possibly Fish Hatchery Creek, and the non-tidal East Pasture Old Slough Pond. A detailed description of these areas can be found under the No Action Alternative. Numbers of tidewater goby in the Project Area have also been relatively low within each of these sites, ranging from five to 22 at most. These sites represent the only known occurrence of this species in the Tomales Bay watershed, as, prior to 2002, the species had last been sighted in the bay in 1953. Genetic analyses indicate that this population is genetically distinct from the nearest existing occurrences of tidewater goby at Salmon Creek Marsh and Rodeo Lagoon (Jacobs and Earl 2005). The effects of Alternative C on tidewater goby habitat would be very similar in most aspects to Alternative B, specifically with regards to tidal reconnection of the East Pasture Old Slough, filling of drainage ditches, and introduction of full tidal flushing to the West Pasture.

While approximately 0.3 acres of ditches in the East Pasture would be filled in as part of the elimination of agricultural infrastructure under Alternative, A, the extent of tidal channel creation would increase under Alternative C, creating approximately 11.6 acres of habitat for tidewater goby. The Park Service and CSLC would also continue with the proposed captive propagation program to expand the distribution of tidewater goby within the southern portion of the Tomales Bay watershed.

Under Alternative C, however, Tomasini Creek, the primary habitat for tidewater goby in the Project Area, would be partially realigned into one of its historic alignments. The old Tomasini Creek channel would be leveed off from the new channel in the vicinity of the Giacomini Hunt Lodge, thereby converting the old channel into more of a backwater slough feature. As with the other alternatives, existing habitat conditions would be maintained in Tomasini Creek through retention of the tidegates and associated hydrologic infrastructure. Retention of the tidegates and flashboard dam structure on Tomasini Creek, along with natural gravel bar features, create residual brackish pool habitat that provides habitat for the tidewater goby, despite the fact that the substrate and flow conditions are probably not optimal.

In some senses, realignment may improve conditions in the backwater slough portion of the old Tomasini Creek channel. Scour during high flows would be reduced considerably, with the height of the new levee designed to allow some flood overflow during larger storm events. Disconnection from the Tomasini Creek watershed would also reduce influx of nutrients and pathogens, as well as contaminants potentially being leaked from the West Marin Landfill. However, realignment of the creek would remove a major source of freshwater inflow during at least winter, spring, and early summer months. Creek flow often dries up or becomes subsurface near Mesa Road by late summer into fall. While fluvial contributions would be lost, the section of Tomasini Creek between the Giacomini Hunt Lodge and the bay also appears to receive considerable contributions of groundwater from the Point Reyes Mesa through either seep waters flowing down the face of the Mesa or from groundwater emerging at the toe of the Mesa directly into the Tomasini Creek channel. This contribution was evident during hydrodynamic modeling of the creek, because observed salinities in the creek were much lower than ones predicted on the basis of tidal and fluvial inflow. Based on modeling, salinities



near the Giacomini Hunt Lodge during the summertime with typical low summer flows should range from 20.5 to 25.0 ppt, but actual salinities recorded during monitoring by the Seashore show that salinities actually range from 15.0 to 18.0 ppt in both surface and bottom waters (KHE 2006a). Eventually, the salinity structure of the Tomasini Creek backwater slough could become more strongly influenced by tides due to sea level rise.

While these factors would suggest that conditions acceptable for tidewater goby would be maintained – and, in some ways, improved -- in the old Tomasini Creek backwater slough, the direct impacts to existing habitat do pose a risk over the short-term for tidewater goby habitat. Realignment of the Tomasini Creek channel and creation of new channels in the East Pasture would dramatically increase potential habitat in the East Pasture, but these benefits would take time to realize due to need for the habitat to establish and mature during a transitional phase following implementation. This phenomenon would not be as pronounced in the West Pasture, because there would be no new channel excavation or direct impacts to existing channel habitat other than removal of the tidegate. The tidewater goby does not currently occur in Olema Marsh, but improvements in hydraulic connectivity and expansion of brackish habitats could increase the potential for the species to establish here. For this reason, impacts to tidewater goby over the short-term are characterized as moderate adverse, with major or substantial beneficial effects expected over the long-term.

Relative to Alternatives A and B, most of the impacts to what would now be the Tomasini backwater slough from the public access component would be eliminated by removal of the through-trail component and replacement with two spur trails, one of which would extend the Tomales Bay Trail south along the old railroad grade adjacent to the slough channel.

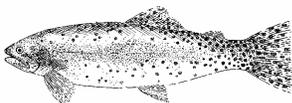
Construction activities would directly impact existing habitats in the East Pasture and Tomasini Creek, although impacts from earthmoving to the existing Tomasini Creek would be limited in scale. Construction in the West Pasture would not directly affect tidewater goby habitat. Due to incorporation of mitigation measures, impacts during construction would be characterized as moderate adverse. Possible mitigation measures are discussed in a separate sub-section below.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: Similar to Alternative B, the effects of Alternative C on salmonid rearing and passage habitat in the Project Area would be beneficial and would generally range from moderate to major. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component due to removal of the Fish Hatchery Creek tidegate, filling of the borrow ditch adjacent to the West Pasture north levee, and, under this alternative, partial realignment of Tomasini Creek and shallow excavation of Bear Valley Creek in Olema Marsh.

As discussed under the No Action Alternative, the Project Area does not represent a potential breeding or spawning area for steelhead, coho or Chinook salmon, but rather important feeding, resting, and refugia habitat for salmonids as they migrate to the ocean or move upstream to spawning grounds. Steelhead has recently been found in Fish Hatchery Creek, Tomasini Creek, the section of Lagunitas Creek in the Project Area, and in Bear Valley Creek upstream of Olema Marsh. Coho occur in Lagunitas Creek and in Tomasini Creek. Chinook has been documented in upstream portions of Lagunitas Creek, but they have not been captured as yet in the Project Area. Salmonid presence in these watersheds indicates that, while impediments, the levees and tidegate facilities are still allowing some degree of fish passage. The levees severely constrain the potential for development of off-channel or rearing habitat on Tomasini Creek and Lagunitas Creek. Fish Hatchery Creek is not leveed within the West Pasture, although it is infrequently dredged. On Bear Valley Creek, Levee Road, Bear Valley Roads, and their culverts limit both passage and rearing potential, along with the indistinct flow path in Olema Marsh created by excessive impoundment of waters.

The major benefit to salmonids under this alternative related to passage and rearing conditions would come from the considerable reduction in passage constraints associated with improvements in hydraulic connectivity of Bear Valley Creek with Lagunitas Creek and partial realignment of Tomasini Creek into an unregulated channel. In addition, these changes would also have moderate effect on the extent of rearing habitat along Bear Valley and Tomasini Creeks.

