APPENDIX C: GGNRA DOG MANAGEMENT PLAN/EIS DETERMINATION OF NON-IMPAIRMENT

In addition to determining the environmental consequences of implementing the preferred and other alternatives, NPS Management Policies 2006 (section 1.4) requires analysis of potential effects to determine whether or not the preferred alternative would impair a park's resources and values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park. That discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (NPS Management Policies 2006). Whether an impact meets this definition depends on the particular resources that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

Impairment may result from visitor activities, NPS administrative activities, or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the environmental impact statement for the preferred alternative. Impairment findings are not necessary for visitor experience, public health and safety, environmental justice, and park operations. These impact areas are not generally considered to be park resources or values according to the Organic Act, and cannot be impaired the same way that an action can impair park resources and values.

The park foundation statement, enabling legislation, and park significance statements were used as a basis for determining if the preferred alternative would cause impairment.

Foundation Statement Overview

The foundation statement contains the shared understanding of GGNRA's purpose, park significance, fundamental resources and values, primary interpretive themes, special mandates and the legal/policy requirements for administration and resource protection. The primary advantage of developing a foundation statement is the documented understanding of what is most important about the park, which provides the basis for future planning and decision-making.

The park's legislation is the basis for developing the foundation statement. Park managers and planners use the park's legislation and legislative history in order to understand why Congress created GGNRA. The foundation statement articulates the shared understanding of park managers in defining the park purpose, park significance, fundamental resources and values, primary interpretive themes, and special mandates.

The purpose of GGNRA is to offer national park experiences to a large and diverse urban population while preserving and interpreting its outstanding natural, historic, scenic, and recreational values.

The NPS Organic Act of 1916 states that units of the national park system are established "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for enjoyment of the same in such manner and by such means as to leave them unimpaired for the enjoyment of future generations." This statement represents the most basic mission of GGNRA.

Golden Gate National Recreation Area Enabling Legislation

GGNRA was established by Congress in 1972 (PL 92-589). The language of the enabling legislation states the park's purpose as follows: "In order to preserve for public use and enjoyment certain areas of Marin and San Francisco counties, California, possessing outstanding natural, historic, scenic, and recreational values and in order to provide for the maintenance of needed recreational open space necessary to urban environment and planning, the Golden Gate National Recreation Area is hereby established." The hearing records pertinent to the enabling legislation reveal that the future use of the park was the subject of considerable discussion. The nearby presence of several million people provided an unprecedented opportunity to make national park resources and programs available to a wide variety of visitors, many of whom had not been able or willing to access the more remote national parks. Based on the record, this "parks to the people" idea was clearly intended by Congress and the administration to be a major purpose of GGNRA (NPS 1980, 7).

The enabling legislation also requires that the park and its visitors "utilize the resources in a manner which will provide for recreation and education opportunities consistent with sound principles of land use planning and management," and that the recreation area be preserved "as far as possible in its natural setting" and protected from uses that would "destroy the scenic beauty and natural character of the area."

The enabling legislation recognized that heavy use could impair its "outstanding natural, historic, scenic, and recreational values," and reconfirmed the mandate of the Organic Act: "In the management of the recreation area, the Secretary of the Interior shall utilize the resources in a manner which will provide for recreation and educational opportunities consistent with sound principles of land use planning and management…the Secretary shall preserve the recreation area, as far as possible, in its natural setting, and protect it from development and uses which would destroy the scenic beauty and natural character of the area."

Golden Gate National Recreation Area Park Significance Statements

The founders of GGNRA intended to bring national park experiences to urban populations. The park's diverse and extensive collections of "outstanding natural, historic, scenic, and recreation values" not only fulfill this purpose, but represent an exceptional range of nationally important resources. Collectively, the value of these resources is enhanced, due to their proximity to the 7 million people residing in the San Francisco Bay area. The following are the seven park significant statements:

1. The convergence of the San Andreas Fault, San Francisco Bay at the Golden Gate, and the California coastline creates a dynamic landscape and environment of exceptional scientific value.
2. The undeveloped remnant coastline corridor of marine, estuarine, and terrestrial ecosystems supports native biodiversity and provides a refuge for one of the largest concentrations of rare, threatened, and endangered species in the national park system.
3. The park includes the largest and most complete collection of military installations and fortifications in the country, dating from Spanish settlement in 1776 through the 20th century. These installations served as command post for the Army in the Western United States and the Pacific. This long period of military presence has yielded one of the most extensive collections of historic architecture in the national park system.
4. Alcatraz Island is the site of pre-Civil War fortifications, served as the nation's first military prison, later became the most notorious maximum security penitentiary in the United States, and subsequently was the site of the occupation that helped ignite the movement for the American Indian self-determination.
5. The headlands of the Golden Gate and its scenic landscapes, vistas, and coastal environment are internationally recognized as the panoramic backdrop to the metropolitan San Francisco Bay area and contribute to the quality of life of the people who live in the region.
6. The continuum of park resources at the doorstep of the San Francisco Bay area provides an abundance of recreational and educational opportunities.
7. Parklands are within the traditional homelands of Coast Miwok and Ohlone people. They contain indigenous archeological sites with native heritage, historic, and scientific values.

NATURAL RESOURCE TOPICS

DESCRIPTION OF SOILS AND GEOLOGY AT GGNRA

The park's fundamental natural geologic systems and processes, and the resulting effects on people and the environment, link the park to the highly visible and geologic forces around the world. The park's geologic resources include faults, plate margins, and subduction zone; a diversity of rock types and deposits representing more than 100 million years of the earth's history; and complex geologic processes that continue to shape the landscape.

The San Andreas Fault, which extends most of the length of California, defines many of the major recognizable landforms in the park. Ancient marine and nearshore rocks scraped off the edge of the continent in the subduction zone form the unique geology of the Marin Headlands – a diversity of rock types including cherts, basalts, greenstones, and sandstones. Other coastal bluffs and headlands, from the Presidio to Land's End, and from Muir Beach to Stinson Beach formed from serpentine and mélange extruded from deeper within the subduction zones. More recent geologic history is exposed at Fort Funston and south where nearshore deposits of silts and sands were deposited in an environment of sea

level rise and fall and uplift. The sea cliffs at Fort Funston are easily eroded by wave action. Dunes are another geologic resource that provides unique habitat within the park.

The greatest threat to the geologic features within the park is excavation and accelerated erosion. Off-road vehicles, hang gliders, bicyclists, horses, dogs, hikers, and other visitors have created denuded areas with compacted soil. Compaction also inhibits infiltration, increasing runoff and erosion. Serpentine outcrops are generally unstable and very erodible. While natural serpentine erosion is important for this unique habitat, human activities such as trampling and grading in or near the outcrops accelerate the erosion and disrupt the fragile habitat.

Potential Impacts to Soil and Geology from Dog Walking

Dog walking activities would not create impacts to the fundamental natural geologic systems and processes, including faults, plate margins, and subduction zones; a diversity of rock types and deposits; and complex geologic processes that continue to shape the landscape. There would be no impact to the San Andreas Fault, the unique geology of the Marin Headlands, the coastal bluffs that formed from serpentine and mélange, and the sea cliffs along Fort Funston. To avoid impacts to the fundamental geologic resources, dog walking would be prohibited in areas where unique features occur.

In areas with soft, unstable soil, dog traffic can physically move the soil. The sandy coastal bluff faces and sand dunes at Fort Funston are an example of geologic resources that are very susceptible to disturbance. Where loose or mobile soils are present and dogs are not prohibited, the impacts are considered moderate, because the disturbance would be readily apparent, but not major because dunes are naturally highly dynamic systems and there are other factors also affecting the resource, such as human traffic, wind, and storm events. Impacts to the sand dunes would be minimized by requiring on-leash dog walking at some sites (Crissy Field, Baker Beach, and Ocean Beach) to prohibit dog walkers from entering the dunes. ROLAs at Baker Beach and Fort Funston would include a portion of the foredunes (Baker Beach) and coastal dunes (Fort Funston). Impacts would be minimized in these areas because the dunes have been previously disturbed and the ROLA would only be located within a portion of the site.

Dog traffic can compact the soil, which would kill vegetation and expose the soil to erosion by rainfall. Also, soil compaction can create subsurface barriers for water, nutrients, and microorganisms that result in changes to vegetation integrity. Soil compaction could be a problem along social trails that are established by dogs or where on-leash dog walking or dog walking under voice and sight control would limit dog traffic to the existing trail or road bed. At most sites, the area affected is relatively small compared to the total park area. Soil compaction also is impacted by multiple other sources, including human foot traffic, bicycles, and horses. The preferred alternative for each of the 21 sites allows on-leash dog walking within some portion of the site. Impacts to soils would range from negligible to long-term, minor, and adverse since dog walking would contribute to soil compaction. To minimize impacts to soils, dog walking would be allowed on trails where soils have been previously disturbed and no longer have a natural function or support vegetation. The physical restraint of dogs to a 6-foot leash would protect the natural soil function in areas outside of the trails, dunes, or other permitted dog walking areas. In the five areas where ROLAs are allowed (Oakwood Valley, Rodeo Beach, Crissy Field, Ocean Beach, and Fort Funston) there may be long-term, minor to moderate, adverse impacts to soils. The disturbance to soils within the ROLA could affect habitat quality; however, to minimize impacts, ROLAs would only include a portion of the site.

