

TECHNICAL EVALUATION OF POTENTIAL PUBLIC ACCESS ALIGNMENTS FOR THE GIACOMINI WETLAND RESTORATION PROJECT

Part I: Resources Study

POINT REYES NATIONAL SEASHORE

MARIN COUNTY, CALIFORNIA

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EXECUTIVE SUMMARY

The National Park Service (NPS) is evaluating a range of possible restoration alternatives for the proposed wetlands restoration project at the Giacomini Ranch in Marin County, California (Figure 1). The Giacomini Ranch is located in the southern portion of the Tomales Bay watershed. The potential for incorporating public access within the Project Area is an important issue that was raised during the project scoping. During scoping, several potential public access concepts or alignments were proposed either by members of the public, the NPS, or by other local agencies such as the County of Marin. The intent of this study is to inform the public and the NPS on potential resource impacts associated with these alignments, so that fully informed decisions can be made on options for future planning studies.

This technical evaluation addresses the potential impacts to existing and potential future hydrologic, cultural, and biological resource conditions that would result from implementation of 18 potential public access alignments, including perimeter/loop pathways, spur/point access, and/or viewing platforms/overlooks. Potential trail alignments and platform/overlook location included for study were based on concepts discussed by the NPS, the County of Marin, the West Marin Paths study, or the public through comments both during and outside of the scoping period. The potential impacts of each potential trail alignment or platform/overlook location were analyzed for two possible restoration concepts: Alternative A and Alternative C. Impacts were considered for both 1) existing conditions and 2) potential future conditions of the restored wetlands and unrestored areas. The NPS intends to use the information from this technical evaluation to determine those potential public access alignments and platform/overlook locations that have the least environmental and cultural resource impacts. In addition, this evaluation assesses whether alignments might pose conflicts with the project purpose, goals, and objectives. While every effort has been made to identify all potential resource impacts associated with these potential public access opportunities, additional impacts could be discovered during the technical feasibility analysis or production of the environmental document that might change how a particular alignment or siting is evaluated in the future.

Those potential alignments and platform/overlook locations that have either low or moderate environmental and cultural resource impacts are recommended for incorporation into the next phase of analysis – a technical evaluation of the feasibility of each of the public access alignments and platform/overlook locations. This study will analyze the technical feasibility of each of the alignments and facility sitings and examine potential conflicts of each alignment and platform/overlook location with existing land uses, including effects on private and public landowners and local communities. The NPS expects to initiate this study in winter 2004/2005. Because impacting the environment directly conflicts with the project's purpose of restoring wetlands, potential public access components identified as having high environmental impacts are recommended to not be studied in further detail.

The technical evaluation indicated substantial differences among the potential trail alignments in terms of their impacts on hydrologic and geomorphic processes and cultural and biological resources of the existing Giacomini Ranch and future restored marsh. A summary of individual and overall impacts associated with each potential trail alignment is provided in Table 1 for both Restoration Alternative A and C. To rate the overall environmental impacts of each trail alignment, qualitative rankings of impacts to hydrology and geomorphology and biological resources were converted to a numerical score (e.g., + = 0, 0 = 1, - = 2, -- = 3, and --- = 4). Impacts to cultural resources were not included in the totals, because almost all of the trail alignment would have either no impact or a very small potential for impact on cultural resources.

In terms of overall impacts, the results indicated that:

- Trail alignments with Low Impacts were Trail Alignments 1a (Restoration Alternative A only), 1b, 2d, 2e, 4a, 4d, and 4e for both restoration alternatives.
- Trail alignments with Moderate Impacts were Trail Alignments 2c, 4b, and 4c for both restoration alternatives.
- Trail alignments with High Impacts were 1a (Restoration Alternative C only) and 3 (Restoration Alternative A only).
- Trail alignments with Very High Impacts were Trail Alignments 2a, 2b, and 3 (Restoration Alternative C only).
- All of the Viewing platforms/Elevated overlooks Locations were rated as having potentially Low Impacts. This suggests that this type of “point” public access may have the least impact on resources.

Based on these results, Trail Alignments 1a (Restoration Alternative A), 2c, 2d, 2e, 4a, 4b, 4c, 4d, and 4e have Low to Moderate environmental impacts and would be the best alignments for possible inclusion in the restoration project. In addition, all of the potential platform/overlook locations have Low environmental impacts. Based on this analysis, it is recommended that these alignments and platform/overlook locations be carried forward for more detailed technical analysis of feasibility before determining which of these are appropriate for incorporation in Restoration Alternatives.

INTRODUCTION

The National Park Service (NPS) is evaluating a range of possible restoration alternatives for the proposed wetlands restoration project at the Giacomini Ranch in Marin County, California (Figure 1). The Giacomini Ranch is located in the southern portion of the Tomales Bay watershed. Lagunitas Creek bisects the Ranch into two pastures, referred to as the West and East Pastures. The purpose of the restoration project is to restore natural hydrologic and geomorphic processes within a “significant portion” of the Project Area, thereby promoting restoration of ecological processes and functions (NPS 2004).

The potential for incorporating public access within the Project Area is an important issue that was raised during the project scoping in 2002. In response to people’s interest in public access, the NPS worked to incorporate public access without compromising the project’s Purpose and Goals of restoring natural hydrologic and ecological processes and functions. Through a series of internal and external workshops, it informally evaluated a number of potential public access opportunities, including perimeter/loop pathways, spur trails/point access, and/or viewing platforms/overlooks. Eventually, it selected a trail alignment that it felt would answer the need expressed during scoping for a safe connection between the east and west sides of Tomales Bay with what appeared to be the least compromise of the project’s Purpose. The proposed trail went from Point Reyes Station to Inverness Park by following the southern bank of Lagunitas Creek as does the existing social trail, crossing the creek near the location of the old summer dam with a bridge, connecting to the County Park trail at White House Pool, and then heading to Inverness Park either along Sir Francis Drake Boulevard or on a boardwalk through the West Pasture. It also proposed a series of viewing platforms or elevated overlooks that would incorporate interpretative exhibits that discussed the importance of wetlands, the restoration process, and the site’s history as a tidal marsh and dairy.

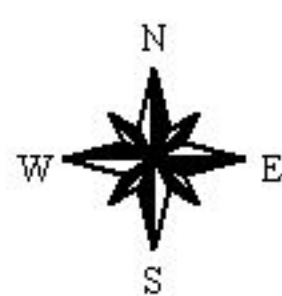
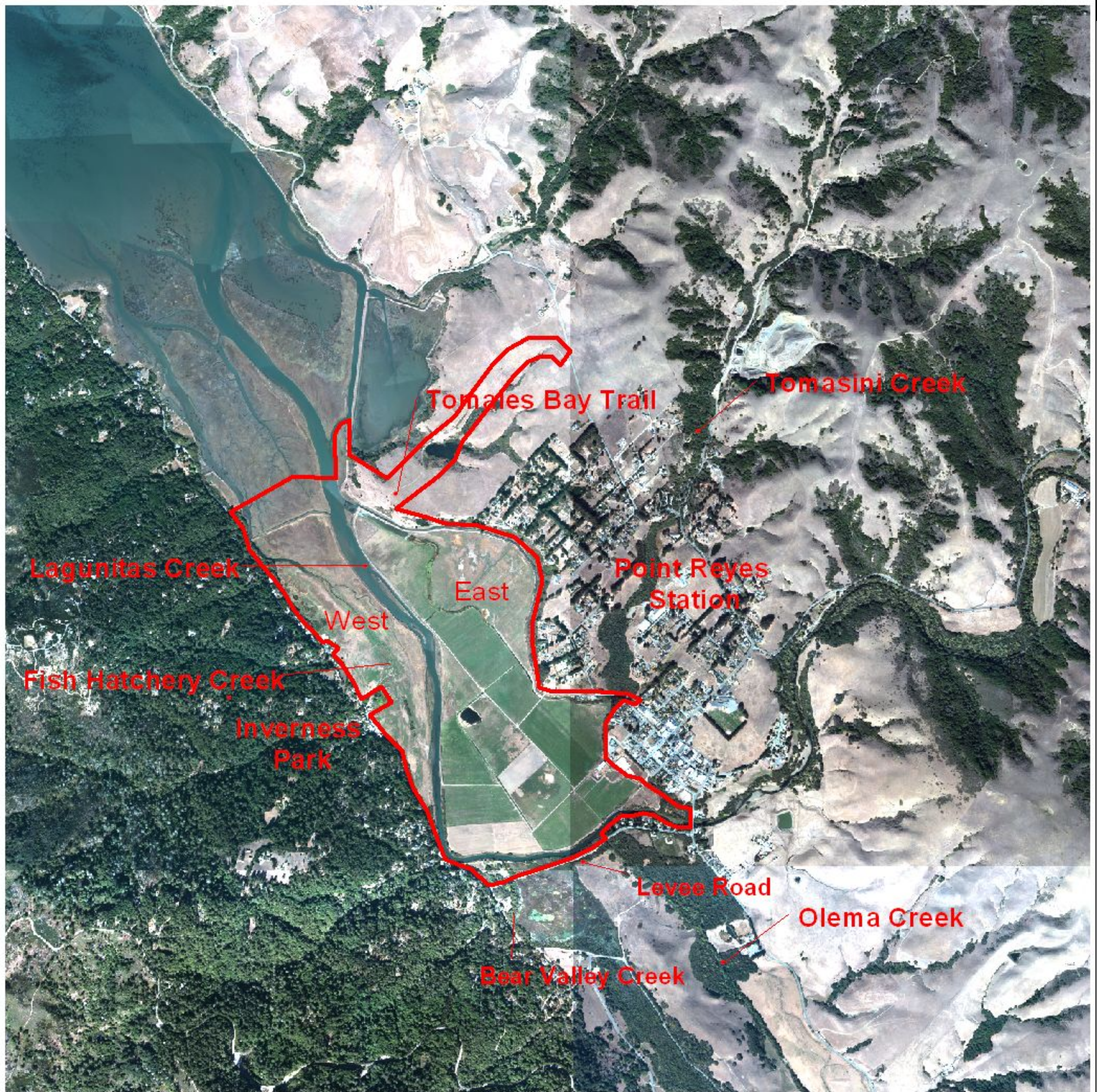
The NPS unveiled this public access component at a series of workshops held during the early part of 2004 to gather public input on the preliminary restoration concepts. During the workshops and subsequent scoping period, NPS received numerous comments on public access, the proposed trail alignment and viewing platforms/elevated overlooks, and the potential for either different or additional public access alignments. In total, there were at least 13 potential public access trail alignments that were proposed either by members of the public, NPS, or by other local agencies such as the County of Marin. In addition, some potential public access trail alignments were proposed as part of the West Marin Pathway Study conducted in 1988 (Brian Wittenkeller & Associates and Copple Foreaker & Associates 1988).

Potential public access trail alignments that were proposed by the public during scoping include:

- Extending the proposed path to Drakes View Drive in Inverness Park or Inverness.
- Routing the proposed path over the Green Bridge and along either the southern or northern portions of Levee Road to the White House Pool County park rather than along the southern bank of Lagunitas Creek and across a bridge near the old summer dam location.
- Connecting Mesa Road to the Tomales Bay Trail through use of the historic railroad grade as a trail.
- Connecting Mesa Road to the Tomales Bay Trail through use of the Tomasini Creek berm rather than the historic railroad grade.
- Lengthening the Tomales Bay Trail by creating a spur trail along the historic railroad grade that would end north of the portion that supports riparian vegetation.
- Creating a connection between Point Reyes Station and the west side of Tomales Bay by constructing a trail along the old historic railroad grade and across the northern perimeter of the Giacomini Ranch to Sir Francis Drake Boulevard with a bridge over Lagunitas Creek.

Project Area Location

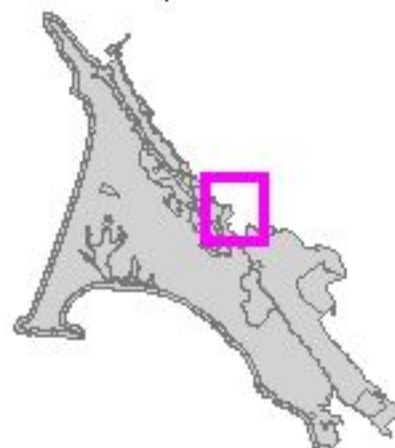
Giacomini Wetland Restoration Project



1000 0 1000 2000 Feet



Map Location



National Park Service
Golden Gate National Recreation Area/
Point Reyes National Seashore

Figure 1. Location of Giacomini Wetland Restoration Project Area

- Retaining the existing informal social path that exists along the north levee of the West Pasture.
- Connecting the southern path to other Park Service trails near Olema Marsh.

In its draft General Plan update (2004), the County of Marin proposed a path that would have connected Point Reyes Station to Inverness Park through a path that would have cut across the Giacomini Ranch and potentially the restored marsh.

The issue of how much public access should occur in natural and restored wetland habitats is one that government agencies have also been grappling with in the much more urbanized San Francisco Bay watershed. The Bay Conservation and Development Commission (BCDC) supports public access along the shoreline of San Francisco Bay, encouraging project developers to create access for the public where possible. However, this agency and others have spent considerable effort in recent decades trying to reconcile the public access experience and natural values of Bay habitats. BCDC issued a report examining public access and wildlife compatibility in 2001. In the late 1990s, the Bay Trail Project funded an ongoing study, the Wildlife and Public Access Study, to look at if and how recreational trail users were impacting shorebirds. In its report, BCDC (2001) concluded that “public access to natural areas around the Bay is highly desirable, but should be subject to ... special considerations, especially in rural and undeveloped areas.” Specifically, access should only be provided where it can be controlled and managed, and access to margins of marshes and managed wetlands, particularly in isolated areas, should generally be restricted to “point” rather than “continuous” access (BCDC 2001). “In some cases, project uses, environmental constraints, or uses on adjacent areas may conflict with the goal of providing maximum feasible public access” (BCDC 2001). In or adjacent to wetlands in non urban areas, public access, if appropriate, should only be developed or provided in a way that “respects and enhances the natural values” (BCDC 2001).

This technical evaluation addresses the potential impacts to existing and potential future hydrologic, cultural, and biological resource conditions that would result from implementation of 13 potential public access trail alignments (including the two (2) existing social paths) and five (5) potential viewing platform/elevated overlook locations (see Figure 2 on page 17). To some degree, it also identifies how these potential trail alignments and platform/overlook sitings might hinder the NPS from implementing some of the restoration actions proposed under the existing restoration concepts. The potential impacts of each potential trail alignment and platform/overlook siting have been analyzed for two possible restoration concepts: Alternative A and Alternative C. The two (2) restoration alternatives are described below. The potential trail alignments and anticipated impacts are discussed later in this document. Landmarks and waterbodies referred to in these descriptions are labeled in Figure 1.

Public access may conflict with the project purpose and objectives if it adversely impacts biological resources, cultural resources, or hydrologic and geomorphic conditions of the existing and restored wetlands. For this reason, information from this technical evaluation will be used to determine those potential public access trail alignments and platform/overlook sitings that have the least environmental and cultural resource impacts. Those potential trail alignments and platform/overlook sitings that have either low or moderate environmental and cultural resource impacts will be incorporated into the next phase of analysis – a technical evaluation of the feasibility of each of the public access alignments and sitings. This technical study will analyze the technical feasibility of each of the alignments and examine potential conflicts of each alignment with existing land uses, including effects on private and public landowners and communities. The NPS expects to initiate this study in winter 2004/2005. Because impacting the environment directly conflicts with the project’s purpose of restoring wetlands, potential public access alignments and sitings identified as having high environmental impacts would most likely not be studied in further detail. **While every effort has**

been made to identify all potential resource impacts associated with these potential public access opportunities, additional impacts could be discovered during the technical feasibility analysis or production of the environmental document that might change how a particular alignment or siting is evaluated in the future.