Under Alternative C, aquatic edge habitat in Giacomini Ranch would increase approximately 31 percent relative to existing conditions, with edge habitat in the Project Area climbing from approximately 15 miles under existing conditions to 19.6 miles under Alternative B. While approximately 0.3 acres of ditches would be eliminated, a total of 11.6 acres of new and restored tidal channel would be created in the East Pasture Old



Slough. The old Tomasini Creek channel would remain, functioning somewhat as a backwater slough and thereby providing additional rearing and refugia habitat for salmon. As with Alternative B, removal of the levees and Fish Hatchery Creek tidegate would improve passage potential, extent of rearing habitat, and habitat quality in the West Pasture, with 4.6 acres of tidally influenced channel expected to develop in the West Pasture.

Passage potential in Tomasini Creek and Bear Valley Creek would improve immediately following implementation of the proposed project, but benefits to areal extent of rearing habitat and habitat quality would take longer to effect, with relatively short-term transitional phases expected in both systems as they adjust and respond to changed conditions. As has been described earlier, changes during the transitional phase would be much more dramatic in Olema Marsh than in Tomasini Creek, with extensive vegetation die-back predicted in response to dramatic reductions in water surface levels. These changes would have less of an effect on salmonids than some of the other aquatic species, because the lack of hydraulic connectivity and other constraints related to infrastructure has probably considerably reduced numbers of steelhead within this system, if not eliminated passage entirely. Therefore, Bear Valley Creek and Olema Marsh are not currently perceived as either key spawning or rearing habitat for steelhead, although this subwatershed once reportedly supported at least a modest run of this fish. Because of the lower values offered during the transitional phase in both the Giacomini Ranch and Olema Marsh, short-term effects were characterized as moderate, with long-term effects anticipated to be major.

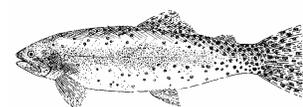
Construction would have the potential for only minor adverse impacts associated removal of the Fish Hatchery Creek tidegate, filling in of the borrow ditch, tidegate, filling of the borrow ditch adjacent to the West Pasture north levee, and, under this alternative, partial realignment of Tomasini Creek and shallow excavation of Bear Valley Creek in Olema Marsh. Construction would be scheduled to ensure that grading does not begin before July 15, which is the end of the typical period for smolt outmigration. Possible mitigation measures are discussed in a separate sub-section below.

California black rail and California clapper rail: Alternative C would have very similar major beneficial effects to Alternative B in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh. During the transitional period following construction, only negligible to minor beneficial effects would be expected, as grassland and other habitats begin the process of converting to brackish and tidal marsh, leading to temporary establishment of a more weedy, ruderal habitat that would have less benefits for rails. Similar to Alternative B, impacts during construction would be moderate adverse, because of construction actions on and near the north levee in the West Pasture and in Olema Marsh.

As discussed under the No Action Alternative, breeding populations of California black rail have primarily occur in the undiked marsh north of the Giacomini Ranch and in Olema and Bear Valley marshes in intermittent years (ARA 2002). Small numbers (1-2 individuals) also occurred within the Project Area in brackish and freshwater marsh, with possible breeding one year in the West Pasture freshwater marsh (ARA 2002). Clapper rail historically occurred in Tomales Bay, and individuals were sighted in the undiked marsh north of the Giacomini Ranch during fall and winter between 1995 and 2001 (J. Evens, R. Stallcup, unpub. field notes). There have been no sightings since then, however, and there are no recent breeding records either from the bay.

Under Alternative C, benefits for black rail and clapper rail from restoration of the Giacomini Ranch would be almost identical to those under Alternative B, with breeding, foraging, resting, and refugia habitat almost tripling from approximately 120 acres to more than 350 acres with restoration of the East and West Pastures. The restoration would provide benefits primarily to black rail, although clapper rail could benefit substantially, as well, from establishment of low and high Tidal Salt Marsh habitats. Increases in high marsh habitat in Giacomini Ranch could, at least temporarily, offset any decreases in this habitat in the undiked marsh habitat north of the ranch from accelerated rates of bank slumping and channel widening that might be potentially being caused by a non-native isopod. This isopod would be likely to move south into the Giacomini Ranch once tidal connection and habitats are restored. Alternative C could improve the quality of refugia habitat in the East Pasture through efforts to increase the cover of native grasses in the southern portion of the pasture. The proximity of the East and West Pastures to the existing habitat in the adjacent undiked marsh would greatly increase the likelihood for successful establishment by rails in the restored areas.

As noted above, California black rails have bred in intermittent years in Olema Marsh and Bear Valley Marsh. With lowering of water surface levels and associated changes in the mix of riparian, brackish marsh, and



freshwater marsh habitats, the suitability of these marshes for black rail would be enhanced, particularly if pockets of more seasonally flooded habitat develop on the perimeter. As with Giacomini Ranch, these minor beneficial effects would take place over the long-term, with conditions expected to be less desirable during the short-term due to the extensive die-back of vegetation and water quality problems that may occur during the transitional phase.

Construction would be expected to have potential moderate adverse effects on rails. While construction would be conducted outside of the documented breeding season for clapper rails (February through August 31), the filling of the borrow ditch and extension of the tidal channel in the undiked marsh into the West Pasture could negatively affect rails through temporary impacts to habitat and disturbance from noise. Possible mitigation measures are discussed in a separate sub-section below.

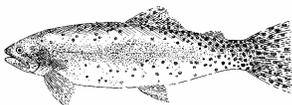
Other Special Status Species: The effects of Alternative C on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East and West Pasture and Olema Marsh restoration components would range from beneficial negligible to moderate adverse. Proposed mitigation measures proposed for some of these species are described in a separate sub-section below.

Species included in this category are federally or state-listed threatened and endangered species that are only occasional visitors or vagrants to the Project Area or were formerly listed as a Species of Concern by the Sacramento office of the USFWS. These species include **California freshwater shrimp**, California brown pelican, green sturgeon, Least Bell's vireo, American peregrine falcon, sandhill crane, bank swallow, **northwestern pond turtle**, **southwestern river otter**, and **saltmarsh common yellowthroat**. Impacts from implementation of this alternative would be beneficial or only have negligible to minor adverse effects from conversion in habitat type for most of these species, except northwestern pond turtle, which is characterized as having moderate adverse effects. A detailed description of effects for most of the incidental visitors to the Project Area can be found under Alternative A.

California freshwater shrimp primarily occurs considerably upstream of the Project Area on Lagunitas and Olema Creeks, although it occasionally moves downstream on Lagunitas Creek into the White House Pool reach of Lagunitas Creek. The frequency of occurrence within the Project Area probably depends to a large degree on flow and salinity conditions in this highly variable estuarine zone of the Lagunitas Creek delta. Based on results of hydrodynamic modeling, there is a potential under Alternative C for minor adverse impacts to this species from a change in salinity structure of the White House Pool reach of Lagunitas Creek due to an increase in exchange with Olema Marsh, which would store a higher volume of brackish waters relative to existing conditions (KHE 2006a). These higher salinity conditions could preclude or discourage use of habitat in this area by freshwater shrimp. In addition to project-related effects, construction could result in minor adverse impacts from levee removal, creek bank grading, and removal of riparian vegetation along the southern portion of the East Pasture, although every effort would be made to preserve as much riparian vegetation as possible.