Dog waste contains nitrogen and phosphorus, which are nutrients required by plants for growth. However, because dogs are not considered natural species in the park habitats, dog waste would increase the amount of nutrients in the soil above natural levels. An increase in nutrients from dog excrement in concentrated areas could result in some areas becoming overfertilized and lead to changes in species, both soil

organisms and vegetation. Also, dog urine would increase the natural salinity of soil. At sites where natural habitat exists and dog waste is not routinely removed by dog owners, impacts would occur. Nutrient addition also occurs from other sources, including other animals natural to the habitat and atmospheric deposition. At sites where natural habitat is no longer present (paved areas, picnic grounds, lawns, and trails/roads), the natural soil function has been lost and compaction has already occurred. Nutrients may move with runoff from the compacted area into the adjacent habitat areas along the trails and any other developed areas adjacent to those habitat areas; however, these nutrients would be diluted with rainwater. At sites with serpentine soils, adding nutrients would change soil composition and eventually cause detrimental effects on sensitive plant species adapted to serpentine soils. Dog waste on beaches may add nutrients to the beach soil and digging on beaches may disturb the soil. An increase in salinity in the soil on beaches may kill some dune plant species, including the non-native European beachgrass (*Ammophila arenaria*). The preferred alternative for each site is expected to eliminate or greatly reduce dog waste and nutrient additions to the soil. It is assumed that leash control and/or voice and sight control would reduce dog waste and nutrient addition in comparison to current voice-control restrictions because owners would be in closer contact with their dogs and presumably would be more likely to comply with cleanup regulations.

It is expected that all new lands would be surveyed prior to designating an area either open or closed to dogs to determine if sensitive soils and/or geologic resources exist at the site. If open to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. To minimize impacts to soils, dog walking would be allowed in areas where soils have been previously disturbed and no longer have a natural function or support vegetation. The physical restraint of dogs to a 6-foot leash would protect the natural soil function in areas outside of the permitted dog walking areas. New lands would not allow ROLAs.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs, as well as monitoring for vegetation damage, all of which would indirectly benefit soils and geology. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to soils similar to dog walking; the enabling legislation foresees not only that these impacts would occur, but deems them appropriate when managed "consistent with sound principles of land use planning and management." The preferred alternative only allows dog walking in those areas where soils have been previously disturbed. Although impacts would occur, the amount of soils impacted would only occur within a small percentage of the park when considered as a whole. Fundamental resources such as the natural geologic systems and processes, including faults, plate margins, and subduction zones, a diversity of rock types and deposits, and complex geologic processes that continue to shape the landscape would not be impacted by dog walking activities. There would be no impact to the San Andreas Fault, the unique geology of the Marin Headlands, the coastal bluffs that formed from serpentine and mélange, and the sea cliffs along Fort Funston. Dog walking would not impact these resources since the preferred alternative would restrict dogs to existing trails and areas that are not of geological importance. Although expected impacts to soils and geology

from dog walking activities would occur, the preferred alternative would not rise to the level of impairment.

DESCRIPTION OF WATER RESOURCES AT GGNRA

GGNRAs water resources support coastal corridor ecosystems and these consist of groundwater sources (aquifers and springs); freshwater systems (streams, lakes, and ponds); coastal, estuarine, and marine water resources (the Pacific Ocean and San Francisco Bay); and other wetlands. The Mediterranean climate of the San Francisco Bay area includes wet winters and dry summers that shaped the life history and adaptations of the park's native species. Water resources are the lifeblood of the ecosystems of GGNRA.

The connected water resources are essential corridors for movement and sustainability of the park's aquatic animals and other wildlife. Streams support a variety of native plants and animals, including several threatened and endangered species. Most streams within the park are naturally dynamic and are characterized by highly variable winter flows and intermittent summer flows that significantly influence the riparian ecosystem.

Because of dry summer conditions, groundwater-fed seeps, springs, wetlands, and surface water systems are biological oases that support rare and endangered species and provide other important habitat.

The park's wetlands support complex food webs, housing a rich biodiversity of wetland-endemic species, and providing habitat for many aquatic and terrestrial species. Wetlands provide numerous vital functions including water quality protection, flood and drought mitigation, erosion control, and groundwater recharge.

Coastal marine and estuarine waters of Golden Gate National Recreation Area provide one of the most diverse and productive ecosystems in the world. Coastal habitats are important for the preservation of several rare and endangered species.

Oceanic conditions, such as tides, currents, waves, surf, upwelling, and sea level, influence GGNRAs coastal environment, including climate and land. Horizontal and vertical movements of water along the coast vary by season and bring changes in local climate. Upwelling brings nutrient-rich waters to the sunlit zone resulting in one of the five most productive marine environments in the world. The seasonal changes in coastal patterns create dynamic beaches and dunes through coastal erosion, accretion, and the transport of sand.

Many of the park's freshwater resources are relatively intact, compared with those in other areas of the greater Bay Area. However, the San Francisco Bay Estuary receives less than 50% of its historical freshwater inflows and therefore contains significantly altered biological communities. Furthermore, many of the streams located in the park are impaired and are not in compliance with water quality requirements.

Human influence has increased the degradation and contamination of water quality from past and present activities within and outside the park. In addition, there is continued human occupancy of historic floodplain and wetland habitats that includes park facilities such as parking lots, buildings, and roads. In addition, there is some water withdrawal from streams and groundwater aquifers for municipal, domestic, and agricultural use. In developed areas of the park, water resources have been altered by excavation, filling, grading, paving and the installation of septic systems, drains, and storm sewers. This has resulted in a decrease of water availability and quantity, and thus, a decrease in species abundance and diversity, too.

Water quality will continue to be affected by past, current, and future activities, including bacteria and nutrient loading, as well as pharmaceutical and other contaminants from wastewater disposal (septic systems); pollutants from landfills and dredging operations; nutrients and chemicals from urban and agricultural sources, including fertilizers and pesticides; non-point-source pollution in runoff, including accelerated erosion from existing roads and trails and future construction activities; heavy metals from roads, parking lots, and stormwater outfalls; sediment and bacterial impacts from domestic animals; and chemical spills.

Potential Impacts to Water Quality from Dog Walking

Impacts to water quality from dog walking activities were analyzed for ten sites which include Stinson Beach, Oakwood Valley, Muir Beach, Rodeo Beach/South Rodeo Beach, Fort Baker, Crissy Field, Baker Beach, Ocean Beach, Fort Funston, and Mori Point. There would be no impact to water quality at the remaining eleven sites (Homestead Valley; Alta Trail/Orchard Fire Road/ Pacheco Fire Road; Marin Headlands Trails; Upper and Lower Fort Mason; Fort Point Promenade/Fort Point NHS Trails; Fort Miley, Lands End; Sutro Heights Park; Milagra Ridge; Sweeney Ridge/Cattle Hill; and Pedro Point Headlands) since no water resources are found at the site or dog walking activities would not be allowed near the water bodies at the site.

Dogs entering streams, ponds, and lagoons with fine bottom sediments may stir up the sediment and increase turbidity in the water. Excessive turbidity can reduce the ability of sight-feeding fish to capture prey, can smother aquatic eggs, can cause filter-feeding mussels to close up and stop feeding, and can impair the aesthetic value of the water resource (Dunlop et al. 2005, 44–45). The intensity of the impact on turbidity from dogs depends on the frequency of dogs entering the water body, the persistence of the turbidity, and the degree to which other sources (e.g., runoff from rain events and people wading in the same resources) contribute to the turbidity. Impacts to water quality would be negligible at Stinson Beach, Oakwood Valley, Muir Beach, Fort Baker, Baker Beach, and Mori Point. These sites would require on-leash dog walking which would minimize the opportunity for turbidity through the physical restraint of the dogs, although dogs may still have some access to the ocean. The preferred alternative for Rodeo Beach, Crissy Field, Ocean Beach, and Fort Funston would create negligible to long-term, minor, adverse impacts to water quality since ROLAs would be located on the beach and dogs would have access to the ocean. Oakwood Valley includes a ROLA; however, the ROLA would be fenced and dogs would not have access to the tributary. No impacts would occur at Muir Beach or Stinson Beach since dogs would not be allowed on the beach or near any other waterbodies.

Dog waste contains nitrogen and phosphorus, which are nutrients required by algae for growth. Excessive nutrients in water resources, especially ponds or lagoons with low flushing rates, can lead to excessive algae growth, known as an algal bloom. Algal blooms can be unsightly, and the eventual die-off of the algae can cause dissolved oxygen levels in the water body to drop below water quality standards, which can cause fish kills (MDNR undated, 1). Where dogs are present near water bodies and the waste is not routinely removed by the dog owners, impacts on water quality may occur due to nutrients in dog waste in addition to multiple other sources of nutrients contained in stormwater runoff. Preferred alternatives that would prohibit dogs on beaches or in riparian areas would be expected to reduce dog waste and nutrient runoff. Preferred alternatives that include on-leash areas or ROLAs would be assumed to reduce dog waste in comparison to current voice-control restrictions because owners would be in closer contact with their dogs and would better comply with cleanup regulations. Additionally, tidal flushing and the volume of ocean water along the beaches would dilute the adverse effects on water quality from nutrients and pathogens originating from dog waste.

Pet waste contains a large number of bacteria and may contain *Giardia*, roundworms, *Salmonella*, parvovirus, and many other microorganisms called pathogens that can be harmful to human health

(CRCCD 2009, 1). If pet waste is left on the ground, runoff from rain events may transport these microorganisms to adjacent water bodies. Defecation from dogs can also occur directly in a water resource, such as a creek, stream, or pond. Fecal coliform bacteria are routinely measured across the nation at bathing beaches as an indicator of potential contamination from human or animal waste. Preferred alternatives that would prohibit dogs on beaches and in water bodies, that would require on-leash dog walking, and that would designate ROLAs would be expected to reduce dog waste and associated pathogens in runoff in comparison to current voice-control restrictions, because owners would be in control of their dogs. In addition, owners would be required to comply with cleanup regulations, which would reduce the amount of dog waste that could result in pathogens and nutrients entering nearby water bodies.