This impact evaluation focuses on the following:

- 1) How would potential trail alignments and platform/overlook sitings impact existing sensitive habitats such as wetlands, riparian, and open water habitat?
- 2) How would potential trail alignments and platform/overlook sitings impact existing biological resources such as special status plant and wildlife species?
- 3) How would potential trail alignments and platform/overlook sitings impact potential future habitats and conditions that might develop as a result of the preliminary restoration concepts?
- 4) How would potential trail alignments and platform/overlook sitings preclude or negatively impact current components of the restoration plan?

PUBLIC ACCESS EVALUATION CRITERIA

For each of the potential trail alignments and platform/overlook sitings, the following resource factors were considered in the analysis of potential impacts from public access. Impacts were evaluated based on existing resource values such as wetlands, riparian habitat, special status species, and values that would be expected after implementation of the proposed restoration (Restoration Alternative A or C).

Impacts on Hydrology and Geomorphology

The overall approach and objective of the restoration project is to restore natural hydrologic processes in order to promote restoration of ecological processes and functions. The success of this restoration approach relies on reintroducing highly dynamic freshwater inflows and tidal exchange to modify and maintain the diverse geomorphic and hydrologic conditions and, in turn, yield a wide variety of healthy and sustainable ecological functions and habitats. This does not imply a static physical or morphological state, but one that is free to respond and re-equilibrate to short- and long-term changes in climatic, hydrologic, biological, water quality, and anthropogenic influences.

The potential impacts of the trail alignments and platform/overlook sitings on hydrologic and geomorphic conditions and processes include:

1. Constrained natural current or anticipated hydrologic and geomorphic processes;
2. Reduced tidal circulation or freshwater inflows;
3. Reduced or delayed flood water passage and drainage;
4. Accelerated sediment deposition;
5. Increased flood hazards;
6. Reduced water quality;
7. Increased bank erosion; and
8. Increased erosion potential and sediment supply from created earthen surfaces

Two additional potential impacts, although not impacts to hydrologic or geomorphic processes, are indirectly related to flooding and earthquake hazards. Most potential trail alignments evaluated would increase human access and exposure to areas that experience infrequent, but dangerous flood flow conditions. Trail alignments that include a bridge over Lagunitas Creek or an elevated overlook near White House Pool may attract more trail users who wish to observe high flow events. Because bridges and viewing platforms/elevated overlooks would be high points in trail alignments, rapidly rising waters that accompany floods and inundate the land-based sections of trails may leave people stranded if they are not paying attention to surrounding trail conditions.

The second indirect impact of most trail alignments and platform/overlook sitings is the susceptibility to, and near certainty of, damages due to earthquakes over the life span of associated structures. The project site is bisected by the 1906 trace of the San Andreas Fault. The likelihood is very high for a major earthquake that would produce substantial ground motion and damages to trails, bridges, and other public access infrastructure along a local stretch of the San Andreas fault (Knudsen et al. 1999, Cotton et al. 1980). In other words, the project could likely face trail, bridge, and infrastructure repair and/or replacement costs that are well above and beyond routine annual maintenance costs. In addition, large and/or frequent repair and replacement costs could also be incurred due to the dynamic creek processes that are likely to naturally occur such as channel meandering or avulsion. Changes in channel morphology are an anticipated and encouraged part of restoration design that could threaten the stability of any bridge, boardwalk, or platform structures and/or the usability of a static trail alignment.

Trail alignments may also impact the potential for geomorphic variation across the site. Trails that require bank stabilization and/or bridges that constrain channel locations are considered detrimental to restoration. The entire Project Area, including marsh plain and channel, constitute the potential stream corridor. Channel migration across the corridor is a natural and ecologically beneficial process that produces disturbance of both vegetation and redistribution of sediment, promoting ecological diversity across the site. A reduction in the potential for movement of watercourses within the channel corridor will reduce the creation and maintenance of habitat and habitat diversity.

Impacts on Cultural Resources

A study conducted in 2002 identified two cultural resources in the Project Area (Newland 2002). One of these resources consists of portions of the levee system along Lagunitas Creek. The levee system is currently in place, but it is not entirely known which portions, if any, are remnants of the original levee system and which are more recent constructions or modifications in the same locations: modified areas would be unlikely to qualify as cultural resources. For this reason, potential impacts to the original levee system are not included in this analysis. The second cultural resource identified in the study is a historic-period railroad bed located along the eastern bank of Tomasini Creek. The railroad bed is made of compacted dirt and is now covered by dense riparian vegetation for a significant portion of the bed between the Giacomini Hunt Shack and the end of the Tomales Bay Trail. Trail Alignments 2a and 2c are the only public access concepts with potential to impact this cultural resource. Neither of the two resources identified is eligible for the National Register of Historic Places (National Register).

Impacts on Biological Resources

This evaluation focused on sensitive habitats and biological resources of the Project Area, including wetlands, riparian zones, native vegetation communities, and individual special status or special interest plant and wildlife species. Information on the status and distribution of sensitive habitats and biological resources was provided by the NPS in the form of written reports, maps, and informal records of field observations made by NPS staff, contractors, and local residents. This information was used to determine which existing and potential future habitats and species were likely to be adversely affected by one or more of the trail alignments and platform/overlook sitings. This evaluation analyzed potential impacts to sensitive habitats and biological resources due to increased disturbance by people and dogs, increased predator access, and habitat loss or modifications due to trail and infrastructure construction.

There has been much debate as to whether public access negatively affects biological resources such as wildlife, perhaps because any effects could be largely indirect or have delayed response times that make them harder to quantify. Human disturbance cannot only cause immediate responses such as flushing of wildlife species 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). A recent Bay Conservation and Development Commission report on public access and wildlife compatibility (2001) quoted a study by Boyle and Samson (1985) that reviewed 166 articles on the effects of non-consumptive recreation on wildlife and found that a majority of articles reported negative effects on wildlife. The Bay Trail Project identified eight (8) studies that specifically addressed the effect of trails on wildlife, all of which showed some negative impact on wildlife from trail activity (Sokale and Truljio 2000).

Some concerns have been expressed that there may be a tendency to only publish studies that find significant adverse effects from human interactions with wildlife and that those showing no effect are not published (BCDC 2001). Results from the first two years of a Bay Trail Project study showed no general relationship between human use of trails and bird abundance or diversity in foraging habitats

within three locations in San Francisco Bay (Sokale and Truljio 2000). The lack of pattern between areas with trails and without suggested that habitat quality might be a more important determinant of bird use than human trail use (Sokale and Truljio 2000). However, the authors cautioned that this study had only looked a few specific measures of wildlife abundance and diversity under some very specific site conditions (highly developed, urbanized ecosystems within San Francisco Bay that were leveed, but had no motorized vehicle access). In its report, BCDC (2001) noted that, “based on the studies available, however, there is clearly evidence that public access may have adverse effects on wildlife.”

This analysis focused on the following biological resources:

1. Special-status plant species

- Humboldt bay owl’s-clover (*Castilleja ambigua* ssp. *humboldtiensis*; 1B¹)
- Point Reyes bird’s-beak (*Cordylanthus maritimus* ssp. *palustris*; 1B)

Point Reyes bird’s-beak and Humboldt Bay owl’s-clover, both formerly Federal Species of Concern (FSC), occur in undiked marshlands north of the Giacomini Ranch. Humboldt Bay owl’s-clover has also established on mid-marsh areas that fringe the northern and central portions of the Giacomini Ranch levees along Lagunitas Creek. Both of these species are annuals that have been impacted throughout their range by development and conversion of tidal wetlands.

2. Special-status animal species

- California black rail (*Laterallus jamaicensis coturniculus*; ST²)
- California clapper rail (*Rallus longirostris obsoletus*; FE³, SE⁴)
- California red-legged frog (*Rana aurora draytonii*; FT⁵, CSC⁶)
- Northwestern pond turtle (*Clemmys marmorata marmorata*; CSC)
- Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*; CSC)
- Tidewater goby (*Eucyclogobius newberryi*; FE, CSC)

All of the species listed above have been observed within the Project Area. Although the California clapper rail was once widely distributed along the California coast, present distribution of this species is restricted almost exclusively to the emergent salt and brackish tidal marshes of San Francisco Bay and the Suisun Delta (ARA 2002). Recent records from coastal estuaries outside of San Francisco Bay are sporadic and represent presumed dispersants or vagrants (ARA 2002). 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 have been sighted in the undiked marsh north of the Giacomini Ranch during fall and winter between 1995 and 2001 (J. Evens, ARA, and R. Stallcup, PRBO Conservation Science, 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 that is believed to have occurred historically in Tomales Bay appears to be extirpated (ARA 2002). California black rail,

¹ 1B = California Native Plant Society List 1B

² ST = State Threatened

³ FE = Federally Endangered

⁴ SE = State Endangered

⁵ FT = Federally Threatened

⁶ CSC = California Species of Special Concern

a stated-listed threatened species, also has been observed as a year-round resident in the undiked marsh north of the West Pasture since the 1980s (ARA 2002). Breeding individuals have also occurred intermittently in Olema and Bear Valley marshes, including in 2001-2002 (ARA 2002).

While extirpated or nearly gone from many parts of California, the California red-legged frog still has large, vigorous populations in the central Coast Range. Some of the largest remaining populations in California are at Point Reyes National Seashore (Marin County) where there are more than 120 breeding sites with a total adult population of several thousand frogs (Fellers and Guscio 2002). Only a few adult frogs have been observed in the East Pasture both in 1993 and 2001-2002, and these individuals were judged to be unlikely to be breeding, as there were no eggs or tadpoles (Fellers and Guscio 2002). Most of the frogs found in winter/spring 2001-2002 occurred in a freshwater marsh (Freshwater Marsh) in the northwestern corner of the West Pasture and, to a lesser extent, in Fish Hatchery Creek. During the summer, these frogs may move into pooled areas within the riparian fringe along Sir Francis Drake Boulevard or into shaded riparian corridors and springs on the hillside west of Sir Francis Drake (Fellers and Guscio 2002). While numbers of this species in the Freshwater Marsh were among the highest recorded in Point Reyes during the 2001-2002 breeding season, subsequent surveys during winter/spring 2003-2004 found only a few adult red-legged frogs and no signs of breeding (e.g., egg masses, tadpoles; Gary Fellers, U.S. Geological Survey, *pers. comm.*). Tidal incursion into the Freshwater Marsh from failure of the Fish Hatchery Creek tidegate in 2003 may have negatively affected this population, although tidal influence had been reduced substantially though repair of the tidegate by the time the 2003-2004 surveys were conducted. Northwestern pond turtles also occur in the Project Area, with most of the sightings in and along freshwater drainage ditches and Tomasini Creek in the East Pasture (Fellers and Guscio 2002). There was at least one pond turtle sighting in the West Pasture (Fellers and Guscio 2002).

A small tidewater goby population was found in lower Tomasini Creek below the Point Reyes Mesa during wildlife baseline surveys. This occurrence represents the first sighting of this species in the Tomales Bay watershed since 1953. This small resident fish appears to occur in the both the vegetated and unvegetated brackish portions of Tomasini Creek, which receives the full amplitude of high tides due to malfunctioning of the tidegates. Surveys of other Tomales Bay watersheds since 2002 have found evidence of no other Tomales Bay populations (Darren Fong, GGNRA, *pers. comm.*). A genetic analysis has revealed that this population is distinct from those of other central California coast populations, including Estero de San Antonio and Salmon Creek Marsh (David Jacobs, University of California, Los Angeles, *pers. comm.*).

Point Reyes, Olema Marsh, and the Project Area may support one-third of the total population of salt marsh common yellowthroat (ARA 2002). Five pairs of breeding yellowthroats were found nesting in wetlands within the Project Area in 2002 (ARA 2002). Yellowthroats occurred principally in the freshwater marsh-riparian complex in the northwestern portion of the West Pasture, but they were also observed south of the Project Area in riparian habitat along Lagunitas Creek and near the Tomasini Creek/Mesa Road confluence (ARA 2002).

3. Special-interest animal species

- Black-crowned night-heron (*Nycticorax nycticorax*): roosting sites are of concern because many birds can be disturbed in a specific location.
- River otter (*Lutra canadensis*): burrow sites and foraging locations are of concern because the Marin County population has only recently increased from very low numbers.
- Shorebirds and other waterbirds: areas known to support high concentrations of these species are of concern, because many birds can be disturbed in a specific location.

- Neotropical migrant and other birds that utilize riparian habitat for breeding: these species tend to breed in a few, very specific locations in the Project Area and vicinity.

4. Habitat types and/or vegetation communities that provide important functions for humans, wildlife, and native plants

- Riparian habitat
- Potential jurisdictional wetlands (salt, brackish, and freshwater)
- Habitats for special status species, including “Critical” or “Essential” habitats either listed or proposed for listing by the U.S. Fish and Wildlife Service (USFWS) or NOAA Fisheries (NOAA).
- Transitional or ecotonal habitat between tidal marsh and upland

In evaluating impacts to sensitive habitat types or vegetation communities, we considered impacts to areas subject to the jurisdiction of several different regulatory agencies, including the U.S. Army Corps of Engineers (Corps), California Coastal Commission (CCC), USFWS, and NOAA.

The Corps regulates wetlands under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act. It is specifically interested in activities that result in either fill (Section 404 and Section 10) or excavation (Section 10 only) in wetlands and waters subject to its regulatory oversight. Because of how it defines its jurisdiction, the Corps typically claims jurisdiction over a smaller areal extent of wetlands than does the CCC. The CCC has oversight over wetland and waters within coastal areas of California. It is specifically interested in activities that affect wetlands through fill, excavation, or some other types of alterations such as shading from pier and boardwalk structures. The CCC claims jurisdiction over areas that are dominated by hydrophytic or water-adapted plant species, which results in a broader extent of oversight than the Corps. While riparian areas occur next to creeks and ponds that might be subject to Corps’ jurisdiction, the creekside vegetation may or may not fall within its jurisdiction, depending on a number of factors such as depth to the water table during the growing season, duration of surface ponding, etc. Conversely, because most riparian areas are dominated by hydrophytic plant species, the CCC typically considers riparian areas “wetlands.” While design specifications for paths have not been prepared, where possible, we have attempted to quantify the potential impacts to wetlands, waters, and riparian areas subject to Corps or CCC jurisdiction from construction of a 4-, 6-, or 8-foot path or siting of a viewing platform/elevated overlook.

Vegetation communities such as wetlands, riparian habitat, and other upland communities provide important habitat for wildlife species. Wetlands provide breeding habitat for reptiles and amphibians and foraging habitat for birds, fish, and mammals. Riparian habitat or areas dominated by hydrophytic trees and shrubs such as arroyo willow (*Salix lasiolepis*) and red alder (*Alnus rubra*) support breeding birds and overwintering red-legged frogs and act as a migratory corridor for both terrestrial and aquatic species. In certain instances, habitats deemed critical or essential for special status species have received protection or are proposed for protection by agencies such as USFWS and NOAA. These agencies have also designated certain regions or areas as Recovery or Critical Habitat Units, where efforts to reestablish or increase numbers of species are considered of the highest priority. The Point Reyes area falls into one of the proposed Critical Habitat Units for the California red-legged frog. Critical Habitat for red-legged frog within these “units” must have three primary components – suitable breeding locations, permanent water source, and associated uplands (Federal Register 2001).