Similar to red-legged frog, **northwestern pond turtles** would be negatively affected by conversion of grassland and freshwater marsh habitats to tidal and brackish marsh habitats in both the East and the West Pastures. Construction activities expected to have the most effect would be filling in of the drainage ditches, tidal reconnection of the East Pasture Old Slough and excavation, construction of the eastern perimeter trail along Tomasini Creek, and removal of the Fish Hatchery Creek tidegate. Following implementation, turtles may become restricted to freshwater portions of Tomasini Creek and Fish Hatchery Creek and pockets of freshwater marsh along the ranch periphery. In the East Pasture, the Tomasini Creek levee would remain, which could maintain aestivation habitat. Northwestern pond turtle has not been observed in Olema Marsh, although it does occur in Lagunitas Creek. The potential changes in salinity structure for the White House Pool reach of Lagunitas Creek could have similar adverse impacts on turtles in the creek as described in freshwater shrimp above. Improvements in hydraulic connectivity between Lagunitas Creek and Olema Marsh may increase the potential for turtles to move into the Olema and Bear Valley marshes, although the southernmost portions of Olema Marsh would probably be too saline to be appropriate habitat.

Under Alternative C, construction-related effects on **saltmarsh common yellowthroat** would be reduced from minor under Alternative B to negligible with elimination of the through-trail component of the eastern perimeter trail. Saltmarsh common yellowthroat may actually benefit from this alternative after implementation, because of the considerable reduction in direct impacts to existing habitat from public access-related components and the increase in Forested and Scrub Shrub Riparian habitat in Olema Marsh from



conversion of Freshwater Marsh with dewatering. Olema Marsh has historically supported a large breeding population of saltmarsh common yellowthroat.

Proposed Additional Mitigation Measures: Standard BMPs would be implemented to reduce impacts to special status species and wildlife habitats are discussed under Chapter 2. All construction and staging/stockpiling areas would be cleared by biologists prior to use to ensure that there are no nesting or breeding species within the vicinity of the Project Area or staging/stockpile areas prior to implementation. Measures specific to certain species are described below:

General: Impacts to aquatic organisms in construction areas such as Fish Hatchery Creek, East Pasture Old Slough Pond, and Bear Valley Creek/Olema Marsh would be minimized through dewatering affected channel areas to the extent possible and performing extensive seining to remove fish and macroinvertebrates prior to construction. Organisms would be relocated to areas outside the construction zone. In Olema Marsh, fine-mesh fencing or nets may be installed if possible on the perimeter of the channel excavation area to ensure that, once pre-construction surveys and seining have been completed, fish and other aquatic organisms do not automatically move back into the construction area. This measure may be difficult to implement due to the deep water depths unless some dewatering occurs prior to construction.

High Value Wildlife Habitats/General Wildlife Use: Implementation of restoration in Olema Marsh would have the potential for moderate adverse impacts over the short-term. Some of the impacts to general wildlife use, if not wildlife habitats, from water quality problems generated by lowering water surface levels could be potentially mitigated through extending the period of drawdown. Olema Marsh implementation would include adaptive management and monitoring. In order to reduce the potential water quality impacts associated with the reduction in water level and aquatic vegetation die off, the excavation and lowering of water level would be limited to excavation of only the fill area controlling water level.

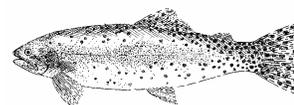
California red-legged frog:

Construction Mitigations: Construction activities would include removal of ditches; excavation of certain portions of the East Pasture Old Slough; and shallow excavation of the portion of Bear Valley Creek in Olema Marsh. Olema Marsh is known breeding habitat for red-legged frog. Though not documented as supporting breeding habitat, the Old Slough and ditches and other areas within the East and West Pastures may provide non-breeding habitat. Construction activities adjacent to or within California red-legged frog habitat documented as breeding habitat would not be conducted until August. Pre-construction surveys would be completed in all construction areas to confirm that no red-legged frogs are present.

In Olema Marsh, fine-mesh fencing or nets may be installed if possible on the perimeter of the channel excavation area to ensure that, once pre-construction surveys and seining have been completed, fish and other aquatic organisms do not automatically move back into the construction area. This measure may be difficult to implement due to the deep water depths. Frogs encountered would be relocated.

Possible Project-Related Mitigation Measures - Olema Marsh: Proposed reductions in the Olema Marsh water level would result in reduction in static water level, which may result in large fluctuations in water quality and emergent vegetation conditions that could affect the viability of the marsh over the short-term for breeding habitat. For these reasons, several possible mitigation measures may be implemented to reduce short-term impacts to breeding habitat. One possible mitigation measure would involve construction of a creek bypass that would involve excavation of fill from the eastern edge of the marsh, with most of the material placed immediately to the west, essentially separating the flow channel from the marsh. In addition, another potential mitigation measure identified as part of the water quality section includes a more gradual approach to dewatering of Olema Marsh through limiting the excavation depths at the outflow of the Olema Marsh. Removal of vegetation along the excavated flow path and either notching or culverting the berm that currently constricts outflow would allow for a more gradual drawdown in water level that may reduce the potential water quality impacts associated with restoring the currently impounded marsh.

Tidewater goby: Construction would not occur in or directly adjacent to existing tidewater goby habitat during the typical season of reproduction for tidewater goby documented in the literature (late April – early summer; Swift 2003). Prior to construction in the East Pasture Old Slough Pond, ditches, Tomasini Creek, and Fish Hatchery Creek for removal of the tidegate, extensive seining would be performed after some dewatering to lower water levels and to increase the efficiency of trapping. Minnow traps and dip nets may also be used to



increase capture rates. Captured fish would be immediately relocated to Tomasini Creek, the West Pasture Old Slough, or other appropriate habitat.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: Work affecting Lagunitas Creek, Fish Hatchery Creek, Tomasini Creek, and Bear Valley Creek would be conducted after July 15 to minimize impacts to salmonids. BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, construction of the eastern perimeter trail, and installation of a pre-fabricated bridge. In addition to these BMPs, other actions would be taken to minimize impacts, including use of an excavator rather than a bulldozer to remove fill and excavation in sensitive creek areas during periods when construction area is exposed to the extent possible. During removal of the tidegate on Fish Hatchery Creek, water levels within the construction zone would be lowered, and extensive seining would be performed to remove any salmonids prior to construction. Captured fish would be relocated to appropriate upstream habitats.

California black rail and California clapper rail: The proposed project would comply with directives to not come within 250 feet of established rail habitat prior to August 31 by delaying construction in the northern portion of the East, West Pasture, and Olema Marsh until September.

California freshwater shrimp: Construction conducted in the White House Pool reach would comply with BMPs identified in Chapter 2 to decrease sedimentation and impacts to wetlands would mitigate potential impacts associated with selective deconstruction of levees, regrading of creek banks, and installation of a pre-fabricated bridge. Pre-construction surveys would be conducted, and any shrimp found would be relocated upstream outside of the construction zone.