Impacts to water quality were also analyzed for new lands. It is expected that all new lands would be surveyed prior to designating an area either open or closed to dogs to determine if sensitive water resources exist at the site. If opened to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. Requiring on-leash dog walking would minimize the opportunity for dogs to enter waterbodies and would minimize increase in turbidity and nutrient levels. New lands would not allow ROLAs.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to water quality similar to dog walking; the enabling legislation foresees not only that these impacts would occur, but deems them appropriate when managed "consistent with sound principles of land use planning and management." The preferred alternative prohibits access to streams, lakes, and ponds by requiring on-leash dog walking and the physical restraint of dogs from entering these water bodies. At some sites dogs would have access to the Pacific Ocean. Although impacts to water quality would occur, the impacts would only occur within a small percentage of the ocean when considered as a whole. Fundamental resources including the groundwater sources (aquifers and springs); freshwater systems (streams, lakes, and ponds); coastal, estuarine, and marine water resources (the Pacific Ocean and San Francisco Bay); and other wetlands would only be negligibly impacted by dog walking activities. Other activities inside and outside the park including bacteria and nutrient loading, wastewater disposal, landfills, dredging operations, chemical or oil spills, and stormwater runoff would continue to pose much more of a threat to water quality. Although expected impacts to water quality from dog walking activities would occur, the preferred alternative would not rise to the level of impairment.

DESCRIPTION OF VEGETATION AT GGNRA

GGNRA contains a rich assemblage of coastal native plant habitat that includes forests, coastal scrub, grassland, freshwater, estuarine, and marine habitats, beaches, coastal cliffs, and islands. The environmental processes that take place in these habitats create a biologically diverse ecosystem. GGNRA

includes many plant species that reach the extent of their geographic range. Native plants and habitats within the park are situated in the central California Coast Range, which is one of only five regions in the world with a Mediterranean climate. This climate fosters ideal habitat for nearly 900 native plants. This represents a high level of biodiversity within a relatively small geographic area. The existence and continued survival of this diverse biota is based on several ecological drivers, including wind, climate, natural erosional processes, flooding, fire, winter storm events, predator-prey relationships, grazing/herbivory, and plant-animal interactions.

Marine and estuarine areas in and near the park provide important habitat for numerous sensitive species. The wide continental shelf that exists in and adjacent to the park creates conditions that produce a great diversity and abundance of aquatic species. Rocky intertidal areas and kelp beds also provide important habitat.

While the park supports an extremely diverse array of plant species and habitats, a broad range of forces threaten the viability of these plant populations and the habitats they depend upon. Visitor use occurs throughout the park with more than 20 million people annually. Historic domestic grazing and ranching; development and operation of military installations; manipulations of topography through grading, blasting, and road building; and the planting of non-native species have significantly influenced native plant communities.

The threat of non-native plants represents the most significant threat to the biodiversity of native plants in the park. Non-native species thrive in the park, especially in areas affected by intensive historic land use and on land adjacent to urbanized areas that serve as a constant weed source. Other threats include development of social trails, non-natural erosion, and poorly maintained/managed infrastructure.

Threats to marine resources include oil transportation and possible exploration, pollution due to shipping and other maritime activities, and recreational use of marine areas.

Potential Impacts to Vegetation from Dog Walking

Vegetation can be both directly affected by dogs through physical disturbance and indirectly affected by dogs through defecation and urination. Physical disturbance to vegetation can include trampling or digging that may reduce the viability of the plant(s). Both dog and human traffic compact the soil and crush vegetation and in addition dogs enjoy digging which would unlikely have significant effects on the un-vegetated areas but could contribute to degradation of vegetated areas (Andrusiak 2003, 3.2). Impacts to each vegetation community from dog walking activities are discussed below.

The coastal communities at GGNRA include habitats such as coastal dunes, beaches, adjacent open water, and rocky intertidal areas, of which only the coastal dune habitat supports terrestrial plant communities that could be affected by dog activities. In the study area at GGRNA, coastal dune habitat is found at Stinson Beach, Muir Beach, Rodeo Beach/South Rodeo Beach, Crissy Field, Baker Beach and Bluffs to Golden Gate Bridge, Ocean Beach, and Fort Funston. Coastal dune plant species are very sensitive and easily disturbed by trampling, digging, and other activities, and may not recover due to their sensitive nature or may create opportunities for the establishment of non-native and/or invasive plant species. Impacts to the coastal dune communities from implementation of the preferred alternative ranges from no impacts at Muir Beach and Stinson Beach, to long-term, minor, and adverse at Rodeo Beach and Fort Funston. To prevent impacts to the coastal communities, no dog walking would be allowed on the beach at Stinson Beach and Muir Beach. To minimize the negligible impacts to the coastal communities at Fort Baker, Baker Beach, Lands End, Crissy Field, Ocean Beach, and Mori Point on-leash dog walking would be required. Impacts to vegetation would be limited to the 6-foot corridor along trails and dog walking would not be allowed within the dune communities. ROLAs would be established at Rodeo Beach, Crissy

Field, Ocean Beach, and Fort Funston. To minimize impacts to the coastal communities, the ROLAs at Crissy Field and Ocean Beach would not be located in areas supporting dune or rocky intertidal vegetation communities. The ROLAs at Rodeo Beach and Fort Funston would include some dune habitat. To minimize impacts to vegetation in the ROLA at Rodeo Beach, dog walking under voice and site control would be allowed in a small portion of the foredunes when compared to the entire site. To minimize impacts at Fort Funston, the ROLA would include a small portion of the dunes that currently only supports non-native vegetation.

Coastal scrub, chaparral, and grassland plant communities are found at Homestead Valley, Alta Trail/Orchard Fire Road/ Pacheco Fire Road, Oakwood Valley, Marin Headlands, Fort Baker; Baker Beach, Lands End, Mori Point, Milagra Ridge, Sweeney Ridge/Cattle Hill; and Pedro Point Headlands. Overall impacts to coastal scrub, chaparral, and grassland communities at these sites would be negligible from the trampling and digging of vegetation. To minimize impacts to these communities, on-leash dog walking would be required at all sites except Oakwood Valley. By restricting dog walking to a 6-foot leash, the impacts would be limited to a 6-foot corridor immediately adjacent to the trails. Oakwood Valley would allow a ROLA along the Oakwood Valley Fire Road. To minimize impacts to vegetation within the ROLA, a fence would be placed around the ROLA, which would limit the area of disturbance to the width of the trail. Overall, impacts would be limited to the trail and the 6-foot corridor, which is a relatively small impacted area when compared to the size of each site.

GGNRA contains both freshwater wetlands and coastal (estuarine) wetlands (riparian forest and stream corridors are considered separately). Vegetation in these wetlands is composed of both herbaceous and woody plant species and is located at Rodeo Beach/South Rodeo Beach (Rodeo Lagoon and Rodeo Lake), Muir Beach (tidal lagoon), Crissy Field, and Mori Point. Impacts associated with dog walking would include trampling and digging of wetland vegetation. Impacts would be minimized at Muir Beach, Rodeo Beach, Crissy Field, and Mori Point by requiring on –leash dog walking and placing a fence around wetland areas. Since dogs would be restricted by a 6-foot leash, dogs would no longer have access to these areas. To minimize impacts to the wetland vegetation at Marin Headlands, on-leash dog walking would be required on trails. The impacts to wetland vegetation would be restricted to the 6-foot corridor adjacent to the trail. Impacts would be minimal when the relatively small area is compared to the site as a whole.

In the planning area at GGNRA, native hardwood forests exist at Oakwood Valley, Alta Trail/Orchard Fire Road/Pacheco Fire Road, and Fort Baker. Negligible impacts to this community would result from the trampling and digging of vegetation. To minimize impacts at Alta Trail/Orchard Fire Road/Pacheco Fire Road, a 6-foot leash would be required. Impacts to vegetation would only occur within the 6-foot corridor of the trails where on-leash dog walking would occur. A ROLA would be located on the Oakwood Valley Fire Road; however, to reduce impacts to vegetation, a fence would be placed around the ROLA. Therefore, impacts would only result to vegetation located within the 6- foot corridor. In addition, the amount of area available for dog walking is only a small portion of the entire site.

Riparian plant communities in GGNRA include streamside corridors of forests, shrubs, and herbaceous vegetation that tolerate moist conditions. The sites in GGNRA that possess riparian habitat include: Redwood Creek at Muir Beach and Marin Headlands Trails along the Rodeo Valley Trail Corridor from Rodeo Beach to Capehart Housing. Negligible impacts to the riparian plant communities would occur from the trampling and digging of vegetation by dogs. To minimize the impacts, on-leash dog walking would be required. The physical restraint of dogs would protect habitat outside of the 6-foot corridor. The amount of impacted vegetation is relatively small when compared to the entire site.

In addition to the potential direct, physical disturbance to vegetation by dogs, “marking” (scent marking with urine) or defecation by dogs could also affect vegetation by concentrating nutrients in particular

areas. Uncollected dog waste can damage turf and other vegetation (LEES + Associates N.D., 2). The preferred alternative for each site is expected to eliminate or greatly reduce dog waste and nutrient additions to the soil. It is assumed that leash control and/or voice and sight control would reduce dog waste and nutrient addition in comparison to current voice-control restrictions because owners would be in closer contact with their dogs and presumably would be more likely to comply with cleanup regulations.