Critical habitat for central California coast coho salmon is designated to include all river reaches accessible to listed coho salmon from Punta Gorda in northern California south to the San Lorenzo River in central California, including Mill Valley (Arroyo Corte Madera Del Presidio) and Corte Madera Creeks, tributaries to San Francisco Bay. Excluded are areas above specific dams or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). No Critical Habitat has been developed yet for steelhead, but the Point Reyes area is considered Essential Fish Habitat for this species under the Magnuson-Stevens Fishery Conservation and Management Act.

Critical habitat has not been developed for the California clapper rail either. California clapper and black rails tend to prefer salt and brackish marshes with an intricate slough network (ARA 2002). Low marsh areas with sparse vegetation, mudflats, and tidal sloughs are important foraging areas for rails (ARA 2002). The slough network provides an abundant source of invertebrates, as well as escape routes from predators. Higher marsh areas with dense vegetation are used for nesting and high-tide refugia (Albertson and Evens 2000). Tall emergent plant species such as Pacific cordgrass or bulrush (*Scirpus* sp.) are used by rails for nesting material.

While areas transitional between uplands and wetlands are not specially protected, these “ecotones” often play a vital role for both common and special status wildlife species. During high tides, species such as the California clapper rail and other less mobile animals will move into higher elevation ecotones and uplands as refugia. Rails and other species have been negatively affected, however, by development of adjacent uplands and ecotones in California’s coastal and San Francisco Bay wetlands. Because natural uplands and ecotones have been lost, these species are often forced to use levees and other minimally vegetated structures, which increase their vulnerability to predation.

MITIGATION MEASURES THAT WOULD BE INCORPORATED INTO TRAIL OR INFRASTRUCTURE DESIGN

The following measures have been identified to mitigate potential impacts to resources from public access. For the purposes of this evaluation, we assume these mitigation measures would be incorporated into the trail or infrastructure design.

Hydrology and Geomorphology Mitigation Measures

1. Trail Realignment

Trail and infrastructure sitings would be realigned as necessary to avoid to the maximum extent possible hindering the development of natural hydrologic and geomorphic within and in the vicinity of the Project Area.

2. Channel Bank Protection

Bank protection would be necessary along reaches of on-site water courses where (a) trail alignments or infrastructure siting would be subject to erosion, and (b) instream structures (e.g. bridges) would introduce potential erosion hazards on banks both upstream and downstream of the structure. Bank protection typically consists of armoring channels with rip-rap, concrete, and/or certain types of vegetation. Usually, channel armoring is necessary where ground slope along the channel alignment is steep, available right-of-way is limited, and bed and bank erosion of an unarmored channel is unacceptable. Bank protection would also reduce adverse water quality impacts associated with erosion. The extent of bank protection would be the minimum necessary to achieve the desired protection.

3. Elevated Pathways and Infrastructure

Boardwalks might be used to maintain access through perennially and seasonally saturated or ponded wetland areas. Compared to elevated trail berms, boardwalks reduce adverse impacts during flooding (e.g. erosion and sediment deposition) and allow for more rapid and natural drainage after flooding from intense winter storms and extreme high tide events. Boardwalks would be constructed at a reasonable elevation in order to avoid or minimize impacts to tidal circulation and accumulation of debris. Viewing platforms and overlooks would naturally be elevated to some degree to allow for a better view of the restored wetlands, but this would also allow for better tidal circulation and accommodation of flood flows.

4. Sediment Removal

Under most proposed restoration alternatives, the rate and volume of sediment deposition during flood events would be enhanced within the East and West Pastures. Substantial volumes of deposits may limit access to trails and infrastructure and/or the drainage and flow conveyance through or around trail alignments and infrastructure. The only mitigation for these impacts may be a long-term program of sediment removal and drainage control in order to maintain trail alignments and infrastructure and avoid undesirable changes in habitat. Sediment removal would be the minimum necessary to preclude these undesirable changes.

5. Limiting Public Access

During large storm events and in an effort to avoid injury, a combination of warning signs, fencing, and temporary gates would be used to restrict the public from accessing internal trails, bridges, and platforms/overlooks.

6. Property Acquisition

Purchase of adjacent lands will be considered, if feasible, to ameliorate or eliminate negative impacts.

Cultural Resource Mitigation Measures

There is a possibility that cultural resources other than those found in the 2002 survey are present in the Project Area, but are obscured by sediment or vegetation. If sediment excavation or vegetation clearing reveals buried or concealed cultural resources, a qualified archaeologist would be consulted before the activity proceeds, and appropriate mitigation would be implemented, if required.

Biological Resource Mitigation Measures

1. Trail Alignment

Trails would be aligned to ensure that the least amount of existing and future wetlands and riparian habitat are impacted. The alignment would also be designed to create the least amount of impact to known populations of special-status plant and animal species. Access routes that do not provide some sort of access to desirable areas such as the shoreline or a wildlife area may inadvertently encourage the creation of numerous alternative pathways created by users (BCDC 2001). Similarly, strategies that limit access by concentrating use such as boardwalks and viewing platforms (see below) may lead to negative social outcomes users overcrowding and creation of informal pathways as users attempt to avoid crowds (BCDC 2001).

- **Perimeter/Loop Pathways:** These types of trails provide users with visual access to interesting habitat, yet preserves an enclosed, undisturbed interior habitat (BCDC 2001). They also may reduce overall use (public passes only once) and may require fewer parking/staging areas. For wildlife, these types of trails provide predictability of human use for wildlife. However, the design may not adequately discourage creation of social trails, and it is possible that continuous perimeter access may have a greater impact on biological resources than point access.
- **Spur Trails/Point Access:** These types of trails limit physical access to sensitive areas while providing users with some access (BCDC 2001). Spur trails tend to have lower volume of users and, as with perimeter/loop pathways, provide predictability of human use for wildlife. However, public may tend to wander past end of the trail, creating social trails and potentially impact sensitive species and habitats.

2. Buffers

Appropriate buffers would be established, where feasible, between “sensitive habitats” and potential trail alignments to minimize impacts on disturbance-prone species. For the purposes of this mitigation measure, sensitive habitats include high tide or upland/ecotone refugia for rails, breeding habitat for neotropical migrants and other birds, foraging sites for river otter, roosting sites for black-crowned night-heron, and ponds and shallow open water used by shorebirds, waterbirds, or California red-legged frog. Some of these ponds and shallow open water features could be considered Critical Habitat components for the red-legged frog. Appropriate buffers may vary in size, depending on the species, but for the purposes of this analysis, we assume a 40-meter buffer would be necessary between trails and infrastructure and sensitive habitats.

3. Fences and Signs

Fences and signs would be installed to discourage people and dogs from off-trail use while allowing visual access to the restoration site. Fences would be designed (as appropriate) to (a) discourage perching by raptors and other predatory birds, (b) allow movement of small animals underneath, and (c) allow passage for larger native animals, such as deer.

4. Boardwalks

Boardwalks would be installed for selected trail segments through perennially and seasonally saturated or ponded wetland areas and where fencing would inhibit movement of smaller native animals, such as rails and rodents. Boardwalks do create some indirect effects on habitats through shading.

5. Enhanced Vegetation Cover and Refugia

Where high tide refugia are within 40 meters of a potential trail alignment, vegetation cover would be enhanced as needed to provide continuous cover (from tidal marsh to high tide refugia) for rails and other animals at high tide. To discourage use of trails as refugia during high tides, alternate refugia areas would be constructed that would enable rails to seek refugia away from areas used by people.

6. Viewing Platforms/Overlooks

These types of structures restrict and confine use while providing desired visual access and may prevent creation of social trails (BCDC 2001). It also limits contact with wildlife and provides species with predictability of human use. However, as with fences, unless designed properly, it can provide perches for predators. Also, concentrated use could cause the public to create social trails in order to escape over-crowding.

DESCRIPTION OF WETLAND RESTORATION ALTERNATIVES

This report evaluates the impacts of 13 potential trail alignments and five (5) viewing platforms/elevated overlook locations for each of two (2) restoration alternatives, which are described briefly below.

Restoration Alternative A

Alternative A would maintain existing conditions in the West Pasture, while introducing limited restoration of tidal hydrologic processes in the East Pasture. In the West Pasture, levees and the tidegate on Fish Hatchery Creek would be maintained, allowing only limited tidal inflow through the two-way tidegate. In the East Pasture, levees would be selectively breached. Some limited grading and tidal channel creation would be performed in the East Pasture, including regrading of the creek banks along the southern portion of Lagunitas Creek and the entire western berm of Tomasini Creek. Riparian vegetation would be planted on regraded creek banks. Agricultural roads and infrastructure would be removed, and internal drainage ditches would be filled.

Restoration Alternative C

Restoration Alternative C would provide for the maximum restoration of tidal and freshwater hydrologic processes in the Project Area without the need for off-site disposal of excavated material. Most levees and ranch roads would be removed and/or lowered to the surrounding grade, and internal drainage ditches would be filled. Tidal exchange would be reintroduced into a majority of the West and East Pastures, and the southern end of the West and East Pastures would be converted to transitional or ecotone habitat between high marsh and upland. This would entail removing several existing tidegate structures (e.g., at Fish Hatchery Creek and Old Slough) and creating/enhancing tidal channels throughout the northern half of the site. Portions of pastures would be regraded, and Lagunitas Creek banks/levees would be cut back to a 10:1 slope in order to increase the frequency of overbank flood flows and restore riparian vegetation. Other notable components of Alternative C include (1) creating a freshwater marsh in the “Tomasini Triangle” area with conditions optimized to support California red-legged frog, and (2) improving the hydraulic connection between Olema Marsh and Lagunitas Creek by widening and deepening the connection under Levee Road.

EVALUATION OF POTENTIAL TRAIL ALIGNMENTS AND VIEWING PLATFORMS/OVERLOOK LOCATIONS

In the following evaluations, the overall impacts to each environmental or cultural resource factor are indicated by a symbol in parentheses. The symbol summarizes the cumulative effects of all reasonably foreseeable impacts, including both positive and negative impacts, on existing and potential future resource conditions and assumes implementation of the mitigation measures described above. Where possible, potential impacts to wetlands, waters, or riparian areas are quantified, but the overall evaluation remains qualitative.

The symbols are:

- (+) = no (or negligible) measurable adverse impact
- (0) = low overall adverse impact
- (-) = moderate overall adverse impact
- (--) = substantial overall adverse impact
- (---) = highest overall adverse impact

The overall level of impact to specific resource conditions is evaluated relative to:

- 1) the level of existing impacts to these resource conditions from the existing, informal public access as described in Trail Alignments 1a and 1b; and
- 2) the level and range of impacts posed to existing and future resource conditions individually by all 11 potential trail alignments and __ platform/overlook sitings.

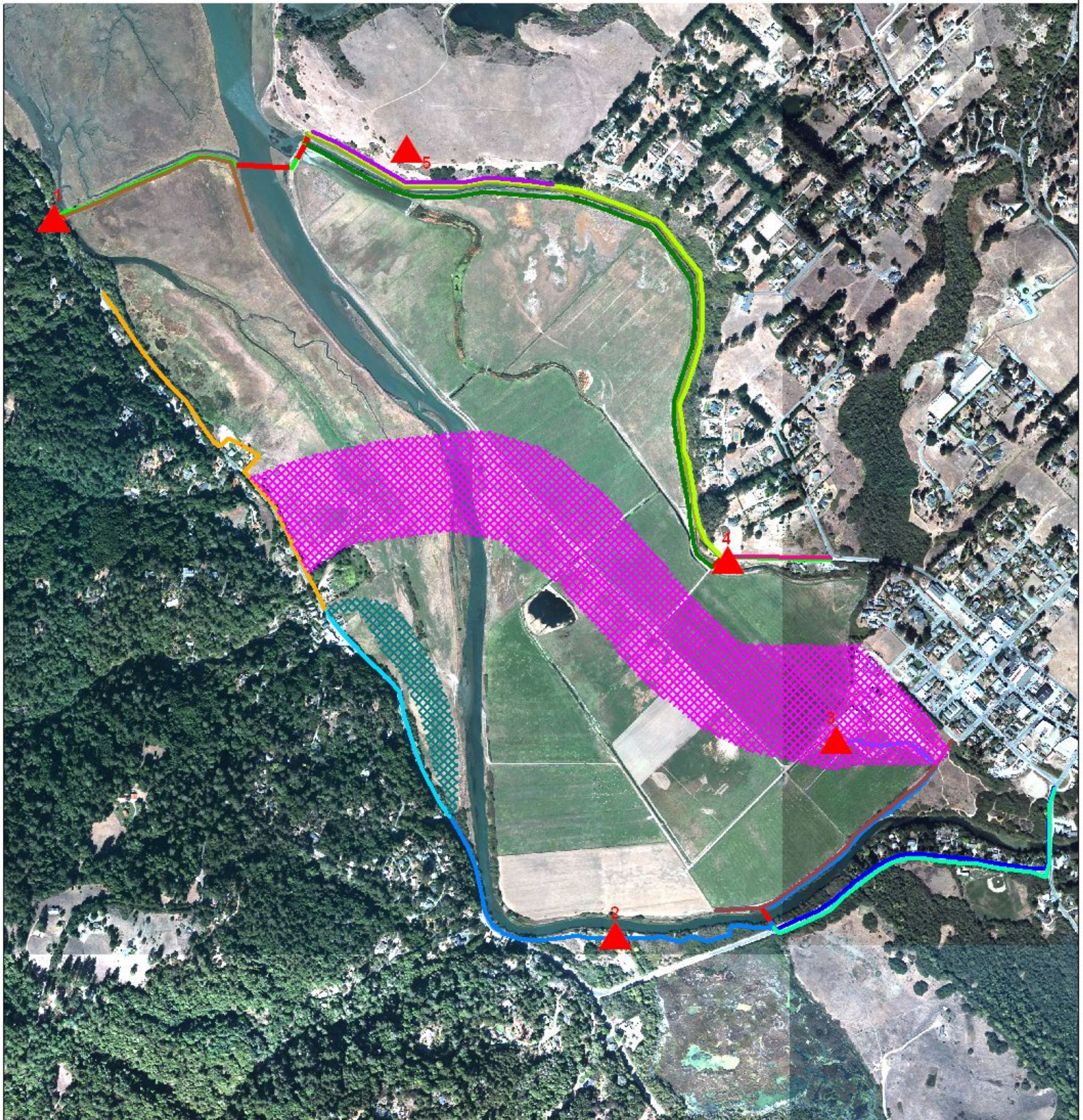
A description of each potential Trail Alignment and Platform/Overlook Siting precedes the evaluation of environmental and cultural resource impacts. These alignments and sitings are shown in Figure 2. Detailed design specifications for these trails and infrastructure have not been conducted, but it is envisioned that trails could be 4-, 6-, or 8-foot wide and, depending on the location and type of trail, would be earthen, paved with a permeable or porous material, or paved with concrete. Most of the viewing platforms or elevated overlooks would be elevated to some degree and vary slightly in shape and overall dimensions depending on site constraints and other factors.

Trail Alignment 1a (Existing Conditions)

This alignment would maintain one of the existing informal public access alignments within the Project Area. For many years, the public has accessed the Giacomini property along two unofficial trails. Trail Alignment 1a is along the top of the levee at the northern end of the West Pasture (northwestern levee). It can be accessed from a small parking area on the east shoulder of Sir Francis Drake Boulevard north of Drake's View Drive. A bridge crossing Fish Hatchery Creek at the west end of this section would be required under Restoration Alternative C, as well as a boardwalk, as the north levee would be removed. Historically, these unofficial trails have been maintained by the Giacomini family as levees only and are typically used by local residents of the Point Reyes area. If these levee trails are officially designated as part of the NPS trail system, they would be subject to a substantial increase in use.