Northwestern pond turtle: Prior to construction in the ditches, East Pasture Old Slough, and Fish Hatchery Creek, water levels would be lowered to the extent possible, and turtles would be trapped and relocated to appropriate habitat, either to Lagunitas Creek or the Martinelli Ponds in the Martinelli Ranch directly to the north of the Giacomini Ranch.

Saltmarsh common yellowthroat: Prior to construction of the southern perimeter trail or the possible future extension of the southern perimeter trail to Inverness Park, pre-construction surveys would be conducted to ensure that no active nests are present or that nesting and fledging have been completed prior to construction being conducted within or in the immediate vicinity (< 100 feet) of riparian habitat that is either known to support or believed capable of supporting common yellowthroat.

Effectiveness of Proposed Additional Mitigation Measures

High Value Wildlife Habitats/General Wildlife Use: Mitigation measures proposed would be expected to reduce the severity of short-term impacts to use by wildlife from restoration of Olema Marsh, but potential short-term impacts to High Value Wildlife habitats may be unavoidable. Over the long-term, these impacts, however, would be mitigated by adjustment to changed conditions and reestablishment of a slightly different mix of High Value Wildlife Habitats.

California red-legged frog: The potential project-related mitigation measures proposed above, in combination with the habitat creation proposed under Alternative C as described in Chapter 2, would possibly further reduce the moderate short-term and long-term impacts to California red-legged frog. Construction-related mitigation measures would keep impacts during implementation of restoration to no more than minor.

Tidewater goby: The mitigation measures would be expected to reduce impacts, but impacts cannot be eliminated. Even with extensive seining, some mortality of fish would be expected, because tidewater goby burrow in the mud, making it extremely difficult to trap all fish. Construction would, therefore, result in incidental take. The proposed mitigation measures would result in this alternative having moderate adverse impacts on tidewater goby during construction.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: The proposed mitigation measures should reduce any potential impacts to minor levels.

California black rail and California clapper rail: The proposed mitigation measures should result in no more than moderate adverse impacts on rails during construction.



California freshwater shrimp: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Northwestern pond turtle: The mitigation measures would be expected to reduce impacts, but would not eliminate them. Even with dewatering of the channels and extensive trapping, some mortality of turtles would be expected. The proposed mitigation measures would result in this alternative having moderate adverse impacts on turtles during construction.

Saltmarsh common yellowthroat: The proposed mitigation measures should reduce any potential impacts to negligible levels.

Cumulative Impacts: Based on the list of recently conducted, proposed, or reasonably foreseeable projects described under the No Action Alternative, cumulative impacts to California red-legged frog under Alternative C would not be expected to change from the impacts already characterized for the proposed project. Over the short-term, moderate adverse impacts to breeding habitat units in the Seashore-owned and managed portions of the Point Reyes Peninsula Core Area would occur from the dramatic changes in Olema Marsh and the conversion of a large portion of the West Pasture freshwater marsh to Tidal Brackish Marsh. However, these impacts would be reduced to moderate or less-than-significant levels through maturation of created habitat in the East Pasture Tomasini Triangle and the Olema Creek ponds as described under Alternatives B and/or C, as well as implementation of the project-related mitigation measures proposed above. Because many of the mitigation measures approved by USFWS for other Seashore projects involve maintenance or repair of existing ponds, these measures are expected to provide appropriate habitat value for frogs over a much shorter timeframe than those involving habitat creation such as the proposed project. Therefore, the cumulative impact of the proposed project with the projects identified under the No Action Alternative would not exacerbate the intensity of the impacts over the short-term, which are already characterized as moderate. Over the long-term, mitigation measures proposed for all the projects, including habitat creation, would reduce impacts to at least minor for the Point Reyes Peninsula Core Area.

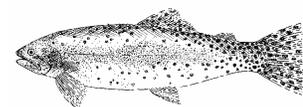
Cumulative impact for California black rails, California clapper rails, shorebirds, and waterfowl would be expected to be very similar to those described under Alternative A.

In terms of steelhead, the proposed project would be expected to have at least minor to moderate beneficial effects on fish in Bear Valley Creek should the proposed Bear Valley Creek Watershed and Fishery Enhancement Project be conducted. Through improvement of hydraulic connectivity and a decrease in water impoundment in Olema Marsh, Alternative C would increase passage potential and off-stream refugia for steelhead in the lower reaches of Bear Valley Creek. The Bear Valley Creek project could improve passage potential in the upper reaches of Bear Valley, thereby leading to a cumulatively beneficial effect on movement of steelhead into this watershed, particularly as the anadromy of the low to moderate numbers of steelhead observed in the past is uncertain.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative C on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from major adverse to major beneficial. As with Alternative B, the East and West Pastures would be restored, with new public access facilities limited to the eastern and southern perimeters of the East Pasture. However, under this alternative, there would also be restoration of Olema Marsh. Over the long-term, Alternative C would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some minor adverse impacts during construction and moderate adverse impacts over the short-term from the dramatic changes expected in the Olema Marsh.

As with Alternative B, the largest change under this alternative relative to existing conditions would come from the substantial conversion of grassland or pasture to salt and brackish marsh. Through restoration, more than two-thirds of the East Pasture and one-third of the West Pasture would be expected to shift from grassland to tidal or brackish marsh. A transitional period would be expected over the short-term in the Giacomini Ranch during which, as pasturelands slowly convert through exposure to saline conditions to marsh, restored areas would be dominated by a mix of non-native opportunistic, moderately salt-tolerant species characteristic of brackish conditions.



Most of the gain in High Value Wildlife Habitat under Alternative C would come from restoration of Olema Marsh. The major increase in High Value Wildlife Habitats would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. Some of the largest changes in wildlife use under this alternative relative to Alternative A would be expected to come from increased use of expanded marsh and riparian habitats in Olema Marsh and Tomasini Creek. While restoration efforts in the East Pasture and the West Pasture would increase, general wildlife use patterns would be relatively similar to those under Alternative B, probably due to the small increase between Alternatives B and C in acreage of High Value Wildlife Habitats in the Giacomini Ranch. Elimination of the eastern perimeter through-trail component would be expected to reduce impacts on wildlife from increased visitation to negligible, with most of the impact occurring on the already moderately trafficked southern perimeter Lagunitas Creek corridor. Because of the disturbed nature of the Mesa Road spur trail area (e.g., ranch housing, heavy vehicle traffic for ranch maintenance, use of the Giacomini Hunt Lodge, and gardening operations), the impact of this public access element on wildlife use within the highly disturbed riparian corridor would be negligible, at most.

In the Olema Marsh restoration component, removal of a small berm that is limiting outflow of waters from the marsh would improve hydraulic connectivity with Lagunitas Creek. The dewatering expected with removal of the berm and possible replacement of the Levee and Bear Valley Road culverts would potentially lower water surface levels in Olema Marsh by as much as 1- to 4 feet or more. It should be noted that proposed mitigation actions to reduce impacts to the California red-legged frog would include reduction in marsh excavation to reduce potential water level drop, and effect of conditions described below. During the transitional period following implementation, considerable die-back of Freshwater Marsh vegetation would take place, leaving dead stands of tall emergents and larger expanses of open water areas subject to water quality problems. From a wildlife perspective, the short-term effects of these changes in Olema Marsh would generally range from minor to moderate adverse. Over the long-term, as brackish vegetation and freshwater marsh habitat rebounds in Olema Marsh, a recovery of freshwater marsh-associated species (e.g. marsh wrens, red-winged blackbirds, rails) would be expected, as well as an increase in riparian-associated bird species due to expansion of riparian habitat.