It is expected that all new lands would be surveyed prior to designating an area either open or closed to dogs to determine which vegetation resources exist at the site. If opened to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. There is a potential for coastal plant communities; coastal scrub, chaparral, and grassland plant communities; freshwater and coastal wetland plant communities; native hardwood forests; and riparian plant communities to occur within new lands. The physical restraint of dogs on-leash would protect habitat outside of the 6-foot corridor. Additionally, dog walking would not be prohibited in sensitive habitats.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs, as well as monitoring for vegetation damage, all of which would directly benefit vegetation. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to vegetation similar to dog walking; the enabling legislation foresees not only that these impacts would occur, but deems them appropriate when managed "consistent with sound principles of land use planning and management." The preferred alternative minimizes impacts to vegetation by requiring on-leash dog walking along most trails. Restricting dogs to a leash would limit the amount of disturbance to vegetation within the 6-foot corridor adjacent to the trails. To minimize impacts to vegetation from dog walking under voice and sight control, ROLAs would be located in areas where vegetation has been previously disturbed or away from sensitive habitat such as the sand dunes. To further minimize potential impacts to wetland vegetation, fences would surround the wetlands, lagoons, and ponds to restrict dog walkers from entering these areas. Although impacts to vegetation would occur, the impacts would only occur within a small percentage of the park when considered as a whole. The park would continue to contain a rich assemblage of coastal native plant habitat that includes forests, coastal scrub, grassland, freshwater, estuarine, and marine habitats, beaches, coastal cliffs, and islands. The park would continue to have a high level of biodiversity within the small geographic area. Although expected impacts to vegetation from dog walking activities would occur, the preferred alternative would not rise to the level of impairment.

DESCRIPTION OF WILDLIFE AT GGNRA

GGNRA contains a rich assemblage of coastal native wildlife habitat that includes forests, coastal scrub, grassland, freshwater, estuarine, and marine habitats, beaches, coastal cliffs, and islands. The environmental processes that take place in these habitats create a biologically diverse ecosystem. GGNRA includes many wildlife species that reach the extent of their geographic range. Native wildlife habitats

within the park are situated in the central California Coast Range, which is one of only five regions in the world with a Mediterranean climate. This climate fosters ideal habitat at least 387 vertebrate species, including 11 amphibians, 20 reptiles, 53 fish, 53 mammals, and 250 birds; terrestrial invertebrates are less well known. This represents a high level of biodiversity within a relatively small geographic area. The existence and continued survival of this diverse biota is based on several ecological drivers, including wind, climate, natural erosional processes, flooding, fire, winter storm events, predator-prey relationships, grazing/herbivory, and plant-animal interactions. Terrestrial invertebrates in the park are less well known, with the exception of the Marin Headlands and Milagra Ridge which support diverse butterfly populations.

Marine and estuarine areas in and near the park provide important habitat for numerous sensitive species and are considered to be some of the most productive oceanic areas in the world. The continental shelf that exhibits in and adjacent to the park creates conditions that produce a great diversity and abundance of aquatic species. Rocky intertidal areas and kelp beds also provide important habitat.

Alcatraz Island contains important wildlife habitat, especially for colonial seabirds. Over 1,000 pairs of western gulls nest in the Island and it is home to the largest regional populations of several species of pelagic birds. The Island has become a refuge for these species and they are often used and studied as an indicator of the ecological health of the San Francisco Bay.

While the park supports an extremely diverse array of wildlife species and their habitats, a broad range of forces threaten the viability of these wildlife populations and the habitats they depend upon. Habitat fragmentation, degradation, and isolation are inherent features of GGNRA's urban interface. Fragmentation and isolation of wildlife habitat is increasing with further development occurring on lands that surround the park. Therefore, GGNRA is becoming even more important as a corridor for wildlife populations. Threats to wildlife and their habitat throughout GGNRA include habitat fragmentation, the presence of non-native animals, human disturbance such as high levels of recreational use, the presence of domestic and feral animals, habitat change caused by non-native plant establishment, environmental contaminants, wildlife diseases, and wildland fire.

Threats to marine resources include oil transportation and possible exploration, pollution due to shipping and other maritime activities, recreational use of marine areas, and abalone hunting and collecting of other marine resources.

Potential Impacts to Wildlife from Dog Walking

Potential direct impacts to wildlife as a result of interactions with domestic dogs could be broadly classified as falling into three categories: harassment, injury, or death. Secondary or indirect impacts including displacement, avoidance, abandonment of areas and habitat, physical alteration of habitat, and potential disease transmission could also occur. Harassment is defined as the disruption of normal maintenance activities, such as feeding, resting, or grooming and can include disrupting, alarming, or even chasing after wildlife. Animals most often affected by disturbance from dogs include deer, small mammals, and birds (Denny 1974 in Sime 1999). Small mammals, including squirrels (*Sciurus* spp.) and rabbits (*Sylvilagus* spp.) have exhibited reduced levels of activity within 50 m of trails in areas that allowed dogs when compared with areas without dogs (Lenth et al. 2008, 218). If dogs chase or pursue wildlife, injuries to wildlife could be sustained directly or indirectly as a result of accidents that occur during the chase rather than direct contact with the dog. Injuries sustained may result in death or may compromise the animal's ability to carry on other necessary life functions resulting in eventual death, or reduced reproductive success. The modification of normal behaviors such as feeding, nesting, grooming, and resting can occur through repeated disturbance and wildlife may relocate from preferred habitat to other areas to avoid harassment.

Within coastal shrub, chapparal, and grassland communities, unrestrained dogs, because of their innate abilities as hunters, could affect wildlife by disturbing low- and ground-nesting birds and reptiles using roosting or sunning sites, chasing after fleeing birds and small mammals, and even on occasion capturing individuals. Dogs can also physically damage burrows used by ground-dwelling mammals (squirrels, pocket gophers, chipmunks, and other rodents) and reptiles by digging up or collapsing the burrows. There is potential for dogs to interact with coyotes and mountain lions which could result in injury and possibly transmission of disease to either species, as well as injury to visitors. Dog walking at Homestead Valley, Alta Trail/Orchard Fire Road/Pacheco Fire Road, Oakwood Valley, Marin Headlands, Fort Baker, Baker Beach, Lands End, Mori Point, Milagra Ridge, Sweeney Ridge/Cattle Hill, and Pedro Point Headlands would create negligible to long-term, minor, adverse impacts to wildlife within the coastal shrub, chapparal, and grassland communities. To minimize impacts to wildlife, on-leash dog walking would be required within these habitats. Physically restraining dogs on leash would protect habitat and wildlife off trail and would eliminate chasing after wildlife. Impacts to wildlife would be reduced to the trails and the 6-foot corridor adjacent to the trails (LOD) which are relatively small portions of each site.

GGNRA contains both freshwater wetlands and coastal (estuarine) wetlands that support wildlife habitat. Wetlands are located at Rodeo Beach/South Rodeo Beach (Rodeo Lagoon and Rodeo Lake), Muir Beach (lagoon), Crissy Field, and Mori Point. Impacts from dog walking to the wetland habitats would be negligible at these sites. To reduce impacts, dog walkers would be prohibited from accessing wetland areas at all locations in GGNRA. Feeding and roosting shorebirds, wading birds, waterbirds, and other wildlife using the wetland areas would not be disturbed.

The native hardwood forest or Douglas-fir/coast redwood communities exist at Oakwood Valley, Alta Trail/Orchard Fire Road/Pacheco Fire Road, and Fort Baker support a variety of wildlife species, such as woodland birds (passerines such as chestnut-backed chickadee, flycatchers, warblers, woodland hawks, and owls) and small mammals (shrews, squirrels, and dusky-footed wood rat). Other animals such as deer, coyote, and bobcat, often found in more open habitat, use woodlands as protected cover and resting areas. Birds in woodlands primarily use the canopy and middle-level forest but may nest and forage in the herbaceous understory and on the ground. Mammals would be found mainly at ground level in this habitat. Wildlife using riparian habitat along wetlands, streams, and creeks in GGNRA include amphibians, reptiles, birds, and mammals that require the specialized habitat associated with stream corridors for all or part of their life. Riparian habitat often supports a high diversity of wildlife species and can provide movement corridors for these species. The sites in GGNRA that possess riparian habitat that supports wildlife species include: Muir Beach (Redwood Creek) and Marin Headlands Trails (along the Rodeo Valley Trail Corridor from Rodeo Beach to Capehart Housing). Impacts to wildlife within hardwood forests, Douglas fir/coast redwood forests, and riparian habitat at these sites from dog walking would range from negligible to long-term, minor, and adverse. To reduce impacts to wildlife, on-leash dog walking would be required at all sites except for a ROLA along the Oakwood Valley Fire Road. On-leash dog walking is based on an allowed 6-foot dog leash. The LOD would include 6 feet in each direction from the edges of the trail. Physically restraining dogs on leash would protect habitat and wildlife off trail and would eliminate chasing after wildlife. A fence would be placed around the ROLA at Oakwood Valley, which would also limit impacts to wildlife to the trail and LOD. Overall, impacts would be negligible since the LODs would occur in relatively small areas when compared to the sites as a whole.