Potential Public Access Alignments

Giacomini Wetland Restoration Project



Potential Public Access Alignments/Infrastructure

1a	3	Bridge
1b	4a	Platforms/ Overlooks
2a	4a and 4b	
2a and 2b	4b	
2b	4c	
2c	4d	
2d	4e	
2e		

700 0 700 Feet

Map Location

National Park Service
Golden Gate National Recreation Area/
Point Reyes National Seashore

Figure 2. Potential public access alignments within the Giacomini Wetland Restoration Project Area.

Restoration Alternative A

- *Hydrology and Geomorphology (+)*

Trail Alignment 1a would not introduce or amplify impacts to on-site hydrologic and geomorphic conditions over those that already exist under this restoration alternative. Access would occur on retained levees.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0/-)*

There would be no new, direct impacts to potential Corps' or CCC jurisdictional wetlands, waters, or riparian areas. There is already an opening in the riparian habitat along Sir Francis Drake Boulevard that allows access to the existing gate at the northern levee. Most of the vegetation on levees consists of ruderal species such as radish (*Raphanus sativus*), fennel (*Foeniculum vulgare*), and some native grasses such as blue wildrye (*Leymus triticoides*). Small colonies of Humboldt Bay owl's-clover occur in the marsh that fringes the northern and western levees.

Conversion of the existing social path to a formal trail would likely increase use of this trail alignment relative to existing conditions, which could increase disturbance of rail and other wildlife populations. California black rails and, in certain years, California clapper rails reside in the adjacent undiked marsh and use the levee as refugia during high tides. Therefore, increased use of this trail alignment could heighten predation pressure on rails during high tides, particularly higher than average high tides, by flushing them from their refugia (ARA 2002). Black-crowned night-herons that roost during the day in the nearby riparian zone along Sir Francis Drake Boulevard would also be possibly disturbed or displaced (J. Evens, *pers. comm.*). Southwestern river otters also use this area, with at least one burrow being observed near the Fish Hatchery tidegate (ARA 2002). The riparian habitat along Sir Francis Drake in the northern portion of the West Pasture also supports a high number of breeding birds, including the salt marsh common yellowthroat (ARA 2002).

Restoration Alternative C

- *Hydrology and Geomorphology (-)*

Because of its location at the "throat" of southern Tomales Bay, this trail alignment would have considerable impacts on hydrologic and geomorphic processes that would be restored in this area under Restoration Alternative C. The trail alignment along the northwestern levee would likely need to be constructed as an elevated boardwalk in order to minimize impacts to tidal exchange between the West Pasture and Tomales Bay. A bridge would need to be constructed across Fish Hatchery Creek at the west end of the trail alignment. Footings will need to be located in such a way that impacts to the bridge footings and surrounding banks from concentrated flow under the bridge would be lessened, if not eliminated. Scour and erosion of boardwalk pilings are also possible. Trapping and accumulation of debris on the boardwalk during creek flooding and/or extreme tidal periods could reduce exchange across this feature as well as promote local scour and erosion. These debris dams may also alter desired circulation patterns, accelerate sediment

deposition, and damage trail structures. Any scour and erosion may increase sediment loads to Tomales Bay, adversely impacting local water quality.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (-/--)*

Construction of a boardwalk trail would not lead to any direct impacts of existing potential Corps' and CCC jurisdictional wetlands, waters, or riparian areas. The boardwalk would be constructed where the levee is currently, which is potential non-jurisdictional uplands. However, the boardwalk could alter the type, extent, and quality of habitat such as salt marsh that would establish underneath and around the boardwalk. In addition, it is unlikely that special status plant species such as Point Reyes bird's-beak or Humboldt Bay owl's-clover would establish underneath the boardwalk despite the proximity of existing populations.

As discussed under Restoration Alternative A, increased use of a formal trail would be likely to increase disturbance of rails and other wildlife species. California black rails and, in certain years, California clapper rails reside in the adjacent undiked marsh and might use the boardwalk as refugia during high tides. While alternate refugia areas would be created, it is likely that some of the rails might continue to use the boardwalk for refugia during high tides. The increased visibility of birds during high tides often entices birdwatchers to these areas, thereby increasing the potential for conflict between rails and trail users. Black-crowned night-herons that roost during the day in the nearby riparian zone would also be possibly disturbed or displaced by trail users (Jules Evens, ARA, *pers. comm.*). Southwestern river otters also use this area, with at least one burrow being observed near the Fish Hatchery tidegate (ARA 2002). The riparian habitat along Sir Francis Drake in the northern portion of the West Pasture also supports a high number of breeding birds, including the salt marsh common yellowthroat (ARA 2002).

A boardwalk into the restored marsh would also increase the potential for invasion of the marsh by non-native, invasive plant species and non-native or feral wildlife species such as red fox and domestic cats that could negatively affect rails and other marsh animals.

Trail Alignment 1b (Existing Conditions)

This alignment would maintain the existing public access alignments within the Project Area. For many years, the public has accessed the Giacomini property along two unofficial trails. Trail Alignment 1b is between Lagunitas Creek and the levee at the southeastern end of the East Pasture (southeastern levee). It can be accessed from park lands managed by Marin County that are located between the Giacomini dairy facilities and the green auto bridge (Green Bridge) over Lagunitas Creek. Under Restoration Alternative C, this trail would need to be rerouted slightly north to allow for regrading and revegetating the currently ripped Lagunitas Creek bank. Historically, these unofficial trails have been maintained by the Giacomini family as levees only and are typically used by local residents of the Point Reyes area. If these levee trails were officially designated as part of the NPS trail system, they would be subject to a substantial increase in use.

Restoration Alternative A

- *Hydrology and Geomorphology (+)*

Trail Alignment 1b would not introduce or amplify impacts to on-site hydrologic and geomorphic conditions over those that already exist under this restoration alternative. Access would occur on the existing bank of Lagunitas Creek, which is already elevated due to historic sediment deposition processes.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

Increased use of this trail alignment might increase cause a minor increase in disturbance of wildlife that use the riparian habitat along Lagunitas Creek or adjacent upland areas. Most of the breeding bird activity in this area occurs in the riparian habitat near the Green Bridge. Should the trail alignment be routed to start near the Green Bridge, it could increase disturbance of avifauna, although these dirt trails are already heavily used. It is also possible that trail users will wander off into the adjacent upland areas, creating informal, social trails in the upland habitat, as well, that would disturb habitat and associated species.

There would be no new, direct or indirect impacts to existing potential Corps' or CCC jurisdictional wetlands, waters, or riparian areas.

Restoration Alternative C

- *Hydrology and Geomorphology (+)*

The levee and rip-rap bank along the southeastern levee would be removed under Restoration Alternative C, and a lower gradient slope would be created along the bank to enhance replanting or recruitment of riparian vegetation. As a result, the existing unofficial trail alignment would need to be shifted further north, preferably into the upland habitat zone elevations. Assuming the trail is earthen and flush with the ground surface, there would be no adverse impact to hydrologic and geomorphic conditions.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0/-)*

Increased use of this trail might cause a minor increase in disturbance of wildlife that use the riparian habitat along Lagunitas Creek or adjacent upland areas. Most of the breeding bird activity in this area occurs in the riparian habitat near the Green Bridge. Should the trail alignment be routed to start near the Green Bridge, it could increase disturbance of avifauna, although these dirt trails are already heavily used. There could also be disturbance through development of social or unauthorized trails of recently revegetated native grassland upland areas, decreasing success of revegetation efforts and value of these areas to wildlife.

Development of unauthorized trails could increase potential for establishment of non-native, invasive plant species that would directly jeopardize success of revegetation efforts.

There would be no new, direct or indirect impacts to existing potential Corps' or CCC jurisdictional wetlands, waters, or riparian areas.

Trail Alignment 2a

This alignment provides for the creation of a multiple use path (Class I or II) between Inverness Park and Point Reyes Station along the northern perimeter of the Project Area and requires construction of three bridges under Restoration Alternative A and four bridges under Restoration Alternative C. This alignment was developed based on input received during public scoping. A trail would be constructed on the historic railroad grade that exists along the eastern bank of Tomasini Creek. The southern terminus of the railroad grade trail would connect to Mesa Road in Point Reyes Station. The northern reach of the railroad grade trail would connect to the northern end of the West Pasture by construction of three bridges. Relatively small bridges would be constructed across Tomasini Creek and the East Pasture Old Slough and would be connected by a boardwalk. A bridge of much greater size would be constructed across Lagunitas Creek. Under Restoration Alternative A, the bridge would connect to the existing levee, which already has a tidegate/culvert system. Under Restoration Alternative C, the bridge would connect to a boardwalk, which would cross Fish Hatchery Creek via a bridge. The trail would connect to Sir Francis Drake Boulevard north of Drake's View Drive.

Restoration Alternative A

- *Hydrology and Geomorphology* (--/---)

Little, if any, impact on geomorphic processes would be affected by a trail alignment along the northwestern levee and historic railroad grade portions of Trail Alignment 2a under Restoration Alternative A. There would be no impacts to impacts to existing hydrologic and geomorphic processes under Trail Alignment 2a, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the end of the Tomales Bay Trail. Under this Restoration Alternative, the alignment of Tomasini Creek is maintained in its existing configuration, but, should the creek avulse and breach the berm, no efforts would be made to divert the creek back into this configuration. The creek may encroach upon the historic railroad grade north of the Giacomini Hunt Shack, but it more likely that the creek would breach the outer berm during a large flood event and realign itself to flow across the East Pasture.

Seeps and springs in the Point Reyes Mesa may present more of a challenge to trail creation and maintenance than would Tomasini Creek. A large section of the Point Reyes Mesa supports seeps and springs whose waters flow down the Mesa and across the historic railroad grade into Tomasini Creek. The Giacomini actually maintained the historic railroad grade for some period after it was abandoned by the railroad, but stopped more than 10 years ago, because the amount of seep/spring flow required installation of a number of culverts and constant road maintenance (Richard and Robert Giacomini, *pers.comm.*). To ensure that erosion and sediment loading into the creek is not exacerbated by creation of a trail, the section through this area might need to be constructed as a boardwalk. However, this boardwalk would probably require maintenance to remove debris and sediment from high flows in Tomasini Creek that would spill onto these narrow floodplains during storm events.

In addition to a boardwalk along a portion of the historic railroad grade, a total of three bridges would be needed under this trail alignment: one across Tomasini Creek, one across the Old Slough, and one across Lagunitas Creek. Under Restoration Alternative A, the West Pasture levee would be retained, so Fish Hatchery Creek would continue to have a culvert and tidegate system. With the exception of Lagunitas Creek, all of the bridges could be constructed without footings in the active stream channel. The length of the Lagunitas Creek crossing, however, would require footings in the active channel. These footings and other structural components could act to concentrate flows, increase flow velocities (especially flood flows), and increase the potential for local bank erosion and channel scour. This would have an adverse effect on Tomales Bay water quality.

In addition, some bank protection or armoring might be needed to protect the bridge footings. Bank armoring would be needed both upstream and downstream of the hard structures (e.g., bridge footings and pilings). These structures are typically designed to minimize the potential for stream channel migration. As such, they would likely reduce the potential for geomorphic variability in the lower reaches of Lagunitas Creek, which is one of the Project's objectives. Because of the bridge's location, it is possible that the structure would also reduce the potential for dynamic geomorphic processes in the East Pasture channels, as well as Lagunitas Creek. Impacts to channels in the West Pasture would be less significant, as the existing levees would continue to constrain channel migration. Due to the dynamic nature of this section of Lagunitas Creek, it is likely that the bridge protection would need to be maintained and/or repaired frequently, thereby increasing the likelihood of erosion and water quality impacts.

In addition to bridges, a boardwalk would need to be constructed between the historic railroad grade and Lagunitas Creek, which could increase the potential for accelerated sedimentation and/or erosion in this area. Flood-driven debris accumulation and/or rack driven in by winds and flood tides are likely to accumulate in and around both bridge and boardwalk footings. Accumulated debris could reduce tidal exchange and circulation across the marsh plain. Also, removal of riparian vegetation and increased foot traffic along the historic railroad grade could increase sediment loading into Tomasini Creek, also adversely affecting water quality in the creek and Tomales Bay. If possible, path would be placed on a boardwalk to minimize sediment disturbance and allow freshwater seep from the Mesa to flow under the boardwalk into Tomasini Creek.

- *Cultural Resources (+/0)*

According to NPS cultural resources staff, construction of a trail on the historic railroad bed would cause no substantial adverse impacts to the resource (White and Rudo, *pers. comm.*). The 2002 cultural resources study recommends that if vegetation clearing occurs along the railroad bed, such clearing shall be monitored by a qualified archaeologist for the purpose of identifying buried or currently concealed cultural resources. If cultural resources are identified, they would be evaluated for their potential eligibility to the National Register (Newland 2002). There is a low potential for undiscovered cultural resources to be negatively affected by use of the historic railroad grade as a trail, even if surveys are conducted, due to the difficulty in locating resources in this densely vegetated section of the historic railway.

- *Biological Resources (---)*

Trail construction on the railroad bed would eliminate some of the dense riparian habitat that has established in this area since railroad use and maintenance was discontinued. Perennial freshwater seeps from the adjacent Point Reyes Mesa have created an unusual stand of riparian

vegetation that extends from the top of the Mesa to the banks of Tomasini Creek. This mesic coastal scrub is dominated by arroyo willow and other hydrophytic shrubs and herbs, all of which are characteristic species of native riparian habitat. Riparian vegetation now covers approximately 42 percent (~2828 feet) of the historic railroad grade stretching from Mesa Road to the Tomales Bay Trail (~6722 feet). Wildlife surveys conducted as part of baseline studies identified this area as being one of the three most valuable habitats for breeding birds and other avifauna such as roosting black-crowned night herons in the Giacomini Ranch and vicinity (ARA 2002). Some of the value of this habitat to birds and other wildlife species comes from its proximity to a diverse number of other habitats, including open water, ruderal fields, and marsh. In addition to use by residents and transients, this riparian habitat also provides shade and structure for this section of Tomasini Creek, which supports a population of a federally endangered fish species, the tidewater goby. While salmonid species have not been documented in Tomasini Creek, at least in recent times, Tomasini Creek does fall within Essential Fish Habitat for steelhead and has the potential to support this species in the future.

The value of this habitat to wildlife appears to be one of the reasons that this area was specifically identified in the Point Reyes Station Community Plan as a natural resource protection objective (Point Reyes Station Community Plan 2001). The plan calls for a buffer zone of undeveloped space between the former railroad right-of-way and the upper edge of the mesa bluff to “prevent erosion of the bluff edge . . . , maintain the ecological integrity of the bluff, and the visual separation of the mesa landform from the flat marshlands below.” It defines the buffer zone as being at least 100 feet from the eastern edge of the former railroad right-of-way. Protection of this area may also be supported indirectly by the Marin County Zoning Code and the Local Coastal Plan. Section 22.56.130.G(3) of the Zoning Code states that, “No construction, alteration of land forms or vegetation removal shall be permitted within such riparian protection areas.” The Local Coastal Plan establishes a Stream Buffer Area that includes areas covered by riparian vegetation on both sides of streams and 50 feet landward from the edge of riparian vegetation. In addition, the Local Coastal Plan also establishes a buffer for wetlands that is 100 feet in width, minimum, as measured landward from the edge of wetlands along their entire periphery.