It should be noted that the Olema Marsh, and the ponded conditions that maintain habitat described above for the red-legged frog, also represents the barrier to steelhead and potentially salmon access to Bear Valley Creek. The physical conditions necessary to support breeding habitat of the red-legged frog are the same conditions which limit or eliminate potential salmonid access to the watershed.

Changes in the Giacomini Ranch component relative to Alternative B include partial realignment of Tomasini Creek into one of its historic alignments. The existing Tomasini Creek channel would remain, as would the tidegates and flashboard dam structure, but the old channel would be leveed off from the new one. This change would convert the old Tomasini Creek channel into more of a backwater slough that would continue to receive freshwater influence from groundwater flowing off the Point Reyes Mesa, as well as occasional overbank flooding from Tomasini Creek during large storm events. This change would be expected to increase the intensity of short-term impacts to tidewater goby through direct impacts to existing habitat, but, over the long-term, changes would be beneficial, because of the overall increase in habitat.

Alternative C would have very similar minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions as Alternatives A and B, with increases in numbers and extent of aquatic invasives expected in Olema Marsh. Tidal reconnection of the Giacomini Ranch and Olema Marsh to Lagunitas Creek would have a moderate beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. For the San Francisco Bay region in general, the proposed project, in combination with other proposed and ongoing restoration projects, would be expected to generally have a cumulatively negligible beneficial effect on regional populations of California black rails, California clapper rails, waterfowl, and shorebirds.

California red-legged frog: Alternative C would result in appreciable or moderate adverse impacts over the short-term to California red-legged frog breeding habitat units in the Seashore-owned and managed-portsions of the Point Reyes Peninsula Core Area, as well as on distribution of red-legged frogs in the Project Area. These impacts would occur principally because of proposed activities in the Olema Marsh and the expected conversion of a large portion of the West Pasture freshwater marsh to tidal brackish marsh. However, over the long-term, impacts to California red-legged frog breeding habitat units would be reduced to minor, as freshwater marsh reestablishes within the Olema Marsh, and mitigation habitats in the East Pasture and the Olema Creek become established. There would still be appreciable effects on distribution of the species within the Project Area, because appropriate breeding habitat would be relocated to areas not expected to be



affected by salinity intrusion. Impacts during construction would be characterized as minor adverse, because excavation would be performed in the Olema Marsh. Because many of the mitigation measures approved by USFWS for other Seashore projects involve maintenance or repair of existing ponds, these measures are expected to provide appropriate habitat value for frogs over a much shorter timeframe than those involving habitat creation such as the proposed project. Therefore, the cumulative impact of the proposed project with the projects identified under the No Action Alternative would not exacerbate the intensity of the impacts over the short-or long-term.

Tidewater goby: Alternative C would have moderate adverse effects on tidewater goby habitat on tidewater goby in the Project Area over the short-term, but would have major beneficial effects over the long-term through after implementation through a potential increase in extent of potential habitat and an improvement in quality for most in the areal extent of East and West Pasture habitat and the quality of the existing habitats in Tomasini Creek. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take of this federally listed species.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: The effects of Alternative C on salmonid rearing and passage habitat in the Project Area would be beneficial and would generally range from moderate to major. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component due to removal of the Fish Hatchery Creek tidegate, and filling of the borrow ditch adjacent to the West Pasture north levee, and, under this alternative, partial realignment of Tomasini Creek and shallow excavation of Bear Valley Creek in Olema Marsh.

California black rail and California clapper rail: Alternative C would have very similar major beneficial effects to Alternative B in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh adjacent to existing rail habitat.

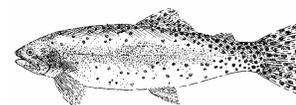
During the transitional period following construction, only negligible to minor beneficial effects would be expected, as grassland and other habitats begins the process of converting to brackish and tidal marsh, leading to temporary establishment of a more weedy, ruderal habitat that would have less benefits for rails. Impacts during construction would be moderate adverse, because of construction actions on and near the north levee in the West Pasture and in Olema Marsh.

Other Special Status Species: The effects of Alternative C on other special status species would generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East and West Pasture and Olema Marsh restoration components would range from beneficial negligible to moderate adverse.

Alternative D

Analysis: The effects of Alternative D on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from major adverse to major beneficial and are almost identical to Alternative C. As with Alternative C, the East and West Pastures of the Giacomini Ranch and Olema Marsh would be restored. However, public access would be scaled back with conversion of the through-trail component on the southern perimeter to an enhanced spur trail with no bridge and no possible for future extension of the trail to Inverness Park. An ADA-compliant spur trail would be constructed at White House Pool County park. The eastern perimeter trail would include only one spur trail – the extension of the Tomales Bay Trail. Some of the other major changes under Alternative D that would affect wildlife would be the complete realignment of Tomasini Creek into one of its historic alignments; excavation of higher elevation intertidal and grassland areas to lower intertidal elevations; and replacement of the Tomasini Creek Mesa Road culvert. There would also be additional tidal channel creation relative to Alternative C in the East Pasture.

Wildlife Habitats and General Wildlife Use – Project Implementation: Over the long-term, Alternative D would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some moderate adverse impacts during construction in the Project Area. Under this alternative as with Alternative C, the dramatic rate of gain in High Value Wildlife Habitats between each of the alternatives would slow considerably. While Alternative B represented an almost 40 percent increase in High



Value Wildlife Habitats from Alternative A, Alternative D would only increase the acreage of High Value Wildlife Habitats relative to Alternative C by 3 percent. As with the other alternatives, the largest change under this alternative relative to existing conditions would come from the substantial conversion of grassland or pasture and freshwater marsh to salt and brackish marsh. Under Alternative D, the degree of conversion is increased through excavation of at least 9 acres of grassland to intertidal elevations. Through these actions, almost 75 percent of the Giacomini Ranch would be expected to shift from grassland to tidal or brackish marsh. Most of the gain in High Value Wildlife Habitat under Alternative D would come from increased restoration of the East Pasture.

As with Alternative C, moderate adverse impacts would occur over the short-term to High Value Wildlife habitats from the changes expected in lowering of water surface levels in Olema Marsh, though in the long-term, these conditions would stabilize, resulting in long-term major beneficial effects on High Value Habitat as natural processes are restored.. These changes are discussed in more detail under Alternative C.