Migrant and overwintering shorebirds use beach and dune habitats along the coastline in GGNRA primarily as stopover and overwintering areas. Collected data for beaches have indicated that willet, marbled godwit, sanderling, and whimbrel are the most common species of shorebirds using beaches in GGNRA and are found to some extent year-round (Beach Watch 2009). The recently delisted California brown pelican is relatively abundant in the coastal community habitats at GGNRA, and the NPS has previously provided important roost areas for this species, which may be affected by dogs (NPS 2010b). Disturbance by dogs generally occurs when unleashed dogs chase feeding and roosting birds. Shorebirds

such as gulls and terns may use beach/dune habitat for roosting, and some species are found year-round. Shorebirds, gulls, and terns roosting or feeding in areas accessible to on-leash or off-leash dogs may relocate to areas of the beach where dogs are prohibited or may use areas only when dogs are absent. Beach areas are vulnerable to the usual beach activities, such as walking, jogging, fishing and dog-walking. Other sources of impacts on shorebirds on beaches include aircraft, kite flying, hawks and falcons, equipment on the beach, and beach patrols (NPS 2009b).

Marine mammals that strand on beaches or other shoreline areas are often injured or ill, and additional stress from disturbance, such as dogs biting, barking at, or climbing on the animals. Healthy marine mammals can also haul out on GGNRA beaches as well. The MMC has documented many cases of marine mammals that have stranded or hauled out on GGNRA sites and been surrounded by dogs, approached by dogs, or chased back into the water by dogs (MMC 2010).

To eliminate the disturbance of shorebirds and marine mammals at Stinson Beach, Muir Beach, and the SPPA at Ocean Beach, no dog walking would be allowed on the beaches. Restricting dogs from these areas would result in protection of nesting and feeding shorebirds and waterbirds that may use the area year-round as well as elimination of chasing after and disturbance and reduction of flushing from preferred areas. Impacts to shorebirds and mammals would be reduced to negligible to long-term, minor, and adverse at Fort Baker, Crissy Field, Baker Beach, Lands End, and Mori Point, by requiring dogs to be on-leash. The physical restraint of dogs would protect shorebirds and marine mammals using the beach or rocky intertidal habitat and would reduce chasing of wildlife. ROLAs would be established on the beach at Rodeo Beach, Crissy Field, Ocean Beach, and Fort Funston. Dogs under voice and site control within the ROLAs may create long-term, minor to moderate, adverse impacts to shorebirds and marine mammals. Shorebirds, gulls, and terns roosting or feeding in the ROLAs would be disrupted by dogs under voice and sight control. Marine mammals that become stranded or haul out on the beach in the ROLA could be subjected to disturbance from the presence of unleashed dogs, which could bite, bark at, or clamber over the animals. To reduce impacts, ROLAs would be located along a portion of the beach, so similar adjacent habitat to shorebirds and marine mammals would be available.

Domestic dogs that are not vaccinated can potentially introduce diseases (distemper, parvovirus, and rabies) and transport parasites from, or transmit diseases to wild animals or wildlife habitats (Sime 1999, 8.2), although the role of dogs in wildlife diseases is not well understood (Sime 1999, 8.4). While dogs can be vaccinated against many of these diseases, adherence to recommended vaccination schedules is necessary for even adult dogs to maintain immunity (Sime 1999, 8.12). Domestic dogs can be vectors for transmission diseases as canine distemper, which can affect wild carnivore species (Sime 1999, 8.9). Dog feces have been implicated in the transmission of muscle cysts (Sarcocystis spp.), which can infect a variety of ungulate species, including mule deer and white-tailed deer. Dogs may also introduce diseases or parasites to small mammals. While dog impacts on wildlife likely occur at the individual scale, the results may still have important implications for wildlife populations (Sime 1999, 8.4). Rabies is a preventable viral disease transmitted in the saliva of infected mammals and is the most common source of infection for humans and domestic animals such as dogs (City and County of San Francisco. 2010, 1). To reduce the risk of transmission of disease, the preferred alternative for each site is expected to eliminate or greatly reduce dog waste and nutrient additions to the soil. It is assumed that leash control and/or voice and sight control would reduce dog waste and nutrient addition in comparison to current voice-control restrictions because owners would be in closer contact with their dogs and presumably would be more likely to comply with cleanup regulations.

It is expected that all new lands would be surveyed prior to designating an area either open or closed to dogs to determine which wildlife resources exist at the site. If opened to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the

park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. Requiring on-leash dog walking would reduce harassing, chasing, and injuring wildlife. Additionally, dog walking would be prohibited in areas with sensitive wildlife species.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs, as well as monitoring for wildlife disturbance, all of which would directly benefit wildlife. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to wildlife similar to dog walking; the enabling legislation foresees not only that these impacts would occur, but deems them appropriate when managed "consistent with sound principles of land use planning and management." The preferred alternatives that include prohibiting dogs, restricting dog walking to on-leash only, and establishing ROLAs are expected to reduce impacts on wildlife from encounters with off-leash dogs . The preferred alternatives that would prohibit dogs from accessing wildlife habitats would eliminate disturbance to wildlife from dogs chasing after wildlife, and barking at wildlife, as well as potential direct or indirect mortality as a result of dog/wildlife encounters. Prohibiting dogs from areas also prevents habitat degradation and loss of species that are sensitive to the presence of dogs. On-leash dog walking restrictions would physically restrain dogs, reducing direct impacts on wildlife and wildlife habitat, and should also eliminate any potential chasing after wildlife. Restricting dogs to a leash would limit the amount of disturbance to wildlife within the 6-foot corridor adjacent to the trails. Additionally, dog waste, nutrient addition, trampling, digging, or spread of invasive species would either be reduced or eliminated if dogs were prohibited or leashed in certain areas. Because of mobility, wildlife can usually avoid areas with dogs present during peak activity or habituate to these activities, but the displacement of wildlife from high quality habitat and preferred habitat that is degraded by the presence of dogs would indirectly affect wildlife. Although impacts to wildlife would occur, the impacts would only occur within a small percentage of the park when considered as a whole. GGNRA would continue to contain a rich assemblage of coastal native animal habitat that includes forests, coastal scrub, grassland, freshwater, estuarine, and marine habitats, beaches, coastal cliffs, and islands. The park would continue to have a high level of biodiversity within a relatively small geographic area. No impacts would occur to the colonial nesting birds at Alcatraz Island. Although expected impacts to wildlife from dog walking activities would occur, the preferred alternative would not rise to the level of impairment.

DESCRIPTION OF SPECIAL STATUS SPECIES AT GGNRA

GGNRA supports one of the largest numbers of federally listed threatened and endangered species in the national parks system, due to the confluence of unique and diverse habitats adjacent to the urban San Francisco Bay region. GGNRA protects a wide range of remnant, isolated, and fragmented habitats that are becoming rare in the broader San Francisco Bay area because of underlying physical processes and the long history of human use. These rare habitats support a large number and diversity of taxa of endangered species, including plants, invertebrates, birds, mammals, fish, reptiles, and amphibians. The park also protects important habitats for sensitive and locally rare species, as identified by the State of California.

Threats to endangered species in the park include a number of broad categories – habitat fragmentation and continuing development outside the park, the presence of non-native animals, human disturbance and recreational impacts, the presence of domestic and feral animals, non-native plant invasion, environmental contaminants, and wildland fire. The spread of non-native plants threatens both endangered plants and some animals. Non-native species thrive in the park and in areas subject to intensive historic land use or adjacent to urbanized areas that are a constant source of weed invasion. Adverse impacts to hydrological processes and water quality threaten endangered marine, estuarine, and freshwater species. Wildlife diseases threaten some wildlife populations. Collecting is a problem for endangered butterflies and the San Francisco garter snake. Rare species, like the state-listed bank swallow, are affected by erosion from current land uses.

The park conducts regular inventory and monitoring work for some of the endangered species occurring at the park. In 2005, approximately 40 percent of the park's threatened and endangered species were determined to have stable or increasing populations. Other endangered species populations trends were unknown based on small and variable populations that in most cases were not monitored.

Potential Impacts to Wildlife from Dog Walking

Generally, potential impacts on threatened and endangered wildlife as a result of interactions with domestic dogs could include harassment, injury, or death. Harassment is the disruption of normal maintenance activities, such as feeding, resting, or grooming, and can include disrupting, alarming, or even chasing wildlife. Dogs may disturb wildlife either accidentally or deliberately through chasing (Andrusiak 2003). If dogs chase or pursue wildlife, injuries to wildlife could be sustained directly or indirectly as a result of accidents that occur during the chase rather than through direct contact with the dog. Injuries sustained may result in death or may compromise the animal's ability to carry on other necessary life functions, resulting in eventual death or reduced reproductive success. The modification of normal behaviors such as feeding, nesting, grooming, and resting can occur through repeated disturbance, and wildlife may relocate from preferred habitat to other areas to avoid harassment.

Threatened and endangered vegetation can be both directly affected by dogs through physical disturbance and indirectly affected by dogs through defecation and urination. Physical disturbance to vegetation can include trampling or digging that may reduce the viability of the plant(s). Both dog and human traffic compact the soil and crush vegetation and in addition dogs enjoy digging which would unlikely have significant effects on the unvegetated areas but could contribute to degradation of vegetated areas (Andrusiak 2003, 3.2).

There would be no impact to special status species at Fort Mason, Fort Point, Fort Miley, Lands End, and Sutro Heights. There are no documented special status species occurring within the areas that would be available for dog walking activities.

It is expected that all new lands would be surveyed to determine whether federally or state-listed plant species exist at the site prior to designating dog management for an area. To minimize the impacts to listed species, if new lands are opened to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. The potential impacts from allowing on-leash dog walking would be negligible because physically restraining dogs on leash would protect any listed species. In addition, it is assumed that management of dog walking activities in new lands acquired by GGNRA would be developed to avoid any impacts on federally or state-listed species.