Potential impacts to riparian habitat from creation of a 4-, 6-, or 8-foot trail on the historic railroad grade range from 0.28 acres to 0.59 acres. This riparian habitat is potentially subject to CCC jurisdiction. A portion of this riparian habitat is considered potential jurisdictional Corps’ tidal wetlands, because it occurs below the High Tide Line: because of faulty tidegates, Tomasini Creek is fully tidal, and tidal influence extends to at least the location of the Giacomini Hunt Shack. Impacts to potential jurisdictional Section 404 wetlands from creation of a 4-, 6-, or 8-foot trail would range from 0.14 acres to 0.27 acres. In addition, these impacts would occur directly adjacent to Tomasini Creek and, therefore, within the Community Plan buffer zone and CCC jurisdiction.

Use of a trail along the banks of Tomasini Creek would impact breeding birds and other types of avifauna and northwestern pond turtles by flushing them from the banks into the water. California red-legged frog adults have occasionally been observed in Tomasini Creek and the northern end of the East Pasture Old Slough. A bridge or trail spanning the mouth of Tomasini Creek may impact feeding opportunities for river otter known to forage at this location (NPS staff observation, 2002-2003). Trail Alignment 2a would increase the opportunities for off-trail use at the mouth of Tomasini Creek and, therefore, may impact Humboldt Bay owl’s-clover and Point Reyes bird’s-beak populations in the tidal marsh near this location (Parsons 2003a and 2003b).

A boardwalk would need to be constructed between the railroad grade and the Lagunitas Creek Bridge. Construction of the boardwalk would not directly impact existing potential jurisdictional

Corps' or CCC wetlands and waters, because the boardwalk would be sited where the levee is currently. However, it could cause changes in establishment, extent, and quality of salt marsh vegetation that would develop in this area once the levee was removed and a boardwalk, installed. Construction of the bridge across Lagunitas Creek would impact approximately 0.0009 and 0.0018 acre of potential jurisdictional Corps' and CCC waters and wetlands, respectively.

While there would no new impacts to wetlands and riparian habitats along the retained northwestern levee, the increased length and connectivity of Trail Alignment 2a relative to Trail Alignment 1a would have the potential to substantially increase trail use along the northern portion of the West Pasture and thereby increase the potential for disturbance of rail populations in the undiked marsh north of the Giacomini Ranch. Increased use of the trail on the northwestern levee would impact rails, black-crowned night-herons, southwestern river otters, and salt marsh common yellowthroat as previously described for Trail Alignment 1a, Restoration Alternative A.

There would be no or very minimal impacts to biological resources for the portion of the trail from Mesa Road to the Giacomini Hunt Shack. This portion of the historic railroad grade, which parallels the current alignment of Tomasini Creek, is heavily used as a farm road and for access to worker housing and supports very little to no riparian vegetation, wetlands, or habitat for special status species.

Restoration Alternative C

- *Hydrology and Geomorphology (--/---)*

Because it lies at a relatively high elevation along the eastern margin of the project site, a trail alignment along the historic railroad grade would not result in substantial impacts to hydrologic and geomorphic processes. However, similar to that described for Restoration Alternative A under Trail Alternative 2a, the segment between Tomasini Creek and Sir Francis Drake Boulevard would impart a variety of potential impacts to hydrologic and geomorphic resources. A total of four bridges would be needed under this trail alignment: one across Tomasini Creek, one across the Old Slough, one across Lagunitas Creek, and one across Fish Hatchery Creek. With the exception of Lagunitas Creek, all of the bridges could be constructed without footings in the active stream channel. As described above under Restoration Alternative A, the impacts associated with the trail crossing of Lagunitas Creek include an increased potential for local bank erosion and channel scour and, in turn, degradation to Tomales Bay water quality.

The amount and extent of bank protection and armoring needed under Restoration Alternative C would be likely to be greater than under Restoration Alternative A due to the fact that this alternative proposes to completely remove all levees. Bank armoring maintains a static creek alignment similar to that currently created by the Giacomini levees and eliminates a creek's ability to meander or migrate laterally, which is a natural geomorphic process. Lateral migration is one of the ways that stream systems cope with seasonal and storm-driven variations in flow and sediment, with aggradation and scour one of the other ways. Therefore, these structures could encourage localized aggradation and/or scour within Lagunitas Creek. Because of the dynamic nature of this section of Lagunitas Creek, it is likely that this protection would need to be maintained and/or repaired frequently, thereby increasing the likelihood of erosion and water quality impacts.

A boardwalk connecting the bridges would need to be constructed across the marsh between Sir Francis Drake Boulevard and the historic railroad grade. Flood-driven debris accumulation and/or

rack driven in by winds and flood tides are likely to accumulate in and around both bridge and boardwalk footings. Accumulated debris could reduce tidal exchange and circulation across the marsh plain. Also, removal of riparian vegetation and increased foot traffic along the historic railroad grade could increase sediment loading into Tomasini Creek, also adversely affecting water quality in the creek and Tomales Bay. If possible, path would be placed on a boardwalk to minimize sediment disturbance and allow freshwater seep from the Mesa to flow under the boardwalk into Tomasini Creek.

Impacts for other portions of the trail alignment under Restoration Alternative C would be similar to those described under Restoration Alternative A.

- *Cultural Resources (+/0)*

No foreseeable impacts to cultural resources, as described previously for Trail Alignment 2a, Restoration Alternative A.

- *Biological Resources (---)*

Impacts to biological resources under this restoration alternative would be very similar to those described for Restoration Alternative A. The primary difference would occur along the northwestern levee and replacement of the levee with a boardwalk. The use of a boardwalk trail in place of the northwestern levee would allow for rails to pass under the trail as they move to high tide refugia, but trail use would still cause disturbance to rails. Also, it is possible that, despite construction of alternate high tide refugia, some rails may continue to use the boardwalk. Increased trail use would create disturbances to black-crowned night herons, southwestern river otters, and breeding birds such as saltmarsh common yellowthroat as described under Restoration Alternative A. In addition, the greater length of boardwalk could increase impacts to vegetation-related resources such as salt marshes, rare plants, etc. As noted under Trail Alignment 1a, replacement of the northwestern levee with a boardwalk would not impact existing potential jurisdictional Corps' and CCC wetlands, waters, or riparian areas.

Trail Alignment 2b

This alignment provides for the creation of a multiple use path between Inverness Park and Point Reyes Station in a manner similar to Trail Alignment 2a. This alignment was developed based on input received during public scoping. This alignment also requires three bridges to cross Tomasini, East Pasture Old Slough, and Lagunitas Creeks (and a fourth bridge to cross Fish Hatchery Creek, under Restoration Alternative C). Unlike Trail Alignment 2a, this trail would be constructed on an existing levee along the western bank of Tomasini Creek rather than on the historic railroad grade. Construction of the trail would preclude or decrease the amount of regrading and riparian revegetation that could be conducted along the western Tomasini Creek berm. In some areas, the berm might need to be expanded into adjacent areas and/or reconstructed, because the existing berm is too narrow or is eroding. The southern terminus of the trail would connect to Mesa Road via construction of a new bridge or retention of the existing car bridge, which may or may not be suitable for the multiple use path. A new bridge would need to be constructed across the mouth of the Old Slough. The northern reach of the Tomasini Creek levee trail would connect to the northern end of the West Pasture as described for Trail Alignment 2a.

Restoration Alternative A

- *Hydrology and Geomorphology* (---)

For the most part, impacts to hydrologic and geomorphic resources from trail construction and trail use would be similar to Trail Alignment 2a. However, there are some differences. The Giacomini redirected Tomasini Creek into its current channel course in the 1960s through excavation and berming. The creek historically flowed in various alignments across the East Pasture. The existing levee or berm creates a hydrologic and geomorphic disconnect between channel, floodplain and marshplain. There is a greater potential for erosion and breaching of the berm on the west side of Tomasini Creek than the railroad grade on the east side of the creek (Trail Alignment 2a) due to increased flow velocity and erosive force on this structure associated with natural hydrogeomorphic processes and poorer construction techniques. Use and any continued maintenance of the berm for a trail could preclude the NPS from allowing the berm to degrade naturally and allowing the creek to be more geomorphically dynamic. This is considered to be a substantial impact to one of the project objectives, which is restoring natural hydrologic and geomorphic processes. Similar to Trail Alignment 2a, three bridges would need to be constructed, however, the Tomasini Creek bridge would be further south near the Giacomini Hunt Lodge, with the other two at the Old Slough and Lagunitas Creek. Use of the western berm as a trail would also preclude the full extent of regrading and revegetation that has been proposed under this Restoration Alternative and would, therefore, likely limit the width of Tomasini Creek's floodplains.

- *Cultural Resources* (+)

No foreseeable impacts to cultural resources.

- *Biological Resources* (--)

Construction of a trail on the western berm of Tomasini Creek would cause little or no damage to existing riparian vegetation. The western berm is largely vegetated by ruderal species with occasional coyote brush (*Baccharis pilularis*) and Himalayan blackberry (*Rubus discolor*) patches. Because this trail relies to a large degree on existing berms and levees, impacts to existing potential jurisdictional Corps' and CCC wetlands, waters, or riparian areas would appear to be relatively low. There will probably be additional impacts to potential jurisdictional Corps' or CCC wetlands near the Tomasini Creek berm should it need to be widened or repaired for trail construction, but these impacts could not be quantified at this point without additional field surveys. However, using the berm for a trail would preclude the amount of regrading and riparian revegetation that could occur and, thereby, decrease the potential for increasing riparian habitat overhanging the creek and providing refugia, shade, and food sources for aquatic species.

In addition trail users would disturb northwestern pond turtles on the creek banks and black-crowned night-herons roosting in the riparian vegetation on the opposite bank. California red-legged frog adults have occasionally been observed in Tomasini Creek and the northern end of the East Pasture Old Slough. Trail users would likely disturb shorebirds and waterbirds in known habitat areas (shallow water and mudflat) near the trail. The height of the trail on the berm relative to the waterbird habitat in the East Pasture may increase visually-triggered disturbance to waterbirds below the trail. While this area may not rank as one of the more important shorebird habitats in Tomales Bay, it does provide alternative habitat for shorebirds and waterfowl, particularly when tides within the Bay are high. In addition, increased use of the trail on the northwestern levee would impact rails, black-crowned night herons, southwestern river otters, and

breeding birds such as saltmarsh common yellowthroat as described for Trail Alignment 1a, Restoration Alternative A.

Impacts for the section of trail from Tomasini Creek to Sir Francis Drake Boulevard would be the same as for Trail Alignment 2a under Restoration Alternative A.

Restoration Alternative C

- *Hydrology and Geomorphology* (---)

Impacts to hydrology and geomorphology resources would be similar to Trail Alignment 2b, Restoration Alternative A. Under Restoration Alternative C, however, Tomasini Creek is redirected into one of its historic alignments, the East Pasture Old Slough, so the current Tomasini Creek channel becomes a backwater slough. Again, using the berm for a trail would preclude the amount of regrading and riparian revegetation that could occur and would minimize the ability to create wider floodplains and floodplain/marshplain connectivity for the backwater slough. However, using the berm for the trail would have less impact on the hydrologic and geomorphic processes of Tomasini Creek, as the creek would be redirected into one of its historic alignments upstream of the trail. Impacts of a trail from Tomasini Creek to Sir Francis Drake Boulevard would be the same as described for Trail Alignment 2a, Restoration Alternative C.

- *Cultural Resources* (+)

No foreseeable impacts to cultural resources.

- *Biological Resources* (--)

Impacts to biological resources would be very similar to that described for Trail Alignment 2b, Restoration Alternative A. It is possible that this trail alignment would have slightly less impact to aquatic biological resources under this alternative than under Alternative A, because Tomasini Creek would be directed away from its current alignment. The existing channel would become a backwater slough that would continue, however, to support a variety of aquatic organisms, including tidewater goby and possibly California red-legged frog adults.

Trail Alignment 2c

This alignment would be very similar to Trail Alignment 2a, but there would be no bridge construction or connection to Sir Francis Drake Boulevard. It was developed based on input received during public scoping. Instead, a trail would be created on the historic railroad grade between Mesa Road and the Tomales Bay Trail, which starts on Highway 1 and ends currently just north of the Tomasini Creek outlet to Tomales Bay.

Restoration Alternative A

- *Hydrology and Geomorphology* (0)

Impacts to hydrologic and geomorphic processes would be the same as described for Trail Alignment 2a, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alternative 2a, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

- *Biological Resources (--)*

Impacts to biological resources would be the same as described for Trail Alignment 2a, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

Restoration Alternative C

- *Hydrology and Geomorphology (0)*

Impacts to hydrologic and geomorphic processes would be the same as described for Trail Alignment 2a, Restoration Alternative C, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alignment 2a, Restoration Alternative C, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

- *Biological Resources (--)*

Impacts to biological resources would be the same as described for Trail Alignment 2a, Restoration Alternative C, for the historic railroad grade section between Mesa Road and the outlet of Tomasini Creek.

Trail Alignment 2d

This alignment would represent a spur access version of Trail Alignment 2c, incorporating only the portion of the historic railroad grade between Mesa Road and the Giacomini Hunt Shack. This alignment was developed based on input received during internal scoping.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

There would be little to no impacts to existing hydrologic and geomorphic processes under Trail Alignment 2d, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the Giacomini Hunt Shack. Under this Restoration Alternative, the alignment of Tomasini Creek is maintained in its existing configuration, but, should the creek avulse and breach the berm, no efforts would be made to divert the creek back into this configuration. It is unlikely, however, that the creek would encroach upon the historic railroad grade in this area, because the creek bank and grade are heavily reinforced with fill. The existing road is also some distance away from the creek itself, thereby decreasing the amount of erosion-related sediment run-off potentially associated with converting it from a road into a trail.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alternative 2a, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the Giacomini Hunt Shack.

- *Biological Resources (+/0)*

There would be no or very minimal impacts to biological resources for the portion of the trail from Mesa Road to the Giacomini Hunt Shack. This portion of the historic railroad grade, which parallels the current alignment of Tomasini Creek, is heavily used as a farm road and for access to worker housing and supports very little to no riparian vegetation, wetlands, or habitat for special status species.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrologic and geomorphic processes would be the same as described for Trail Alignment 2d, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the Giacomini Hunt Shack.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alignment 2d, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the Giacomini Hunt Shack.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Trail Alignment 2d, Restoration Alternative A, for the historic railroad grade section between Mesa Road and the Giacomini Hunt Shack.

Trail Alignment 2e

This alignment would represent a spur access version of Trail Alignment 2c, incorporating only the northernmost portion of the historic railroad grade between the end of the Tomales Bay Trail and the Giacomini Hunt Shack. It would essentially lengthen the existing Tomales Bay Trail and provide some viewing opportunities of the restored wetlands and wildlife using the northernmost portion of the Project Area. The spur trail would end just north of the portion of the historic railroad grade that now supports dense riparian vegetation. This alignment was developed based on input received during public scoping.

Restoration Alternative A

- *Hydrology and Geomorphology (0)*

There would be little to no impacts to existing hydrologic and geomorphic processes under Trail Alignment 2e, Restoration Alternative A, for the historic railroad grade section just

south of the existing Tomales Bay Trail terminus. Under this Restoration Alternative, the alignment of Tomasini Creek is maintained in its existing configuration, but, should the creek avulse and breach the berm, no efforts would be made to divert the creek back into this configuration. The creek may encroach upon the historic railroad grade in this area, but as the grade is wider in this area -- and creek flow velocities are lower -- it is unlikely that there would be any significant erosion of the grade. This section of the historic railroad grade also does not have the seep/spring-associated erosion and sedimentation issues that would potentially require construction of a boardwalk, as discussed under Trail Alignment 2a.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alternative 2a, Restoration Alternative A, for the northernmost section of the historic railroad grade section that terminates at the Tomales Bay Trail.