The major increase in High Value Wildlife Habitats relative to existing conditions would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. In general, the trends in wildlife use predicted under Alternative C would continue under Alternative D for the Giacomini Ranch West Pasture and Olema Marsh. Some of the largest changes in wildlife use under this alternative relative to Alternative C would be expected to come from increased use of expanded marsh and riparian habitats in the East Pasture and Tomasini Creek. Elimination of the bridge component on the southern perimeter trail and the Mesa Road spur trail would have negligible to minor benefits, at most, for wildlife, principally because of the reduction in the small amount (<0.1 acre) of permanent and temporary riparian habitat loss and continued disturbance from bridge maintenance activities.

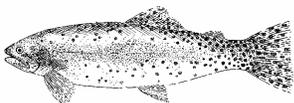
Creation of additional intertidal salt and brackish marsh in the East Pasture through excavation would increase habitat for waterbirds such as California black rail and California clapper rail, as well as marsh-associated passerines (e.g., marsh wren) and colonial waterbirds (e.g., herons and egrets). The excavation would increase mid-marsh areas through lowering of higher elevation intertidal areas, as well as conversion of grassland.

Complete realignment of Tomasini Creek would increase the extent of backwater slough habitat retained in the old Tomasini Creek channel, but would not necessarily change the amount of High Value Wildlife Habitats or abundance and diversity of wildlife species expected to use the creek relative to Alternative C. To ensure that realignment does not inadvertently drain the created Tomasini Triangle freshwater marsh, the creek would be shallowly bermed on either side through the marsh to retain ponded conditions. The berm would be actively revegetated with riparian vegetation to increase the value of this berm as breeding, non-breeding, and refugia habitat for wildlife. This change to the Tomasini Triangle would reduce the size of the created marsh from 5.4 acres under Alternatives B and C to 5.2 acres under Alternative D.

Replacement of the Tomasini Creek Mesa Road culvert would improve hydraulic connectivity between upstream and downstream reaches of the creek and potentially have a negligible to minor indirect effect on riparian habitat upstream of Mesa Road. Improvement of flow conditions could reduce backwater flooding upstream of Mesa Road and thereby decrease the width of the currently sizeable Forested and Scrub Shrub Riparian corridor or maintain the width of the corridor, but convert the understory from marsh vegetation to shrubs more characteristic of drier conditions. A decrease in width of the riparian corridor would have negligible to minor effects on resident and Neotropical migrant passerines associated with riparian habitat, along with other amphibian, reptile, and mammalian species. Red-legged frog and pond turtle have not been observed in this reach of Tomasini Creek, although it could provide non-breeding habitat. While the existing culvert may not have precluded passage of steelhead and coho, replacement may improve conditions for passage.

Removal of approximately 0.3 acres of eucalyptus could have some temporary effects on wildlife use, although removal would be timed to occur after completion of Pre-Construction Surveys and the end of the breeding season for avian species likely to use eucalyptus. Ultimately, these trees could be replaced by riparian species that would offer higher ecological value for wildlife.

Wildlife Habitats and General Wildlife Use – Long-Term Changes: As discussed under Alternative A for Giacomini Ranch, the brackish, tidal marsh, and riparian habitats described would eventually develop after a short-term (~ 10 years) transitional period in which grassland is converted into marsh. In addition, Olema Marsh would also respond to dramatic changes in physical conditions with a short-term transitional period in



which existing vegetation would die-back considerably and create more expanses of open water until equilibrium is reached at which point new habitats would begin to develop. Over the long-term, these habitats would possibly continue to evolve in response to sea level rise, which could lead to regular inundation of large portions of the East and West Pastures below 4 feet NAVD88 should sea level rise at the currently projected rate of 3 feet by 2100 (Overpeck et al. 2006). This change would also affect Olema Marsh, as impoundment would no longer preclude inflow from Lagunitas Creek. However, predicting the magnitude of this change is difficult given the adaptive restoration approach proposed for this component of the proposed project. In general, sea level rise would intensify the conversion of Freshwater Marsh to Tidal Brackish Marsh.

Relative to Alternative C, long-term impacts related to disturbance of wildlife by visitors would decrease somewhat, because access on the eastern perimeter trail would be reduced to just one (1) spur trail originating from the end of the Tomales Bay Trail. The southern perimeter trail would also be converted from a through-trail to an enhanced spur trail, although there is a possibility in the future that a bridge could be built at the location of the old summer dam through a separate environmental compliance process should other southern perimeter access options not prove viable. Elimination of the bridge from project-level consideration would somewhat reduce impacts to wildlife from disturbance by visitors, primarily by decreasing numbers of users and eliminating intrusions directly in the stream corridor. However, this area already receives a considerable amount of disturbance from users of the existing informal path, Giacomini Ranch maintenance, users of the Green Bridge and White House Pool County parks, and residents along Levee Road. With restoration of the wetlands and construction of the ADA-compliant trail and viewing platform at White House Pool County park, these disturbances would be expected to increase slightly, resulting in negligible adverse impacts to wildlife use. In addition, the Tomales Bay spur trail would not be expected to have more than very negligible adverse impacts on wildlife use, because it would end north of the start of the riparian corridor along Tomasini Creek and the Point Reyes Mesa Bluff and would be at some distance from the shallow shorebird area.

Wildlife Habitats and General Wildlife Use – Construction: Construction of Alternative D would generally have minor adverse effects on High Value Wildlife Habitats and use by common wildlife species. Special status species are discussed individually. Pre-construction surveys would be conducted as described under Alternative A.

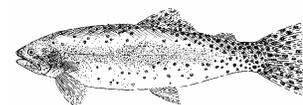
Eleven of the proposed construction activities would have the highest potential to affect both common and special status wildlife species. These activities are regrading of the southern levee in the East Pasture and creek bank to a more stable profile; filling of drainage ditches; tidal reconnection of the East Pasture Old Slough Pond; removal and breaching of levees; removal of the Fish Hatchery Creek tidegate; filling of the borrow ditch in the undiked marsh north of the West Pasture; Tomasini Creek realignment; shallow excavation of Bear Valley Creek; and possible replacement of the Levee Road, Bear Valley, and Mesa Road culverts. Potential impacts to wildlife from most of these construction activities are discussed under Alternatives A, B, and C. As described in Chapter 2, standard BMPs would be employed to minimize sediment discharge, and efforts would be made to preserve larger willows and other riparian trees during regrading of the creek bank.

Under Alternative D, Tomasini Creek would be completely realigned, and the culvert on Mesa Road would be replaced. These construction activities have the potential to negatively affect aquatic organisms such as fish (e.g., salmonids) and potentially macroinvertebrates, as well as amphibians and reptiles. Non-resident species such as waterfowl, waterbirds, southwestern river otter, and rails would not be impacted unless nesting or breeding was occurring.

Based on the scale and timing of construction activities that could affect High Value Wildlife Habitats and use by common wildlife species, the impacts of construction are characterized as minor to moderate adverse. The intensity of construction impacts on special status species is addressed separately below.

Invasive Wildlife Species: Alternative D would have very similar minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions as Alternatives A and B, with increases in numbers and extent of aquatic invasives expected in Olema Marsh.