The following is a discussion of potential impacts from dog walking by species:

San Bruno Elfin Butterfly. The larval host plant for the San Bruno elfin butterfly is sedum, a succulent plant that grows on rocky north-facing slopes along the coast (coastal scrub) (Newby 2000). Existing San Bruno elfin butterfly populations occur in known colonies of sedum only at Milagra Ridge. Negligible impacts to San Bruno elfin butterfly would occur under the preferred alternative. To reduce impacts to this species, on-leash dog walking would be required and would only be allowed on select trails. The physical restraint of the dogs would restrict dogs from entering the habitat. Additionally, the habitat is relatively inaccessible in relation to the trail itself.

Mission Blue Butterfly. Mission blue butterfly populations use lupine host plants (*Lupinus albifrons, L. formosus*, and *L. variicolor*) that inhabit coastal scrub habitat and grassland habitat at GGNRA. The mission blue butterfly is very closely tied to the lupine host plants that support them, and adult butterflies lay their eggs on these plants. The mission blue butterfly has been documented at Alta Trail/Orchard Fire Road/Pacheco Fire Road, Oakwood Valley, the Marin Headlands Trails, Fort Baker, Milagra Ridge, and Sweeney Ridge/Cattle Hill; Tennessee Valley, in the Marin Headlands Trails. It has been suggested that intensive trampling by dogs weakens vegetation in a similar manner as trampling by humans (Sime 1999). Generally, potential damage to vegetation (including mission blue butterfly host plants) could occur with increased visitor use with dogs through the physical disturbance and/or alteration of trail habitat due to increased exposure to dog waste, especially at trailheads where dogs can congregate prior to accessing trails. The lupine host plants grow in the trail beds and directly adjacent to the trail in some locations as well as off trail at GGNRA (NPS 2009b). Therefore, mission blue butterfly host plants (mission blue butterfly habitat) could be affected by both on- and off-leash dog walking due to the plants' presence in and adjacent to the trail beds. The permanent loss of individuals of the species could occur if mission blue butterfly eggs or larvae are present on vegetation along a trail/road that is disturbed by dogs. Potential adverse impacts from dogs include trampling host plants, dislodging eggs from host plants, crushing larvae, adding nutrients to soils from dog waste, and spreading invasive plants, all of which could affect the lupine host plants that support the mission blue butterfly. There would be no impact to the mission blue butterfly at Sweeney Ridge/ Cattle Hill, because dogs would be prohibited at Sweeney Ridge where the species and host plants occur. On-leash dog walking would be allowed within portions of Cattle Hill, however the habitat for mission blue butterfly does not exist. The physical restraint of the dogs would prevent dogs from entering Sweeney Ridge. Impacts to the mission blue butterfly and their habitat would be negligible at Alta Trail/Orchard Fire Road/Pacheco Fire Road, Oakwood Valley, Marin Headlands, and Milagra Ridge. To minimize impacts to the butterfly, on-leash dog walking would be required at each site and would be based on an allowed 6-foot dog leash. The LOD would include the trail/roads and all areas adjacent to the trail/roads up to 6 feet. Areas where dog walking would occur would be located away from potential butterfly habitat. In addition, the physical restraint of the dogs would prevent dogs from entering butterfly habitat. Oakwood Valley would include a ROLA. To reduce impacts to the butterfly, the ROLA would not be located within the preferred habitat and a fence would be placed around the ROLA to prevent dogs from entering the nearby habitat. Impacts to the butterfly at Fort Baker would be negligible to long-term, minor, and adverse. The host plant for the butterfly is located along the Drown Fire Road. To reduce impacts to the host plant, on-leash dog walking would be required. Impacts would be restricted to the road and the LOD.

Tidewater Goby. The tidewater goby is known to occur in high densities in Rodeo Lagoon in the Marin Headlands. Dogs could gain access to the lagoon and could crush goby burrows or cause increased turbidity by trampling shoreline areas and re-suspending sediment. Impacts to the tidewater goby and its critical habitat from dog walking activities would be negligible. To minimize impacts from dog walking, dogs would be prohibited from the entering the lagoon. On-leash dog walking would be allowed on the foot bridge over the lagoon; however the physical restraint of the dogs would restrict the dogs from

entering the area. A ROLA would be located adjacent to the lagoon. To prevent dogs from entering the lagoon, a fence surrounding the lagoon has been proposed.

Coho Salmon. The central California coast coho salmon is found in the Marin Headlands, specifically in Redwood Creek at Muir Beach. Designated critical habitat for coho includes the majority of accessible estuarine and stream areas in the coastal watersheds of Marin County, including Redwood Creek in GGNRA. Adults and juveniles could be affected by dogs gaining access to the creek and causing increased turbidity by trampling shoreline areas and re-suspending sediment. At Muir Beach, impacts to coho salmon and the designated critical habitat from dog walking activities would also be negligible. To minimize impacts, the lagoon and Redwood Creek would be closed to dogs. Additionally, on leash dog walking in adjacent areas would physically restrain the dogs from accessing the creek or the shorelines.

Steelhead Trout. The central California coast steelhead trout occurs in Muir Beach (Redwood Creek) and Rodeo Beach/South Rodeo Beach (Rodeo Lagoon). Designated critical habitat for central California coast steelhead trout includes most of the coastal streams of Marin County, including Redwood Creek in GGNRA (NOAA 2005, 76). Adults and juveniles could be affected by dogs gaining access to the creek and causing increased turbidity by trampling shoreline areas and re-suspending sediment. The steelhead trout has infrequent access to Easkoot Creek at the Stinson Beach site. However, Easkoot Creek is densely vegetated with riparian plant species and generally difficult for leashed dogs to access. Because of the difficulty of access to Easkoot Creek, all impacts on the steelhead trout at this site would be considered negligible. Impacts from dog walking to steelhead trout at Muir Beach and Rodeo Beach would be negligible. To minimize impacts, the lagoon, Redwood Creek, and Rodeo Lagoon would be closed to dogs. Additionally, on leash dog walking in adjacent areas would physically restrain the dogs from accessing the creek or the shorelines.

California Red-Legged Frog. The California red-legged frog occurs in Marin County at the Marin Headlands Trails (Tennessee Valley; Tennessee Valley Pond provides breeding habitat), Muir Beach (the lagoon provides breeding habitat), and Rodeo Beach/South Rodeo Beach (Rodeo Lake provides breeding habitat), as well as at Mori Point (the ponds provide breeding habitat), Milagra Ridge (the ponds provide breeding habitat), and Sweeney Ridge/Cattle Hill (no breeding is known to occur at the site). Although the California red-legged frog is normally associated with wetland areas and water bodies, this species can also use upland and riparian habitat. There is a small portion of critical habitat unit SNM-1A that is located in the southern corner of Sweeney Ridge (USFWS 2006). Proposed critical habitat also occurs at Pedro Point Headlands (USFWS 2008). Eggs, juveniles, and adults could be affected by dogs gaining access to the lake through trampling and suffocation by sediments coating the eggs as well as behavioral disturbance or causing injury or mortality to individuals. Impacts from dog walking to the frog and critical habitat would be negligible. To minimize impacts, dog walking would not be allowed in the waterbodies associated with the above listed sites. These sites would also require on-leash dog walking in some areas. The physical restraint of the dogs would restrict dogs from entering the waterbodies listed above.

San Francisco Garter Snake. In GGNRA, the San Francisco garter snake has been documented as occurring at Mori Point; the freshwater ponds at this site were created to provide foraging habitat for this species. Milagra Ridge has suitable aquatic, adjacent upland, and dispersal habitats for the snake and Sweeney Ridge/Cattle Hill and Pedro Point Headlands may serve as dispersal habitat for the snake. It is important to note that the primary food source of the San Francisco garter snake is the federally threatened California red-legged frog (discussed above). Therefore, described impacts on the frog could also affect the San Francisco garter snake. The snake is normally associated with wetland areas and water bodies, but also uses upland habitat for basking and/or burrowing (USFWS 1985b, 9). Snake behavior could be affected by off-leash dogs directly (through capture or digging) or indirectly (if changes in the California red-legged frog population occur). Impacts from dog walking to the snake would be negligible.

To minimize impacts to this species, dogs would be prohibited in ponds or areas adjacent to the ponds that provide snake habitat. In addition on-leash dog walking would be required on select trails which would reduce direct impacts on snakes through capture and trampling (due to mobility of species).

Western Snowy Plovers. In GGNRA, the western snowy plover use areas with wide, sandy, dune-backed beaches (or sections of beaches) for roosting and foraging during their nonbreeding season. There is no documentation of this species nesting in GGNRA, but they overwinter at the Ocean Beach SPPA and at the Crissy Field WPA. Even though western snowy plovers do not nest at GGNRA, general impacts on the western snowy plover from dogs include disturbance, harassment, interruption of roosting/ foraging behavior, and limitation of use of preferred habitat when plovers are at sites during their nonbreeding season. Chronic disturbance to this species during the nonbreeding season could affect breeding behavior outside GGNRA. Overall, impacts to Western snowy plovers at Ocean Beach and Crissy Field from dog walking activities would be negligible. To minimize impacts to this species, the WPA at Crissy Field and SPPA at Ocean Beach would be closed to dogs. On-leash dog walking would be allowed in areas adjacent to the WPA at Crissy Field. Physically restraining the dogs would prevent dogs from entering or chasing the birds in the WPA. At Ocean Beach, a ROLA would be placed next to the SPPA; however, only a small numbers of western snowy plovers have been observed in this area (outside the SPPA).