- *Biological Resources (0)*

Impacts to biological resources for the northernmost portion of the historic railroad grade that terminates at the Tomales Bay Trail would be much lower than those discussed under Trail Alignment 2a, because the trail would not cross the riparian habitat that has developed on the grade below the seep-dominated portion of the Point Reyes Mesa. A spur trail in this area could impinge upon one of the critical resource objectives established, which focused on enhancing areas appropriate for breeding of northwestern pond turtles. The south-facing exposure of the hillslope immediately above the proposed trail was identified as an area that could be enhanced for pond turtle breeding. However, there is no evidence that pond turtles currently use this area for breeding or other activities. Also, federally protected species such as the tidewater goby, steelhead, and coho salmon may move through the section of Tomasini Creek adjacent to this section of the railroad grade, but, again, erosion and consequently sediment loading into the creek associated with creation, use, and any maintenance of a trail would be lower under this trail alignment than under Trail Alignment 2a, which crosses through the wettest portion of the railroad grade. Impacts to potential jurisdictional tidal wetlands for a 4-, 6-, or 8-foot trail would probably total less than 0.001 acre.

Restoration Alternative C

- *Hydrology and Geomorphology (0)*

Impacts to hydrologic and geomorphic processes would be similar to those described for Trail Alignment 2e, Restoration Alternative A, for the northernmost portion of the historic railroad grade that terminates at the Tomales Bay Trail. Under Restoration Alternative C, however, Tomasini Creek is redirected into one of its historic alignments, and the existing channel course becomes a backwater slough. This change would make it even less likely that this portion of the berm would be subject to any erosion, although there may be some associated simply with tidal action.

- *Cultural Resources (+/0)*

Impacts to cultural resources would be the same as described for Trail Alignment 2e, Restoration Alternative A, for the northernmost portion of the historic railroad grade section that terminates at the Tomales Bay Trail.

- *Biological Resources (0)*

Impacts to biological resources would be similar to those described for Trail Alignment 2e, Restoration Alternative A, for the northernmost portion of the historic railroad grade section that terminates at the Tomales Bay Trail. As Tomasini Creek would be redirected, it would be less likely that salmonid species would use the adjacent channel, although it would provide refugia and opportunities for foraging for fish either moving up the watershed to spawning grounds or smolts moving out to sea.

Trail Alignment 3

This alignment provides for the creation of a multiple use path, generally as depicted in the draft County of Marin General Plan 2004. This draft plan depicts a trail connecting Inverness Park to Point Reyes Station through the central region of the Giacomini property. This evaluation assumes that Trail Alignment 3 would be located somewhere within the general corridor shown on Figure 2. Trail Alignment 3 requires construction of a bridge across Lagunitas Creek (upstream from the northern levees) to connect the West and East Pastures. At Inverness Park, the trail would connect to Sir Francis Drake Boulevard at an undetermined location between the Gradjanski and Kostelic properties. At Point Reyes Station, the trail would connect to existing roads at or near the Giacomini dairy facilities. The central span of the trail and the bridge across Lagunitas Creek would be constructed at an undetermined location within the central region of the property.

Restoration Alternative A

- *Hydrology and Geomorphology (--/---)*

The most substantial impact under this trail alignment/Restoration Alternative combination is the increased potential for erosion and degradation of Tomales Bay water quality associated with a Lagunitas Creek bridge and hydrologic fragmentation of the restored salt marsh in the East Pasture. Depending on the type and exact location of trail constructed, there would be a varying degree of impact to tidal slough/internal creek drainage and flood/marsh plain circulation in the East and West Pastures. Impacts would include changes in sedimentation and erosion processes, changes in drainage, etc. As discussed previously, the accumulation of flood or tide driven rack or debris in and around boardwalk footings could hinder tidal exchange and circulation on the marshplain. Extreme storm events are likely to create structural failure of the boardwalk at one or many locations. Flood flow patterns created by the structure may also create “un-natural” morphological features on the marsh- and floodplain.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (--)*

Under Restoration Alternative A, it is predicted that the central region of the Project Area would remain or become vegetated primarily by salt marsh plant species in the East Pasture and by a mix of glycophytic and halophytic native and non-native grasses and herbs in the West Pasture. Therefore, not only would construction of a trail affect existing potential jurisdictional Corps’ and CCC wetlands and waters (Parsons, *in prep.*), but it would likely have an adverse effect on

establishment and quality of future native vegetation communities, at least in the East Pasture. A 4-, 6-, or 8-foot boardwalk trail would indirectly impact approximately 0.47 acres to 0.96 acres of potential jurisdictional CCC wetlands and waters through shading: direct impacts would potentially include only certain types of fill associated with the boardwalk structure. However, construction of a trail through the center of the Giacomini Ranch would fragment vegetation communities and thereby introduce sources of disturbance to native habitats and associated species, both plant and wildlife. The trail would impact most wildlife using the site by facilitating the introduction of people, non-native invasive plant species, and predators (domestic, feral and otherwise) to a large habitat area that would otherwise be relatively inaccessible and thus would increase disturbance. In addition, while boardwalks would not preclude salt marsh establishment, they might alter the quality of habitat that would establish, including the propensity to support rare plant species such as Humboldt Bay owl's-clover and Point Reyes bird's-beak.

Restoration Alternative C

- *Hydrology and Geomorphology* (---)

As with Trail Alignment 2a/2b, Trail Alignment 3 would have one of the greatest impacts to natural hydrologic and geomorphic processes. It would adversely affect tidal circulation patterns and delay floodwater passage within and through both the East and West Pastures. All of the adverse effects of berm and/or boardwalk trails and bridge installation apply here and include (a) the potential for delayed passage of flood flows which, when compared to the same alternative without this trail alignment, leads to increased flood hazards along Levee Road, (b) increasing both undesired erosion and sediment deposition, (c) degrading Tomales Bay water quality, and (d) hindering the development of natural hydrologic and geomorphic processes and, in turn, channel formation and site evolution. The need for bank armoring and protection adjacent to structures further exacerbates these impacts.

- *Cultural Resources* (+)

No foreseeable impacts to cultural resources.

- *Biological Resources* (---)

Impacts to biological resources would be fairly similar to Restoration Alternative A. Indirect and direct impacts to existing potential jurisdictional Corps' and CCC wetlands and waters would be the same as described under Restoration Alternative A, because much of the West Pasture is already wetland even though it is leveed and would not be restored under Restoration Alternative A. However, under Restoration Alternative C, a majority of the central portion of the Project Area would become tidal marsh, therefore, Trail Alignment 3 would have a much larger impact on establishment of future habitats such as tidal marsh and transitional habitats. Therefore, it would create more fragmentation of what would otherwise be a large expanse of tidal salt marsh. It would also impact special-status species associated with these habitats, such as rails, due to loss of habitat and disturbance. The trail would impact most wildlife using the site by facilitating the introduction of people, non-native invasive plant species, and predators (domestic, feral and otherwise) to a large habitat area that would otherwise be relatively inaccessible and thus would increase disturbance.

Trail Alignment 4a

This alignment provides for the creation of a multiple use path between Inverness Park and Point Reyes Station at the southern perimeter of the Project Area. This alignment was developed based on input received during public scoping in 2002 and was the public access component that was incorporated into the preliminary restoration concepts introduced to the public during scoping in 2004. This alignment requires construction of a bridge across Lagunitas Creek at the former site of the Giacomini Ranch seasonal gravel dam. The trail would connect to Point Reyes Station via an undetermined entrance either north, south, or near the Giacomini dairy facilities. From the dairy, the trail would follow the alignment of the existing unofficial trail (along the southeastern end of the East Pasture) to the gravel dam bridge crossing. From the south side of the bridge, the trail would connect with existing trails in the White House Pool area, which is leased from the state of California by the County of Marin Parks and Open Space District (County Parks). This section of trail would be developed with full approval of and cooperation with the land owners, the state's Wildlife Conservation Board, and the lessees, County Parks. It would then continue west to connect with Sir Francis Drake Boulevard.

If feasible, a pedestrian barrier would be constructed to increase safety for trail users: this study assumes the presence of a 4-foot buffer between road and path that includes a pedestrian barrier. Based on preliminary analyses, there are at least four (4) sections along Sir Francis Drake Boulevard where the path would need to be widened to accommodate a 4-, 6-, or 8-foot trail through expansion of the road berm, creation of a cantilevered section of trail, or other method. The eastern shoulder of Sir Francis Drake Boulevard would be expanded where feasible to connect the path from White House Pool to Inverness Park near the Gradjanski property.

Restoration Alternative A

- *Hydrology and Geomorphology (0/-)*

Apart from the impacts associated with a bridge crossing over Lagunitas Creek at the former summer dam location, Trail Alignment 4a under Restoration Alternative A would not introduce or amplify impacts to hydrologic and geomorphic conditions over existing conditions within the Project Area. The erosional impacts associated with the bridge could be significantly minimized, and possibly eliminated, under this alternative by building a free-span bridge from the top of the Giacomini levee to the top of the southern bank. Such a bridge would minimize flow restrictions to the bank or channel⁷. However, the bridge and bridge footings would likely impede or impinge upon flood flows, especially if logs and other debris accumulate against the structure, leading to increased flood hazards along "Levee Road." Also, flood flow overtopping of the creek bank is likely to encourage erosion of the trail, particularly if paths are earthen or gravel, that will lead to more sediment deposition within the creek and/or the adjacent upland area and a higher potential for development of informal or "social" paths as people create new ways to avoid the muddy trail.

Perhaps, the biggest uncertainty associated with this structure is the potential for Lagunitas Creek to avulse or jump its current course upstream of the structure and either damage or eliminate access to the bridge. Since the 1860s, the creek has followed its current course from the Green Bridge to White House Pool. The reasons for the creek taking this course, which does not follow elevational gradient, are not entirely clear. However, construction of Levee Road (Sir Francis

⁷ The bridge location under this Trail Alternative is the only bridge location that is narrow enough to consider a free-span structure.

Drake) in the early 1900s and the Giacomini levees in the mid-1940's, as well as riprapping of the creek bank just downstream of the Green Bridge, have certainly contributed to maintaining the current alignment. Therefore, it is possible that removal of existing levees might encourage the creek to avulse or jump out of its current course during some future storm event. While avulsion in and of itself would not be an impact to the restoration project, bank stabilization measures incorporated into bridge footings and the footings themselves would impinge upon the Project purpose of restoring natural hydrologic processes. The riprapped bank just upstream of the bridge alignment remains under Restoration Alternative A.

Also, this Trail Alternative would require construction of a cantilevered section of trail at White House Pool that may or may not have some hydrologic and/or geomorphic impacts associated with it. In addition, there appears to be at least four sections of the trail that might require cantilevering or possible extension of the road berm to accommodate a 4-, 6-, or 8-foot trail with a 4-foot pedestrian barrier. It is likely that this trail would flood to some degree during larger storm events due to flood overtopping of Sir Francis Drake Boulevard by small drainages coming off the Inverness Ridge.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

Most of this trail alignment would be constructed along existing berms or trails, thereby decreasing the amount of impact to existing potential jurisdictional Corps' wetlands, waters, and riparian areas. For the section between Point Reyes Station and the Lagunitas Creek bridge, impacts to biological resources would be similar to Trail Alternative 1b, Restoration Alternative A, although the degree of impact may increase slightly due to increased use of this trail, which has greater connectivity than Trail Alternative 1b. Most of the impacts to potential jurisdictional wetlands and waters would be associated with construction of the Lagunitas Creek bridge. The degree of impact from fill associated with footings cannot be determined at this time.

Some riparian habitat potentially subject to CCC oversight would need to be removed on the southern bank of Lagunitas Creek at the bridge and along portions of Sir Francis Drake Boulevard where the road berm would need to be extended (or a cantilevered section constructed) to accommodate a 4-, 6-, or 8-foot trail. Impacts to riparian habitat for a 4-, 6-, or 8-foot trail would range from approximately 0.057 acre to 0.160 acre. Routing a trail along Sir Francis Drake Boulevard would cause some disturbance to species such as saltmarsh common yellowthroat and other avian species that use the roadside riparian habitat, however, it is expected to be relatively minor considering the existing disturbance from traffic along this important thoroughfare.

Restoration Alternative C

- *Hydrology and Geomorphology (0/-)*

The impacts of the Lagunitas Creek bridge crossing on hydrology and geomorphology would be very similar as described for Trail Alignment 4a under Restoration Alternative A. However, under Restoration Alternative C, riprapping of the northern Lagunitas Creek bank just downstream of the Green Bridge would be removed. This might increase the potential for channel avulsion or migration and possibly damage or remove access to any bridge structure

placed at the old summer dam location. Under the NPS proposal, it does not intend to try and prevent channel avulsion by conducting any bank stabilization upstream of the bridge structure other than directly adjacent to the bridge itself. Installation of bank stabilization or other measures to prevent the creek from avulsing would impinge upon the Project purpose of restoring natural hydrologic processes. By minimizing these measures, impacts to hydrologic and geomorphic resources would remain relatively low.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

Impacts to biological resources would be similar to those described for Restoration Alternative A, with a few exceptions. As described under Trail Alternative 1b for Restoration Alternative C, it is possible that informal social paths would be created in the native grassland revegetation area, thereby decreasing success of revegetation efforts and the value of these areas to wildlife species. These informal paths could increase the likelihood of spread of non-native, invasive species that would jeopardize the success of revegetation efforts. Impacts to future riparian and native grassland habitats would be mitigated by relocating the trail northward, outside the proposed riparian vegetation zone, while maintaining a buffer of at least 40 meters between the trail and grassland/high tide refugia near the southern edge of the restored tidal marsh.

Trail Alignment 4b

This alignment provides for the creation of a multiple use path between Inverness Park and Point Reyes Station at the southern perimeter of the Project Area in a manner similar to Trail Alignment 4a. This alignment was developed based on input received during public scoping in 2002 and was the public access component that was incorporated into the preliminary restoration concepts introduced to the public during scoping in 2004. Unlike Trail Alignment 4a, the connection between White House Pool and Inverness Park would be made by constructing an elevated boardwalk through the West Pasture to Sir Francis Drake Boulevard just south of the Gradjanski property.

Restoration Alternative A

- *Hydrology and Geomorphology (-)*

The impacts of this Trail Alternative on hydrology and geomorphology would be the same as described for Trail Alternative 4a under Restoration Alternative A, except for the northernmost portion of the trail in the West Pasture. The proposed elevated boardwalk in the West Pasture connecting to Inverness Park would cause additional impacts to existing hydrologic conditions in the diked pasture due to delayed floodplain drainage and accelerated sedimentation. If sediment and/or debris accumulate under the boardwalk, these materials are likely to locally reduce water movement across the marshplain and impede drainage from adjacent upstream areas. Depending on the height of the boardwalk, it is possible that there might be localized flooding within the West Pasture during larger storm events due to the large amount of ponding present from drainages, seeps, and runoff.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (-)*

Impacts to biological resources would be very similar to Trail Alignment 4a, except for the boardwalk section. Impacts to potential CCC jurisdictional riparian habitat from construction of a 4-, 6-, or 8-foot trail would be lower, ranging from less than 0.001 to 0.008 acre. However, indirect impacts to existing potential jurisdictional CCC wetlands would be greater, with the boardwalk trail crossing through anywhere from 0.16 to 0.33 acre of wetlands. The trail through the West Pasture would be constructed as a boardwalk, rather than a berm. The amount of direct impact associated with fill from footings for the bridge and pilings for the boardwalk cannot be definitively specified at this time. Routing the trail through the pasture rather than along Sir Francis Drake Boulevard would increase disturbance to wildlife species that currently use the freshwater marsh and wet meadow habitats, including waterfowl that have been observed in great numbers in ponded areas during the winter. It could also increase the potential for invasion by non-native plant species that could jeopardize restoration efforts.