Wildlife Conditions in the Watershed: Tidal reconnection of the Giacomini Ranch and Olema Marsh to Lagunitas Creek would have moderate beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. As described under Alternative A, tidal reconnection of the Giacomini Ranch and, under this alternative, Olema Marsh would not only increase the potential for export of sources of carbon such as dissolved and particulate organic carbon, phytoplankton, seeds and other plant matter, and



aquatic organisms to the bay, but for access by marine and estuarine species in search of food and refugia. In addition, watershed habitat quality would be improved by rerouting of the Tomasini Creek and its associated sediment, pathogen, and contaminant load into the East Pasture than into Tomales Bay. These benefits would complement those achieved under Alternative A from discontinuation of agricultural management practices in the Giacomini Ranch and the portion of Lagunitas Creek in the Project Area such as levee maintenance, withdrawal of water for irrigation, infrequent pumping of waters from the ranch into Lagunitas Creek, and crossing of Lagunitas Creek by cattle.

California red-legged frog: Alternative D would have almost identical effects to Alternative C on California red-legged frog despite the complete realignment of Tomasini Creek. Over the short-term, Alternative C would have moderate adverse impacts on California red-legged frog breeding habitat units in the Point Reyes Peninsula Core Area and distribution of red-legged frogs in the Project Area, principally because of restoration of Olema Marsh and the conversion of the West Pasture freshwater marsh to brackish marsh. These effects would be offset through creation of the 5.2-acre Tomasini Triangle freshwater marsh and approximately 2 acres of freshwater marsh ponds in the adjacent Olema Creek watershed less than 0.5 miles from Olema Marsh, the latter of which would be constructed prior to restoration of Olema Marsh. Over the long-term, impacts to habitat units within the region would be reduced to minor through full establishment of the Tomasini Triangle freshwater marsh and reestablishment of freshwater marsh in Olema Marsh. However, as with Alternative C, this alternative would still be expected to have an appreciable or moderate effect over the long-term on distribution of frogs in the Project Area. Impacts during construction would be characterized as minor adverse, because excavation would be performed in Olema Marsh.

Project- and construction-related effects of Alternative D are almost identical to Alternative C and are described in more detail under Alternative C. While Tomasini Creek would be completely rerouted through the created Tomasini Triangle freshwater marsh, thereby reducing the marsh size by 0.2 acres relative to Alternative C, the low berms proposed to run along both sides of the rerouted creek in the marsh to ensure that ponding is retained would be expected to minimize adverse impacts from this change. In addition, low berms would be actively revegetated with riparian vegetation, thereby increasing their value as breeding, non-breeding, and refugia habitat for wildlife, including red-legged frog and northwestern pond turtle. Low berms would be designed to allow some flood overflow into the two marsh "cells" during large storm events to increase fluvial contributions to the marsh.

Tidewater goby: Alternative D would have almost identical effects to Alternative C on tidewater goby despite complete realignment of Tomasini Creek. While this alternative would have minor to moderate adverse effects on tidewater goby habitat in the Project Area over the short-term, it would have major beneficial effects over the long-term through an increase in extent of potential habitat and an improvement in quality for most of the existing habitats. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take.

Project- and construction-related effects of Alternative D are almost identical to Alternative C and are described in more detail under Alternative C. While Tomasini Creek would be completely rerouted through the created Tomasini Triangle freshwater marsh under this alternative, the effects on tidewater goby would be considered similar. One slight change in effect is that the size of the backwater slough habitat feature created in the old Tomasini Creek channel would be enlarged relative to Alternative B by moving the rerouting point for Tomasini Creek further upstream. This change would be expected to have only negligible beneficial effects ultimately on tidewater goby relative to Alternative C. Also, additional tidal channel creation in the East Pasture could also increase habitat.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: Similar to Alternative C, the effects of Alternative D on salmonid rearing and passage habitat in the Project Area would be beneficial and would generally range from moderate to major. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component due to removal of the Fish Hatchery Creek tidegate, filling of the borrow ditch adjacent to the West Pasture north levee, shallow excavation of Bear Valley Creek in Olema Marsh, complete realignment of Tomasini Creek, and replacement of the Tomasini Creek Mesa Road culverts.

Project- and construction-related effects of Alternative D are almost identical to Alternative C and are described in more detail under Alternative C. While Tomasini Creek would be completely rerouted through the created Tomasini Triangle freshwater marsh under this alternative, the effects on salmonids would be very



similar. Replacement of the Tomasini Creek Mesa Road culvert could slightly improve passage conditions for steelhead and coho. Additional tidal channel creation in the East Pasture could also increase rearing habitat.

California black rail and California clapper rail: Alternative C would have very similar major beneficial effects to Alternative B in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh. During the transitional period following construction, only negligible to minor beneficial effects would be expected. Impacts during construction would be moderate adverse, because of construction actions on and near the north levee in the West Pasture and in Olema Marsh.

The primary change to California black rail and California clapper rail under Alternative D would come from the slight increase in habitat relative to Alternative C from excavation of higher elevation intertidal and grassland areas to lower intertidal elevations. This increase and shift in intertidal habitats would be expected to have beneficial effects on rails.

Other Special Status Species: The effects of Alternative D on other special status species would be identical to Alternative C and generally range from minor beneficial effects to moderate adverse effects depending on the species. Impacts during construction of the East and West Pasture and Olema Marsh restoration components would range from beneficial negligible to moderate adverse.

Proposed Additional Mitigation Measures: Standard BMPs would be implemented to reduce impacts to special status species and wildlife habitats are discussed under Chapter 2. Measures specific to certain species are described below:

General: Mitigation measures would be the same as described under Alternative C.

California red-legged frog: Mitigation measures would be the same as described under Alternative C.

Tidewater goby: Mitigation measures would be the same as described under Alternative C.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: Mitigation measures would be the same as described under Alternative C.

California black rail and California clapper rail: Mitigation measures would be the same as described under Alternative C.

California freshwater shrimp: Mitigation measures would be the same as described under Alternative C.

Northwestern pond turtle: Mitigation measures would be the same as described under Alternative C.

Saltmarsh common yellowthroat: Mitigation measures would be the same as described under Alternative C.

Effectiveness of Proposed Additional Mitigation Measures

California red-legged frog: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

Tidewater goby: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

Central California coast steelhead, coastal California ESU Chinook salmon, and central California coast coho ESU salmon: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

California black rail and California clapper rail: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

California freshwater shrimp: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.



Northwestern pond turtle: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

Saltmarsh common yellowthroat: The effectiveness of proposed mitigation measures would be the same as described under Alternative C.

Cumulative Impacts: Cumulative impacts would be the same as described under Alternative C.

Impairment Analysis: This alternative would not impair a resource identified in the Organic Act or as a goal in Park Service management policies or considered as necessary to fulfillment of purposes identified in enabling legislation or key to the natural or cultural integrity of the park.