Bank Swallow. A nesting colony of the bank swallow occupies burrows in the coastal bluff habitat at Fort Funston, one of only a few remaining coastal breeding sites for the species along the outer coast in California. The bank swallows are present at Fort Funston during their breeding season (April to early August) and spend the nonbreeding season in South America (NPS 2009, Review Comment Matrix, July). Dogs could have the potential to dig at or collapse the burrows, flush birds from nests, and cause active sloughing and landslides that may block or crush burrows with the young inside. There would be no impact to the bank swallow from the implementation of the preferred alternative at Fort Funston. To ensure no impacts occur, no dogs would be allowed north of the Beach Access Trail, where the bank swallows nest in the bluff face; therefore, the population/habitat would thus be protected by eliminating access to the breeding sites in the bluff face, which could increase nesting success. In addition, the ROLAs at this site would be located away from the breeding site.

Northern Spotted Owl. In the study area, Northern spotted owls have only been documented at Homestead Valley; suitable habitat (coniferous and evergreen forests) exists at Oakwood Valley, but northern spotted owls have not been detected at this site. Dogs could gain access to fledglings on/along the trails/roads and young owls on the ground could be disturbed or injured and adults could be stressed or physically challenged. Impacts to the Northern spotted owl at Homestead Valley and Oakwood Valley would be negligible. To minimize impacts, dogs would be physically restrained on leash or would be within a fenced ROLA (Oakwood Valley) and it would be unlikely that dogs would gain access to fledglings on/along the trails/roads.

San Francisco Lessingia. San Francisco lessingia recovery units have been identified by the USFWS (2003) and are located in areas in GGNRA. Both Baker Beach and Bluffs to Golden Gate Bridge and Fort Funston have been designated as San Francisco lessingia recovery and enhancement sites for the annual plant (USFWS 2003). A small population of San Francisco lessingia is found in north Baker Beach. Although coastal dune habitat for this species exists at Fort Funston, there is no current documentation of existing presence of this species. The core population of the San Francisco lessingia is at the Lobos Creek Dune community. However, the Lobos Valley, where this population occurs at Lobos Creek in the GGNRA, is not in the study area for this plan/EIS. Dogs could affect San Francisco lessingia through trampling, digging, and the addition of dog waste. Baker Beach contains areas that have not been previously disturbed and contain naturally functioning soils that could support the growth of the San Francisco lessingia. Impacts to the San Francisco lessingia at Baker Beach would be negligible to long-

term, minor, and adverse. To minimize impacts on-leash dog walking would be required. On-leash dog walking is based on an allowed 6-foot dog leash. In general, impacts would be limited to the trails and the 6-foot corridor immediately adjacent to the trails. At Fort Funston, the preferred alternative would result in overall beneficial impacts on the San Francisco lessingia because physically restraining dogs on leash in most areas of the site would protect the San Francisco lessingia and potential habitat. In addition, the preferred alternative would allow the NPS to reintroduce the Daly City genotype of the species at Fort Funston. The San Francisco lessingia population in GGNRA would have the ability to increase in size.

Presidio Manzanita. In the past, Presidio manzanita existed as a single individual east of Lincoln Boulevard in Area B of the Presidio on a serpentine outcrop. As part of recovery efforts to reintroduce this species at GGNRA, clones of this individual have been planted west of Lincoln Boulevard near Baker Beach in suitable serpentine coastal prairie habitat. Dogs could affect Presidio manzanita through trampling, digging, and dog waste. Impacts to the Presidio manzanita at Baker Beach would be negligible. To minimize impacts, on-leash dog walking would be required. On-leash dog walking is based on an allowed 6-foot dog leash. In general, impacts would be limited to the trails and the 6-foot corridor immediately adjacent to the trails. Physically restraining dogs on leash would protect the Presidio manzanita and potential habitat and the restored population would be protected.

Marin Dwarf-Flax. The Marin dwarf-flax is found in coastal serpentine prairie and scrub habitat in GGNRA as two subpopulations. One subpopulation is located west of Lincoln Boulevard of the Presidio and the other subpopulation is located in soil outcrops above Baker Beach, near the one remaining natural Presidio manzanita location (USFWS 2003; NPS 2008d). Dogs could affect Marin dwarf-flax through trampling, digging, and dog waste. Impacts to the Marin dwarf-flax at Baker Beach would be negligible. To minimize impacts, on-leash dog walking would be required. On-leash dog walking is based on an allowed 6-foot dog leash. In general, impacts would be limited to the trails and the 6-foot corridor immediately adjacent to the trails. Physically restraining dogs on leash would protect the Marin dwarf-flax and potential habitat and the restored population would be protected.

California seablite. This species has been extirpated from the San Francisco Bay Area, although it was reintroduced to the restored salt marsh at Crissy Field in 2001. However, two efforts to reintroduce the species to the Crissy Field Marsh have both failed, potentially due to excessive flooding of the marsh. If dogs access the marsh and if the marsh restoration project is expanded, dogs could affect the seablite through trampling, digging, or dog waste. To eliminate impacts to the California seablite, dog walking would be prohibited within Crissy Field Marsh.

Hickman's Potentilla. This plant species inhabits vernally moist areas in serpentine grasslands, coastal scrub, and/or chaparral. Suitable habitat to support Hickman's potentilla occurs at both Mori Point and the Pedro Point Headlands (URS 2010, figure 19). Populations may already exist at these sites, but there has been no intensive monitoring for the species, and the presence of the potentilla at these sites is unknown. Dogs could affect suitable habitat for Hickman's potentilla through digging, trampling, and dog waste. Impacts to the Hickman's potentilla would be negligible at both Mori Point and Pedro Point Headlands. To minimize impacts, on-leash dog walking would be required. Suitable Hickman's potentilla habitat is located away from the trails (beyond the 6-foot LOD corridor) in seasonally wet and moist areas; dogs on leash on the trails would not be in proximity to this habitat and thus would not likely impact Hickman's potentilla in the LOD, resulting in negligible impacts in the LOD.

Domestic dogs that are not vaccinated can potentially introduce diseases (distemper, parvovirus, and rabies) and transport parasites from, or transmit diseases to wild animals or wildlife habitats (Sime 1999, 8.2). Disease can be transmitted through dog excrement. In addition to the potential direct, physical disturbance to vegetation by dogs, "marking" (scent marking with urine) or defecation by dogs could also affect vegetation by concentrating nutrients in particular areas. Uncollected dog waste can damage turf

and other vegetation (LEES + Associates N.D., 2). To reduce the risk of transmission of disease to listed wildlife species and nutrient addition to listed plant species, the preferred alternative for each site is expected to eliminate or greatly reduce dog waste and nutrient additions to the soil. It is assumed that leash control and/or voice and sight control would reduce dog waste and nutrient addition in comparison to current voice-control restrictions because owners would be in closer contact with their dogs and presumably would be more likely to comply with cleanup regulations.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs, as well as monitoring for special status species disturbance, all of which would directly benefit the threatened and endangered species throughout GGNRA. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to listed wildlife and vegetation similar to dog walking; the enabling legislation foresees not only that these impacts would occur, b deems them appropriate when managed “consistent with sound principles of land use planning and management.” The preferred alternatives that include prohibiting dogs, restricting dog walking to on-leash only, and establishing ROLAs are expected to reduce impacts on special status species from encounters with off-leash dogs. The preferred alternatives have been designed to avoid special status species and their habitat. At most sites dog walking would be prohibited in areas where special status species occur. Prohibiting dog walking in these areas would restrict dogs from accessing special status species’ habitats, eliminate disturbance from dogs chasing and harassing listed wildlife species, and prevent trampling or digging listed plant species. On-leash dog walking restrictions would physically restrain dogs, reducing direct impacts to special status species and their habitats to the trails/fire roads and the adjacent 6-foot corridor. Although negligible to long-term, minor, adverse impacts to special status species would occur, the impacts would only occur within a small percentage of the park when considered as a whole. GGNRA would continue to support one of the largest numbers of federally listed threatened and endangered species in the national parks system. The rare habitats at GGNRA would continue to support a large number and diversity of taxa of endangered species, including plants, invertebrates, birds, mammals, fish, reptiles, and amphibians. The park would also continue to protect important habitats for sensitive and locally rare species, as identified by the State of California. Although expected impacts to special status species from dog walking activities may occur, the preferred alternative would not rise to the level of impairment.

CULTURAL RESOURCE TOPICS

DESCRIPTION OF CULTURAL RESOURCES AT GGNRA

As stated in the park significance statement, the park includes the largest and most complete collection of military installations and fortifications in the country, dating from Spanish settlement in 1776 through the 20th century. These installations serve as command post for the Army in the Western United States and the Pacific. This long period of military presence has yielded one of the most extensive collections of historic architecture in the national park system. Coast defense posts are at the heart of park lands, and a

major reason the park is preserved today. Although no hostile shot was ever fired, every major type of military fortification and architecture represented here demonstrates evolving defense technology.

GGNRA includes cultural landscapes, structures, features, and museum collections, including historic fortifications and military installations. The national significance of the seacoast fortifications and Army installations of San Francisco Bay is of the highest order. They possess exceptional value in illustrating the military heritage of the United States and its effects on the broad national patterns of United States social, economic, geographical, and international history. GGNRA includes fortifications and installations that embody an extraordinary range of distinguishing characteristics of military architecture, engineering, style, and construction; collectively have exceptional historical significance; illustrate military culture and yield information on the occupation of these lands; and provoke thoughts about and engage visitors in a discussion of war, peace, and the nature of protection.