Restoration Alternative C

- *Hydrology and Geomorphology (0/-)*

The impacts of this trail alignment on hydrology and geomorphology would be very similar to those described under Restoration Alternative A, with the exception that the West Pasture levee would be removed. Because this area would probably continue to be more heavily influenced by groundwater flow from the Inverness Ridge than by tidal flow, removal of the levee would not appreciably change the level of hydrologic or geomorphic impact.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (-)*

Impacts to biological resources would be the same as described under Restoration Alternative A, because removal of the West Pasture levee is not anticipated to change habitats in this portion of the Project Area.

Trail Alignment 4c

This alignment would extend the multiple use path from the Gradjanski property along the shoulder of Sir Francis Drake Boulevard to just north of Drakes View Drive. It was developed based on input received from the public during scoping. It would be combined either with Trail Alignment 4a or 4b. If feasible, a pedestrian barrier would be constructed to increase safety for trail users: this study assumes the presence of a 4-foot buffer between road and path that would include a pedestrian barrier.

Based on preliminary analyses, there are at least four (4) extended sections along Sir Francis Drake Boulevard where the path would need to be widened to accommodate a 4-, 6-, or 8-foot trail through expansion of the road berm, creation of a cantilevered section of trail, or other

method. At one of these narrow areas, the trail would need to be rerouted around the Kostelic and Lucchesi residences through construction of a boardwalk and a small bridge over the 1906 drainage. Also, the extent of freshwater marsh restoration just north of the Lucchesi residence called for in Restoration Alternatives B-D may need to be scaled back to some degree.

Restoration Alternative A

- *Hydrology and Geomorphology (-)*

Continuation of a trail along Sir Francis Drake Boulevard to Drakes View Drive would have the potential to have an impact on hydrology or geomorphology if 1) the roadside berm were extended into groundwater seep areas or 2) if the trail were routed around the Kostelic and Lucchesi residences with a small bridge/boardwalk over the 1906 drainage. There appear to be at least four (4) very narrow sections of the roadside berm that might require construction of a cantilevered section of trail or possible extensions of the Sir Francis Drake Road berm into areas influenced by groundwater seeps and small drainages. It is likely that this trail would flood during larger storm events due to historic flood overtopping of Sir Francis Drake Boulevard by Fish Hatchery Creek and the 1906 drainage. More significant impacts might occur from the boardwalk and/or berm constructed around the Kostelic and Lucchesi residences, should outflows become clogged with sediment and debris, increasing the potential for flooding of these properties. Trail construction over these drainages will require aggressive sediment management efforts to prevent sediment accumulations from increasing flood hazards on adjacent properties.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

This trail alignment would be constructed along an existing roadside berm, thereby decreasing the amount of impact to existing potential jurisdictional Corps' and CCC wetlands and riparian habitat. Most of the impacts to potential jurisdictional wetlands would be associated with any cantilevering or expansion of the berm necessary to accommodate a 4-, 6-, or 8-foot trail with a 4-foot buffer/pedestrian barrier. Impacts to potential jurisdictional riparian habitat for a 4-, 6-, or 8-foot trail would range from approximately 0.003 acre to 0.020 acre.

Routing a trail along Sir Francis Drake Boulevard would cause some disturbance to breeding birds such as saltmarsh common yellowthroat and other avian species that use the roadside riparian habitat (e.g., black-crowned night heron). Due to the proximity of the undiked marsh north of Giacomini Ranch, the roadside riparian habitat may have slightly higher value for birds than the riparian section south of Inverness Park. In addition, California red-legged frog is believed to possibly use this riparian habitat during the summer after breeding and metamorphosis is completed. However, the level of disturbance is expected to be relatively minor considering the existing disturbance from traffic along this main county thoroughfare. Also, under Restoration Alternative A, the West Pasture is not restored, thereby decreasing the value of this area and the level of impact for wildlife.

Restoration Alternative C

- *Hydrology and Geomorphology (-)*

Impacts to hydrology and geomorphology would be the same as described for Trail Alignment 4c under Restoration Alternative A. No other impacts are expected.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (-)*

Impacts to biological resources would be the same as described for Trail Alignment 4c under Restoration Alternative A, with a couple of exceptions. Routing the path alongside the expanded portion of the Freshwater Marsh just south of the Lucchesi residence could decrease the value of this marsh for red-legged frog, one of the target species. Also, under Restoration Alternative C, the West Pasture would be restored, which would increase the potential and value of this area for wildlife and increase any impact associated with increased traffic along Sir Francis Drake Boulevard.

Trail Alignment 4d

This alignment would realign the path from Point Reyes Station to Inverness Park by routing access along the Green Bridge and then on the southern edge of Levee Road to White House Pool Park. From there, it would follow one of the proposed Inverness Park alignments described under Trail Alignment 4a or 4b and then possibly connect to Trail Alignment 4c. The pedestrian/bike access capability of the Green Bridge might need to be improved. Currently, pedestrians and bicyclists are routed along a narrow section of bridge on the southern side that is physically separated from the bridge roadway. If feasible, a pedestrian barrier might be constructed on Levee Road to increase safety for trail users: this study assumes the presence of a 4-foot buffer between road and path that would include a pedestrian barrier.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

Routing a trail along the existing Green Bridge and on the southern side of Levee Road would have no to very little effect on hydrology and geomorphology, because there would be practically no new infrastructure created within streams or marshes. There is potential for some impact if the trail along Levee Road were extended into marshy or wet areas through construction of a cantilevered section of trail or possible extensions of the Levee Road berm. It is likely that this trail would flood during larger storm events due to historic flood overtopping of Levee Road by Olema, Bear Valley, and Lagunitas creeks. While the potential for flooding by Lagunitas Creek might be reduced by implementation of the restoration project, the trail would likely continue to be flooded by high water flows from Olema and possibly Bear Valley creeks during larger storm events.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

This trail alignment would be constructed along an existing bridge and roadside berm, thereby decreasing the amount of impact to existing potential jurisdictional Corps' and CCC wetlands and riparian habitat. Most of the impacts to potential jurisdictional wetlands would be associated with any cantilevering or expansion of the berm necessary to accommodate a 4-, 6-, or 8-foot trail with a 4-foot buffer/pedestrian barrier. Impacts to potential jurisdictional riparian habitat for a 4-, 6-, or 8-foot trail would probably total less than 0.001 acre.

Routing a trail by the riparian habitat near the Green Bridge and along Levee Road would cause some disturbance to breeding birds such as saltmarsh common yellowthroat and other avian species that use the roadside riparian habitat (e.g., black-crowned night heron) along Olema and Bear Valley Creeks and in Olema Marsh. One of the largest populations of saltmarsh common yellowthroat in the San Francisco Bay area region occurs in the southern portion of Tomales Bay, and its numbers are very high in Olema Marsh. California red-legged frog has also been documented in Olema Marsh, although the size of the population is unknown (G. Fellers, *pers. comm.*). Bear Valley Creek, which flows through Olema Marsh, supports some *Oncorhynchus mykiss* individuals, which may potentially be remnants of historic steelhead populations. Despite this, the level of disturbance is expected to be relatively minor considering the existing disturbance from traffic along this heavily used road. Under Restoration Alternative A, there would be no restoration of Olema Marsh and its hydrologic connection with Lagunitas Creek.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrology and geomorphology would be very similar to those described for Trail Alignment 4d under Restoration Alternative A. Under Restoration Alternative C, the connection between Bear Valley and Lagunitas Creeks would be expanded with construction of a 25-foot causeway. It is expected, however, that the trail would either cross over to the White House Pool Park before reaching Bear Valley Creek and would then cross the creek on an expanded section of the causeway north of Levee Road. If it crossed over after Bear Valley Creek, it would be routed along an expanded section of the causeway south of Levee Road.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0)*

Impacts to biological resources would be the same as described for Trail Alignment 4d under Restoration Alternative A.

Trail Alignment 4e

This alignment would realign the path from Point Reyes Station to Inverness Park by routing access along the Green Bridge and then on the northern edge of Levee Road to White House Pool Park. From there, it would follow one of the proposed Inverness Park alignments described under Trail Alignment 4a or 4b and then possibly connect to Trail Alignment 4c. The pedestrian/bike access capability of the Green Bridge might need to be improved. Currently, pedestrians and bicyclists are routed along a narrow section of bridge on the southern side that is physically

separated from the bridge roadway. If feasible, a pedestrian barrier might be constructed on Levee Road to increase safety for trail users: this study assumes the presence of a 4-foot buffer between road and path that would include a pedestrian barrier.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

Routing a trail along the existing Green Bridge and on the northern side of Levee Road would have no to very little effect on hydrology and geomorphology, because there would be practically no new infrastructure created within streams or marshes. There is potential for some impact if the trail along Levee Road were extended into marshy or wet areas through construction of a cantilevered section of trail or possible extensions of the Levee Road berm. It is likely that this trail would flood during larger storm events due to historic flood overtopping of Levee Road by Olema, Bear Valley, and Lagunitas creeks. While the potential for flooding by Lagunitas Creek might be reduced by implementation of the restoration project, the trail would likely continue to be flooded by high water flows from Olema and possibly Bear Valley creeks during larger storm events.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (+/0)*

This trail alignment would be constructed along an existing bridge and roadside berm, thereby decreasing the amount of impact to existing potential jurisdictional Corps' and CCC wetlands and riparian habitat. Most of the impacts to potential jurisdictional wetlands would be associated with any cantilevering or expansion of the berm necessary to accommodate a 4-, 6-, or 8-foot trail with a 4-foot buffer/pedestrian barrier. There would be probably be no to very little impact (<0.001 acre) to potential jurisdictional riparian habitat for a 4-, 6-, or 8-foot trail. Most of the vegetation that could potentially be disturbed would consist of ornamental and ruderal species.

Routing a trail by the riparian habitat near the Green Bridge and along Levee Road might cause some disturbance to breeding birds such as saltmarsh common yellowthroat and other avian species that use the roadside riparian habitat (e.g., black-crowned night heron) along Lagunitas Creek. Despite this, the level of disturbance is expected to be relatively minor considering the existing disturbance from traffic along this heavily used road.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrology and geomorphology would be very similar to those described for Trail Alignment 4e under Restoration Alternative A. Under Restoration Alternative C, the connection between Bear Valley and Lagunitas Creeks would be expanded with construction of a 25-foot causeway. The trail would cross Bear Valley Creek on an expanded section of the causeway north of Levee Road.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Trail Alignment 4e under Restoration Alternative A.

Viewing Platform/Elevated Overlook Location 1

This potential public access component would involve creation of a slightly elevated viewing platform and interpretative exhibit at the existing entrance to Trail Alignment 1a, one of the existing social paths. It may be designed as a blind to minimize disturbance to wildlife. Depending on date of construction, some riparian habitat may need to be removed to enable construction. Currently, a relatively large unvegetated opening exists, because of construction access needs associated with repair of the West Pasture levee and tidegate on Fish Hatchery Creek. This viewing platform would enable visitors to view the existing undiked tidal marsh to the north and the northern end of the West Pasture. However, it might preclude Trail Alignments 1a, 2a, and 2b unless the facility was sited slightly north or south of the current entrance: if so, more riparian vegetation would have to be removed in order to accommodate the structure and the trail.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

Constructing a viewing platform at the existing entrance to Trail Alignment 1a would have no to very little effect on hydrology and geomorphology. The platform would be constructed on the existing upland berm, and it is unlikely that Fish Hatchery Creek would change course in this area and cause erosion of the berm, unless large portions of the riparian vegetation were removed.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0/-)*

Impacts to biological resources from this facility would be low to moderate depending on a number of factors. This viewing platform would be constructed along an existing roadside berm. Due to recent levee/tidegate repairs, a relatively large unvegetated opening already exists at the entrance to Trail Alignment 1a. However, should this facility be combined with Trail Alignment 1a, 2a, or 2b, more riparian vegetation would need to be removed, thereby increasing impacts to sensitive vegetation communities. The riparian habitat along this section of Sir Francis Drake Boulevard supports breeding birds, as well as roosting black-crowned night herons (ARA 2002). In addition, a burrow for southwestern river otters has been observed on the Fish Hatchery creek bank immediately adjacent to the tidegate. Creation of a viewing platform has the potential to increase disturbance to these special status species, as well as common species that use this riparian habitat.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrology and geomorphology would be very similar to those described for Viewing Platform/Elevated Overlook Location 1 under Restoration Alternative A. Under Restoration Alternative C, the West Pasture north levee and tidegate on Fish Hatchery Creek would be removed, and the creek would be freer to move or migrate across the marsh plain, but this is not expected to have any large impact on siting of a viewing platform in this area.

- *Cultural Resources (+)*

No foreseeable impacts to cultural resources.

- *Biological Resources (0/-)*

Impacts to biological resources would be the same as described for Viewing Platform/Elevated Overlook Location 1 under Restoration Alternative A.

Viewing Platform/Elevated Overlook Location 2

This potential public access component would involve creation of an elevated overlook and interpretative exhibit at White House Pool County Park (Figure 2). It would be located generally north of the County Park parking lot near an existing bridge that is often used by Park visitors for bird-watching. It may be designed as a blind to minimize disturbance to wildlife. It would be developed with full approval of and cooperation with the land owners, Wildlife Conservation Board, and the lessees, County Parks. This elevated overlook would enable visitors to view the restored marsh and uplands in the Giacomini East Pasture and birds and other species using the southern portion of Lagunitas Creek within the Project Area.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

Constructing a viewing platform at the White House Pool County Park would have no to very little effect on hydrology and geomorphology. The platform would be constructed on the existing upland berm, and it is unlikely that Lagunitas Creek would change course in this area and cause erosion of the berm. This section of park occurs along a straight or “run” section of Lagunitas Creek.

- *Cultural Resources (0)*

Potential impacts to cultural resources in this area would appear minimal. No known surveys exist that have evaluated the potential for archaeological resources in this area. However, it is unlikely that construction of an elevated overlook would disturb any cultural resources due to the fact that this area has been filled extensively since the 1900s. If the NPS proposes to locate a facility in this area, a survey should be conducted and/or construction should be monitored by a qualified archaeologist for the purpose of identifying buried or currently concealed cultural resources. If cultural resources are identified, they would be evaluated for their potential eligibility to the National Register.

- *Biological Resources (+/0)*

Impacts to biological resources from this facility would be minimal. This viewing platform would be constructed along an existing creek berm that has been filled historically. Due to historic disturbance, it is likely that the elevated overlook could be constructed without impacting wetlands or riparian vegetation. Large portions of the creek bank in this area do not support riparian vegetation. Wildlife surveys did not identify presence of any special status species in this general area (ARA 2002). Creation of a viewing platform does have the potential to increase disturbance to special status and wildlife species that might start using Lagunitas Creek and/or the enhanced riparian zone that would be created on the northern bank of Lagunitas Creek in the White House Pool area. It is possible that the elevated overlook would be designed somewhat as a blind to decrease disturbance to wildlife species.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrology and geomorphology would be the same as described for Viewing Platform/Elevated Overlook Location 2 under Restoration Alternative A.

- *Cultural Resources (0)*

Impacts or the potential for impacts would be the same as described for Viewing Platform/Elevated Overlook Location 2 under Restoration Alternative A.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Viewing Platform/Elevated Overlook Location 2 under Restoration Alternative A.