Conclusions: The effects of Alternative D on wildlife habitat and use in the Project Area and support of wildlife species in the watershed would generally range from major adverse to major beneficial and are almost identical to Alternative C. As with Alternative C, the East and West Pastures of the Giacomini Ranch and Olema Marsh would be restored. However, public access would be scaled back with conversion of the through-trail component on the southern perimeter to an enhanced spur trail with no bridge and no possible for future extension of the trail to Inverness Park. The eastern perimeter trail would include only one spur trail – the extension of the Tomales Bay Trail. Some of the other major changes under Alternative D that would affect wildlife would be the complete realignment of Tomasini Creek into one of its historic alignments; excavation of higher elevation intertidal and grassland areas to lower intertidal elevations; and replacement of the Tomasini Creek Mesa Road culvert.

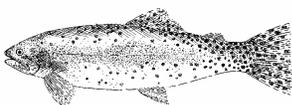
Over the long-term, Alternative D would be expected to have major beneficial effects on High Value Wildlife Habitats in the Project Area, although there may be some minor adverse impacts during construction in the Project Area. Under this alternative as with Alternative C, the dramatic rate of gain in High Value Wildlife Habitats between each of the alternatives would slow considerably. As with the other alternatives, the largest change under this alternative relative to existing conditions would come from the substantial conversion of grassland or pasture to salt and brackish marsh. Under Alternative D, the degree of conversion is increased through excavation of at least 9 acres of grassland to intertidal elevations. Through these actions, almost 75 percent of the Giacomini Ranch would be expected to shift from grassland to tidal or brackish marsh.

Most of the gain in High Value Wildlife Habitat under Alternative D would come from increased restoration of the East Pasture. The major increase in High Value Wildlife Habitats relative to existing conditions would have a moderate beneficial effect over the long-term on use of the Project Area by wildlife, with use by common and special status wildlife species increasing appreciably relative to existing conditions. In general, the trends in wildlife use predicted under Alternative C would continue under Alternative D for the Giacomini Ranch West Pasture and Olema Marsh. Some of the largest changes in wildlife use under this alternative relative to Alternative C would be expected to come from increased use of expanded marsh and riparian habitats in the East Pasture and Tomasini Creek. Construction of Alternative D would generally have minor to moderate adverse effects on High Value Wildlife Habitats and use by common wildlife species.

Creation of additional intertidal salt and brackish marsh in the East Pasture through excavation would increase habitat for waterbirds such as California black rail and California clapper rail, as well as marsh-associated passerines (e.g., marsh wren) and colonial waterbirds (e.g., herons and egrets). Complete realignment of Tomasini Creek would increase the extent of backwater slough habitat retained in the old Tomasini Creek channel, but would not necessarily change the amount of High Value Wildlife Habitats or abundance and diversity of wildlife species expected to use the creek relative to Alternative C. To ensure that realignment does not inadvertently drain the created Tomasini Triangle freshwater marsh, the creek would be shallowly bermed on either side through the marsh to retain ponded conditions. Replacement of the Tomasini Creek Mesa Road culvert would improve hydraulic connectivity between upstream and downstream reaches of the creek and potentially have a negligible to minor indirect effect on riparian habitat upstream of Mesa Road.

Alternative D would have very similar minor adverse effect on the number of non-native invasive wildlife species that would be present as a result of changes in conditions as Alternatives A and B, with increases in numbers and extent of aquatic invasives expected in Olema Marsh.

Tidal reconnection of the Giacomini Ranch and Olema Marsh to Lagunitas Creek would have moderate beneficial effect in terms of support of wildlife species in southern portion of the Tomales Bay watershed. For



the San Francisco Bay region in general, the proposed project, in combination with other proposed and ongoing restoration projects, would be expected to generally have a cumulatively negligible beneficial effect on regional populations of California black rails, California clapper rails, waterfowl, and shorebirds.

California red-legged frog: Alternative D would have almost identical effects to Alternative C on California red-legged frog despite the complete realignment of Tomasini Creek. Rerouting of Tomasini Creek through the Tomasini Triangle would only reduce the size of the Tomasini Triangle freshwater marsh by 0.2 acres, and the marsh would be prevented from draining into the creek through construction of berms on either side of the creek that would be revegetated with riparian vegetation. Impacts during construction would be characterized as minor adverse, because excavation would be performed in Olema Marsh.

Tidewater goby: Alternative D would have almost identical effects to Alternative C on tidewater goby despite complete realignment of Tomasini Creek. While this alternative would have minor to moderate adverse effects on tidewater goby habitat in the Project Area over the short-term, it would have major beneficial effects over the long-term through an increase in extent of potential habitat and an improvement in quality for most of the existing habitats. Impacts during construction would be expected to be moderate, with implementation of mitigation measures designed to reduce the potential or amount of incidental take.

Central California coast steelhead, coastal California Evolutionarily Significant Unit (ESU) Chinook salmon, and central California coast coho ESU salmon: Similar to Alternative C, the effects of Alternative D on salmonid rearing and passage habitat in the Project Area would be beneficial and would generally range from moderate to major. Potential minor adverse impacts to salmonid habitat or salmonids would be expected to occur during construction of the wetland restoration component.

California black rail and California clapper rail: Alternative C would have very similar major beneficial effects to Alternative B in terms of increasing habitat for California black rail and California clapper rail, with the proposed project restoring more than 350 acres of low-, mid- and high Tidal Salt Marsh. During the transitional period following construction, only negligible to minor beneficial effects would be expected. Impacts during construction would be moderate adverse, because of construction actions on and near the north levee in the West Pasture and in Olema Marsh. The primary change to California black rail and California clapper rail under Alternative D would come from the slight increase in habitat relative to Alternative C from excavation of higher elevation intertidal and grassland areas to lower intertidal elevations. This increase and shift in intertidal habitats would be expected to have beneficial effects on rails.

Other Special Status Species: The effects of Alternative D on other special status species would be identical to Alternative C and generally range from minor beneficial effects to moderate adverse effects depending on the species.

Cultural Resources

Laws, Regulations, Policies, and Criteria Guiding Impact Analysis

Since the early 1900s, a number of laws and policies have been enacted to protect cultural resources, including the Antiquities Act of 1906 (16 USC §432), the Archeological Resources Protection Act of 1979 (16 USC §470aa et seq.), and the National Historic Preservation Act of 1966, as amended (NHPA; 16 USC §470 et seq.). In addition to federal and state laws governing protection of cultural resources, Executive Order 11593 instructs all federal agencies to support the preservation of cultural properties. The Park Service incorporated direction from law and federal policy into development of the Cultural Resources Management Guidelines (NPS 1998), which recognizes five types of cultural resources: archeological resources, historic structures, ethnographic resources, cultural landscapes, and museum objects.

The California Office of Historic Preservation is responsible for oversight of the NHPA in California. The Office of Historic Preservation also is responsible for oversight of California Public Resources Codes Section 21083.2-21084.1, which state and local agencies to evaluate impacts of proposed projects to archaeological and historic structure resources. Federal and federally-sponsored programs and projects are reviewed pursuant to Sections 106 and 110 of the NHPA. Section 106 of the NHPA requires federal agencies to consider the effects of proposed federal undertakings on historic properties. NHPA requires federal agencies to initiate consultation with the State Historic Preservation Officer (SHPO) as part of the Section 106 review process. The State Office of Historic Preservation maintains the California Register of Historic Places. The California