Museum collections related to the United States military history receive high emphasis in order to present a representative picture of this important aspect of the park's history. The park has a museum collection of more than 4.7 million objects, including archeological and historical objects and archives, historic documents, and records; the majority of these are related to the military history of the park. Of particular importance are the documents relating to the layout, construction, development, and operation of the fortifications and the Army posts that supported them.

The park significance statement indicates that Alcatraz Island has cultural landscapes, historic structures, museum collections, and stories associated with its use as a Civil war fort, military prison, federal penitentiary, and the Indian Occupation of 1969 to 1971. The 26-acre island is best known for its sinister reputation as the maximum security, minimum-privilege federal penitentiary that house some of America's most notorious criminals. The resources include military-era fortifications, a lighthouse, fog signal building, museum collections, and remnants of the Indian Occupation.

According to the park's List of Classified Structures (LCS), there are 482 structures managed by the NPS that are classified as "Defense." In 2006, 39 percent of these structures were considered to be in fair condition and 30 percent were in poor condition. There are 47 structures on Alcatraz Island designated as historic and 53 percent are considered in fair condition and 17 percent are considered poor. The most significant threats to the resources are the harsh marine environment, lack of occupation, and their remoteness. The moist, salt laden air; drainage and ventilation problems; and erosion accelerate resource deterioration. Because of the structures remote locations and uncontrolled public access, these fortifications are subject to vandalism. Most park cultural landscapes are in fair condition, and are threatened by incremental partner-and visitor-driven changes, erosion, and especially aging trees.

As of 2005, the park was housing its museum collections in ten separate facilities. Many of these locations are substandard and none of them meet NPS museum standards. The museum collections will continue to deteriorate without suitable facilities.

Archeological sites within GGNRA also document the traditional homelands of the Coast Miwok and Ohlone people. These sites constitute the most tangible connection between Coast Miwok and Ohlone peoples and the parklands, and provide a basis for understanding the history of their lifeways and cultures. That native people were severed from their homelands in the park for two centuries due to European and American colonialism and their traditional connections to place irreparably ruptured, magnifies the significance of indigenous archeological sites as focal points of native heritage today. Most of the known indigenous archeological sites in the park are below ground and stable, although sites located along the coast (coastal vulnerability), in unstable geological areas, and at the edge of bluffs, are subject to erosion. Other threats include development, "pot-hunting," and inadvertent damage as a result of visitor use of the park. The greatest threat of all may be ignorance; only a small fraction of the park has been surveyed for

indigenous archeological sites, so the park lacks of knowledge with regard to site identification and significance evaluation.

Potential Impacts to Cultural Resources from Dog Walking

There would be no impact to the 4.7 million park museum collections at GGNRA from dog walking activities. The museum collections are housed within ten separate facilities throughout the park. With the exception of service dogs, no dogs would be allowed within the buildings housing the collections. There would be no impact to the cultural landscapes, historic structures, and museum collections associated with Alcatraz Island. With the exception of service dogs, dog walking would be prohibited from the island. In addition, there would be no impacts to known archeological sites related to the traditional homelands of the Coast Miwok and Ohlone people.

Impacts to cultural resources from dog walking activities were analyzed for ten sites which include Muir Beach, Lands End, Fort Mason, Fort Funston, Fort Miley, Crissy Field, Fort Baker, Marin Headlands Trails, Fort Point, and Baker Beach. There would be no impact to cultural resources at the remaining eleven sites (Stinson Beach, Homestead Valley, Alta Trail/Orchard Fire Road/ Pacheco Fire Road, Oakwood Valley, Rodeo Beach, Sutro Heights Park, Ocean Beach, Mori Point, Milagra Ridge, Sweeney Ridge/Cattle Hill, and Pedro Point Headlands) since no known cultural resources are found at the site. Both surface and subsurface archeological resources could be impacted by dog walking through digging and trampling of the resources. Soil erosion as a result of dog walking would also create impacts to archeological resources. One archeological site is located in the vicinity of Muir Beach and two sites are located in the Lands End area. To minimize impacts to the resources at Muir Beach, no dog walking would be allowed on the beach itself and on-leash dog walking would be required in the parking lot and trail. At Lands End, on-leash dog walking would be allowed on designated trails. The trails proposed for on-leash dog walking are not located within the immediate proximity to the archeological sites; therefore, restraining dogs to a 6-foot leash would offer considerable protection of the resources. For purposes of Section 106 of the NHPA, assessment to archeological resources would be no adverse effect.

Historic structures at the park include permanent seacoast fortifications and their integral earthworks at Forts Baker, Barry, and Cronkhite Historic District (Fort Baker); the Presidio NHL (Forts Scott and Point); Fort Mason Historic District; Fort Miley Military Reservation; and Battery Davis at Fort Funston. An additional historic structure includes the Crissy Airfield. Dog walking can negatively affect sensitive seacoast fortification earthworks through trampling and digging. Ground disturbance by dogs can exacerbate natural erosion processes and ultimately affect the overall integrity of the park's seacoast fortification resources. Dogs can also trample/kill vegetation and cause increased compaction in highly used areas. Both contribute to erosion and increased runoff. To minimize impacts to these resources, on-leash dog walking would be required in areas in close proximity to the historic structures. These on-leash areas do not include direct access to the earthwork portions of the seacoast fortifications. These restrictions provide a greater level of protection for these fragile resources by reducing potential dog-related trampling and ground disturbance. Fencing would be used around the perimeter of Battery Davis at Fort Funston and Battery East at Fort Point within the Presidio NHL as an additional protective measure. Fencing would serve as an effective barrier to visitors and dogs. A ROLA is proposed within the center of the Crissy Airfield. In the past dog walking under voice control did not show any apparent signs of impacts to Crissy Airfield. For purposes of Section 106 of the NHPA, assessment to historic resources would be no adverse effect.

Cultural landscapes at the park include Fort Baker, Barry, and Cronkhite (FBBC) Historic District which includes field fortifications, the Presidio of San Francisco NHL, Fort Mason Historic District, and Fort Miley Military Reservation. Dog walking activities could result in trampling, digging, and increased erosion, which could impact the cultural landscapes of these areas. To prevent impacts to these resources,

on-leash dog walking would be required within designated trails, common areas, parking lots, and picnic areas. The restriction to on-leash dog walking within these areas would minimize the potential for dog-related trampling and ground disturbance to these cultural resources. For purposes of Section 106 of the NHPA, assessment to cultural landscapes would be no adverse effect.

It is expected that all new lands would be surveyed to determine whether sensitive cultural resources exist at the site prior to designating dog management for an area. To minimize the impacts to listed species, if new lands are opened to dogs, on-leash dog walking would be required. An area could only be opened to on leash dog walking if it would not: 1) impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or 2) create an unsafe or unhealthful environment for visitors or employees, or 3) impede or interfere with park programs or activities. To minimize impacts to any archeological resources, historic structures, or cultural landscapes within the new lands, dog walking would not be permitted within close proximity to any known resources.

Under the compliance-based management strategy, park staff would regularly monitor dog walking activities at the park sites to ensure that visitors with dogs are in compliance with new and existing regulations, including picking up pet waste, not going outside of on-leash areas or ROLAs, as well as monitoring for cultural resource disturbance, all of which would directly benefit the cultural resources throughout GGNRA. Where noncompliance over a period of time is observed, multiple, targeted management strategies would take effect to bring compliance back to acceptable levels, or if that fails, not allow the use.

Conclusion

The enabling legislation and purpose of the park is intended to allow recreational opportunities to visitors, while preserving the natural and cultural resources of the park. The enabling legislation allows for a broad range of recreational activities which would cause impacts to cultural resources similar to dog walking; the enabling legislation foresees not only that these impacts would occur, but deems them appropriate when managed "consistent with sound principles of land use planning and management." There would be no impact to the 4.7 million park museum collections at GGNRA from dog walking activities. The museum collections are housed within ten separate facilities throughout the park. With the exception of service dogs, no dogs would be allowed within the buildings housing the collections. There would be no impact to the cultural landscapes, historic structures, and museum collections associated with Alcatraz Island. With the exception of service dogs, dog walking would be prohibited from the island. In addition, there would be no impacts to known archeological sites related to the traditional homelands of the Coast Miwok and Ohlone people.

The preferred alternatives include restricting dog walking from sensitive cultural resources areas and installing fencing around the perimeter of Batteries Davis and East. Prohibiting dogs in certain areas would eliminate or minimize potential damage to archaeological resources, historic structures and cultural landscapes. On-leash dog walking would be required at most sites where cultural resources occur. The on-leash dog walking designation requires walkers to have full control of their dog(s) through a physical restraint with a leash no longer than 6 feet. These restrictions would result in a decreased potential for trampling and ground disturbance of sensitive archeological sites, historic structures (earthwork portions of seacoast fortifications) and cultural landscapes (including field fortifications) by visitors with dogs. Allowing dog walking under voice and sight control at Crissy Airfield has resulted in no apparent impact to the resource. . The preferred alternatives have been designed to avoid dog walking activities within the immediate area of cultural resources. For purposes of Section 106 of the NHPA, assessment would be *no adverse effect*. GGNRA would continue to include the largest and most complete collection of military installations and fortifications in the country, as well as, contain one of the most extensive collections of

historic architecture in the national park system. Although negligible impacts to cultural resources from dog walking activities may occur, the preferred alternatives would not rise to the level of impairment.