Viewing Platform/Elevated Overlook Location 3

This potential public access component would involve creation of a viewing area and interpretative exhibit at the existing Giacomini dairy facility (Figure 2). The westernmost portion of the dairy facility, which is located adjacent to the town of Point Reyes Station on the Point Reyes Mesa, will be owned by the NPS after the rest of the lands come under its full ownership and management in 2007. It would be accessed by an easement that the NPS would retain that would lead from C Street to its lands. Currently, this area contains the Old Calf Barn, along with some manure ponds, which the NPS proposes to remove. This facility would enable visitors to view the restored marsh and uplands in the Giacomini East Pasture and birds and other species using the southern portion of Lagunitas Creek within the Project Area. Because it would be located on the top of the Mesa, it would provide a broader view of the restored Project Area than some of the other potential facilities such as Viewing Platform/Elevated Overlook Locations 1 and 2.

Restoration Alternative A

- *Hydrology and Geomorphology (+)*

Constructing a viewing platform at the White House Pool County Park would have no effect on hydrology and geomorphology. The platform would be constructed on the Mesa, where the Old

Calf Barn and manure ponds are currently located. There does appear to be some seep flow that occurs along the edge of this portion of the Mesa, but construction of this type of infrastructure should not impact any groundwater processes.

- *Cultural Resources (0)*

Potential impacts to cultural resources in this area would appear minimal due to the nature of the proposed activity. While surveys for the presence of cultural resources within the dairy facility area have not been completed, it is unlikely that construction of a viewing area and interpretative exhibit would disturb any historic or archaeological resources. Should the Old Calf Barn qualify potentially for historic listing, the NPS would attempt to avoid or minimize impacts to this structure. If the NPS proposes to locate a facility in this area, construction activities may be monitored by a qualified archaeologist for the purpose of identifying buried or currently concealed cultural resources. If cultural resources are identified, they would be evaluated for their potential eligibility to the National Register.

- *Biological Resources (+/0)*

Construction of this facility would have minimal to no effect on existing or future biological resources. This viewing area would be constructed on the Point Reyes Mesa in the existing dairy facility where the Old Calf Barn and manure ponds are located. There would appear to be no impacts to riparian vegetation or to potential jurisdictional wetlands. Wildlife use of this area is limited to species that are often found in ruderal or heavily disturbed areas such as blackbirds, crows, and even the occasional red fox (ARA 2002). Large flocks of tricolored blackbirds (*Agelaius tricolor*; FSC) have been observed in the fall-winter near the Giacomini's feed lots in the town of Point Reyes Station (ARA 2002). Restoration of the "lowlands" below is not expected to substantially change use patterns by wildlife due to the fact that this area is located next to town and that there is a possibility that some of the adjacent parcels that were retained by the Giacomini's might be developed in the future.

Restoration Alternative C

- *Hydrology and Geomorphology (+)*

Impacts to hydrology and geomorphology would be the same as described for Viewing Platform/Elevated Overlook Location 3 under Restoration Alternative A.

- *Cultural Resources (0)*

Impacts or the potential for impacts would be the same as described for Viewing Platform/Elevated Overlook Location 3 under Restoration Alternative A.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Viewing Platform/Elevated Overlook Location 3 under Restoration Alternative A.

Viewing Platform/Elevated Overlook Location 4

This potential public access component would involve creation of a viewing platform and interpretative exhibit near the Giacomini Hunt Shack at the end of Trail Alignment 2d (Figure 2).

The facility would be constructed on lands owned by the NPS. However, as a condition of the property sale in 2000, the Giacomini retained a 25-year reservation of use agreement on the Hunt Shack. Any siting of a facility in this area would need to ensure that the Giacomini were able to access the Hunt Shack for the duration of this reservation of use agreement. Currently, this area is used for storage of agricultural equipment and is largely vegetated with ruderal or weedy plant species. This facility would enable visitors to view the restored marsh and uplands in the central portion of the Giacomini East Pasture. Because it would be located on the top of the historic railroad grade berm, it would provide a slightly broader view of the restored Project Area than some of the other potential facilities such as Viewing Platform/Elevated Overlook Locations 1 and 2, but not as broad a view as Viewing Platform/Elevated Overlook Location 3.

Restoration Alternative A

- *Hydrology and Geomorphology (+/0)*

Constructing a viewing platform near the Giacomini Hunt Shack on the historic railroad grade would have no effect on hydrology and geomorphology. Any potential impacts to public access infrastructure from hydrogeomorphic processes associated with Tomasini Creek would be the same as those described for Trail Alignment 2d under Restoration Alternative A. It is possible that overbank flow from Tomasini Creek that occurs during large storm events could create debris and sediment accumulation around the base of the structure that would occasionally need to be cleared out. There may also be the potential for some minor damages to the structure associated with flooding, but the structure itself should not impinge hydrogeomorphic processes.

- *Cultural Resources (+/0)*

Potential impacts to cultural resources in this area, namely the historic railroad grade, would be the same as described for Trail Alignment 2a under Restoration Alternative A.

- *Biological Resources (+/0)*

Construction of this facility would have minimal to no effect on existing or future biological resources. The viewing platform would be constructed on the historic railroad grade near the Giacomini Hunt Shack. There would be no impacts to riparian vegetation and only potentially very minor impacts to potential jurisdictional tidal wetlands (<<0.001 acre). With the exception of the tidewater goby, no other special status wildlife or plant species have been specifically documented in the vicinity of the Giacomini Hunt Shack, nor is extensively used by common wildlife species (ARA 2002). Tidewater goby individuals have consistently been recovered from Tomasini Creek near the Giacomini Hunt Shack, although this population appears to use a large portion of the creek within the Project Area. Impacts to tidewater goby would not be expected to increase with siting of a viewing platform here unless the structure increased sedimentation.

Restoration Alternative C

- *Hydrology and Geomorphology (+/0)*

Impacts to hydrology and geomorphology would be the same as described for Viewing Platform/Elevated Overlook Location 4 under Restoration Alternative A.

- *Cultural Resources (+/0)*

Impacts or the potential for impacts would be the same as described for Viewing Platform/Elevated Overlook Location 4 under Restoration Alternative A.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Viewing Platform/Elevated Overlook Location 4 under Restoration Alternative A.

Viewing Platform/Elevated Overlook Location 5

This potential public access component would involve creation of a viewing area and interpretative exhibit near the end of the Tomales Bay Trail at the top of Railroad Point hilltop (Figure 2). The facility would be constructed on lands owned by the NPS and leased to the Martinelli family. Any siting of a facility in this area would need to ensure that terms of the lease agreement are not violated. Currently, this area is grassland that is used for grazing of beef cattle. Despite this, the vegetation community supports a fairly high percentage of plant species that are native to California grasslands. California's grasslands have been severely impacted by the introduction and spread of non-native plant species, particularly grasses, that thrive in areas with high disturbance. This facility would enable visitors to view the restored marsh and uplands in the northern portion of the Project Area, as well as the historic marsh in southern Tomales Bay. Of all the proposed viewing platforms or elevated overlook facilities, it would provide the broadest overview of the restored Project Area and Tomales Bay, although visitors seeking to bird watch would probably move down the trail closer to the Bay.

Restoration Alternative A

- *Hydrology and Geomorphology (+)*

Constructing a viewing area on the hilltop of Railroad Point would have no to very minimal effect on hydrology and geomorphology. There is a very small potential for increased erosion of the hill slopes from construction of the facility, but it would not be located near any drainages, creeks, or seeps/springs.

- *Cultural Resources (+/0)*

Potential impacts to cultural resources in this area would appear minimal due to the nature of the proposed activity. While surveys for the presence of cultural resources within this area of the park have probably not been completed, it is unlikely that construction of a viewing area and interpretative exhibit would disturb any historic or archaeological resources. If the NPS proposes to locate a facility in this area, surveys may be conducted, and/or construction activities may be monitored by a qualified archaeologist for the purpose of identifying buried or currently concealed cultural resources. If cultural resources are identified, they would be evaluated for their potential eligibility to the National Register.

- *Biological Resources (+/0)*

Construction of this facility would have minimal to no effect on existing or future biological resources. The viewing platform would be constructed in grassland on the Railroad Point hilltop. There would be no impacts to riparian vegetation or potential jurisdictional wetlands. During

project planning, one of the critical resource objectives identified focused on enhancing areas appropriate for breeding of northwestern pond turtles. The south-facing exposure of this hillslope immediately below the proposed facility was identified as an area that could be enhanced for pond turtle breeding. However, there is no evidence that pond turtles currently use this area for breeding or other activities.

Restoration Alternative C

- *Hydrology and Geomorphology (+)*

Impacts to hydrology and geomorphology would be the same as described for Viewing Platform/Elevated Overlook Location 5 under Restoration Alternative A.

- *Cultural Resources (+/0)*

Impacts or the potential for impacts would be the same as described for Viewing Platform/Elevated Overlook Location 5 under Restoration Alternative A.

- *Biological Resources (+/0)*

Impacts to biological resources would be the same as described for Viewing Platform/Elevated Overlook Location 5 under Restoration Alternative A.

CONCLUSIONS

The technical evaluation indicated substantial differences among the potential trail alignments in terms of their impacts on hydrologic and geomorphic processes and cultural and biological resources of the existing Giacomini Ranch and future restored marsh. Differences in resource impacts between viewing platforms/elevated overlooks were considerably more minor. Tables 1 and 2 summarize impacts associated with each potential trail alignment and viewing platform/elevated overlook locations for both Restoration Alternative A and C. Included are potential impacts to riparian habitat associated with these public access components. These impacts are typically direct ones associated with removal of riparian vegetation for trail or facility creation, expansion, etc. While several of the trail alignments would cause impacts to existing potential jurisdictional Corps' and CCC wetlands and waters, these acreages are not included in the table, but are discussed in the impact sections. Accurate estimates of direct and indirect wetland impacts cannot be made without a better idea of how the trail or facility would be designed, routed, etc.

To rate the overall environmental impacts of each trail alignment or public access facility, qualitative rankings of impacts to hydrology and geomorphology and biological resources were converted to a numerical score (e.g., + = 0, 0 = 1, - = 2, -- = 3, and --- = 4). Impacts with combined rankings such as +/- were averaged (e.g., +/- = 0.5). These rankings were then summed on a scale of 0-8 and expressed as No Impact, Low, Moderate, High, or Very High based on a summed total of 0 = No Impact; 1-2 = Low, 3-4 = Moderate, and 5-6 = High. Impacts to cultural resources were not included in the totals, because almost all of the trail alignments and facilities would have either no impact or a very small potential for an impact on cultural resources.

In terms of overall impacts, the results indicated that:

- Trail alignments with Low Impacts were Trail Alignments 1a (Restoration Alternative A only), 1b, 2d, 2e, 4a, 4d, and 4e for both restoration alternatives.
- Trail alignments with Moderate Impacts were Trail Alignments 2c, 4b, and 4c for both restoration alternatives.
- Trail alignments with High Impacts were 1a (Restoration Alternative C only) and 3 (Restoration Alternative A only).
- Trail alignments with Very High Impacts were Trail Alignments 2a, 2b, and 3 (Restoration Alternative C only).
- All of the Viewing platforms/Elevated overlooks Locations were rated as having potentially Low Impacts. This suggests that this type of "point" public access may have the least impact on resources.

Based on these results, Trail Alignments 1a (Restoration Alternative A), 2c, 2d, 2e, 4a, 4b, 4c, 4d, and 4e have Low to Moderate environmental impacts and would be the best alignments for possible inclusion in the restoration project. In addition, all of the potential platform/overlook locations have Low environmental impacts. Based on this analysis, it is recommended that these alignments and platform/overlook locations be carried forward for more detailed technical analysis of feasibility before determining which of these are appropriate for incorporation in Restoration Alternatives.

TABLE 1. Summary of impacts to hydrologic, cultural, and biological resources and overall impacts associated with potential trail alignments under Restoration Alternatives A and C.

Trail Alignment	Rest Alt	Hydrologic Resources	Rating	Cultural Resources	Biological Resources	Rating	Potential Riparian Impacts (acres)	Summed Score	Overall Impact Rating
1a	A	+	0	+	0/-	1.5		1.5	LOW
	C	-	2.0	+	-/--	2.5		4.5	MOD-HIGH
1b	A	+	0	+	0	1.0		1.0	LOW
	C	+	0	+	0/-	1.5		1.5	LOW
2a	A	--/---	3.5	+0	---	4.0	0.28-0.59	7.5	VERY HIGH
	C	--/---	3.5	+0	---	4.0	0.28-0.59	7.5	VERY HIGH
2b	A	---	4.0	+	--	3.0		7.0	VERY HIGH
	C	---	4.0	+	--	3.0		7.0	VERY HIGH
2c	A	0	1.0	+0	--	3.0	0.28-0.59	4.0	MOD
	C	0	1.0	+0	--	3.0	0.28-0.59	4.0	MOD
2d	A	+0	0.5	+0	+0	0.5		1.0	LOW
	C	+0	0.5	+0	+0	0.5		1.0	LOW
2e	A	0	1.0	+0	0	1.0		2.0	LOW
	C	0	1.0	+0	0	1.0		2.0	LOW
3	A	--/---	3.5	+	--	3.0	≤0.007	6.5	HIGH
	C	---	4.0	+	---	4.0	≤0.007	8.0	VERY HIGH
4a	A	0/-	1.5	+	0	1.0	≤0.16	2.5	LOW-MOD
	C	0/-	1.5	+	0	1.0	≤0.16	2.5	LOW-MOD
4b	A	-	2.0	+	-	2.0	≤0.01	4.0	MOD
	C	-	2.0	+	-	2.0	≤0.01	4.0	MOD
4c	A	-	2.0	+	0	1.0	≤0.02	3.0	MOD
	C	-	2.0	+	-	2.0	≤0.02	4.0	MOD
4d	A	+0	0.5	+	0	1	≤0.001	1.5	LOW
	C	+0	0.5	+	0	1	≤0.001	1.5	LOW
4e	A	+0	0.5	+	+0	0.5	≤0.001	1.0	LOW
	C	+0	0.5	+	+0	0.5	≤0.001	1.0	LOW

Impact Rating System:

+ = 0
 0 = 1
 - = 2
 -- = 3
 --- = 4

Overall Impact Rating System:

0 = NO
 1-2 = LOW
 3-4 = MOD
 5-6 = HIGH
 7-8 = VERY HIGH

TABLE 2 Summary of impacts to hydrologic, cultural, and biological resources and overall impacts associated with potential viewing platforms/elevated overlooks under Restoration Alternatives A and C.

Platform/ Overlook	Rest Alt	Hydrologic Resources	Rating	Cultural Resources	Biological Resources	Rating	Potential Riparian Impacts (acres)	Summed Score	Overall Impact Rating
1	A	+0	0.5	+	0/-	1.5		2.0	LOW
	C	+0	0.5	+	0/-	1.5		2.0	LOW
2	A	+0	0.5	0	+0	0.5		1.0	LOW
	C	+0	0.5	0	+0	0.5		1.0	LOW
3	A	+	0.0	0	+0	0.5		0.5	LOW
	C	+	0.0	0	+0	0.5		0.5	LOW
4	A	+0	0.5	+0	+0	0.5		1.0	LOW
	C	+0	0.5	+0	+0	0.5		1.0	LOW
5	A	+	0.0	+0	+0	0.5		0.5	LOW
	C	+	0.0	+0	+0	0.5		0.5	LOW

Impact Rating System:

+ = 0
 0 = 1
 - = 2
 -- = 3
 --- = 4

Overall Impact Rating System:

0 = NO
 1-2 = LOW
 3-4 = MOD
 5-6 = HIGH
 7-8 = VERY HIGH

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