GMP
Natural Resource Impact Threshold Definitions

Impacts are determined by comparing projected changes resulting from the action alternatives (1, 2, and 3) to the no-action alternative (continue current management). For all impact topics the analysis, cumulative impacts, and conclusion sections are conducted at the park-wide level supported by discussion specific to the counties or to individual planning areas/sites where the impacts differ from those identified at the park-wide level. For example, for vegetation and wildlife, a park-wide analysis of the impacts of the alternatives would appear first, followed by specific discussions for Marin County and at two sites, Stinson Beach and Rodeo Valley, where impacts to vegetation and wildlife differ from those described at the park-wide level. A description of the impacts at the county level or at individual planning areas/sites would occur only when they differ from the park-wide analysis and conclusions.

NATURAL RESOURCES

Physical Resources

- Soils and Geologic Resources and Processes
  (including: shoreline and coastal processes)

- Water Resources and Hydrologic Processes
  - Marine and Estuarine (including: water quality, ocean stewardship)
  - Terrestrial/Freshwater (including: stream character, water quantity and quality, watershed processes, wetlands, and floodplains)

- Air Quality

- Carbon Footprint

- Natural Lightscape (Dark Night Skies)

- Natural Soundscape

Biological Resources

- Habitats (Vegetation and Wildlife)
  - Marine and Estuarine (including: aquatic vegetation and wildlife)
  - Terrestrial (including: freshwater and wetland plant communities and wildlife)

- Special Status Species
  (including: Federal and State-listed threatened and endangered species, and federal candidate species) [MUWO = Northern spotted owl, coho salmon, steelhead; ALCA = chinook (has designated critical habitat in waters around Alcatraz); GOGA Marin County = California red-legged frog (critical habitat), Mission blue butterfly, tidewater goby, California brown pelican, Chinook (critical habitat in SF Bay), Northern spotted owl, coho salmon (critical habitat), steelhead; GOGA SF County = snowy plover, Chinook, bank swallow (state-listed), San Francisco lesingia; GOGA SM County = San Francisco garter snake, Mission blue butterfly, San Bruno elfin butterfly, California red-legged frog, steelhead, Montara Manzanita (state-listed)]

Soils and Geologic Resources and Processes

Methods and Assumptions for Analyzing Impacts

The effects of the alternatives on soils and geologic resources (including shoreline and coastal processes) are analyzed based on the possibility of impacts resulting primarily from facility development and visitor use.

The thresholds to determine the impact intensity for these resources are defined as follows:

Negligible: The impact is barely detectable and/or would result in no measurable or perceptible changes to soils and geologic resources or processes. The effects on soil productivity and natural shoreline/coastal processes would be slight. Disruptions to key geologic processes would be well within the natural range of variability.

Minor: The impact is slight but detectable, and/or would result in small but measurable changes to soils and geologic resources; the effect would be localized. There could be changes in a soil's profile in a relatively small area, but the change would not noticeably increase the potential for erosion. Disruptions to natural shoreline/coastal processes processes would be within the natural range of variability.

Moderate: The impact is readily apparent and/or would result in easily detectable changes to soils or geologic resources; the effects would be localized. The effect on soil productivity and natural shoreline/coastal processes would be apparent. The potential for erosion to remove small quantities of additional soil would noticeably increase or decrease. Disruptions to key geologic processes are expected to be within the natural range of variability.

Major: The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to soils or geologic resources; the effect would be regional in scale. There would be a strong likelihood that erosion would remove large quantities of additional soil or erosion would be substantially reduced. Disruptions to natural shoreline/coastal processes are expected to be outside the natural range of variability and may be permanent.

Water Resources and Hydrologic Processes

- Terrestrial/Freshwater (including: stream character, water quantity and quality, watershed processes, wetlands, and floodplains)
- Marine and Estuarine (including: water quality, ocean stewardship)

Methods and Assumptions for Analyzing Impacts

Terrestrial/freshwater resources (including stream character, water quantity and quality, watershed processes, wetlands, and floodplains) are analyzed together in this section because of the similarities of these resources, their interrelationship to each other, and their collective effect on the overall integrity of hydrologic systems in the two parks. For example, the health of a creek not only influences the ability of a floodplain to store and convey water, but also affects bank stability, which contributes to the natural sinuosity of a creek. Healthy riparian vegetation can also filter pollutants before reaching a creek, which in turn affects water quality. Also, many riparian areas are often referred to as wetlands, depending in part on the duration their soils remain saturated each year. Together, all of these elements affect hydrologic processes that can influence the condition of a watershed. Marine and estuarine resources/systems are discussed with a focus on water quality and ocean stewardship. Although impacts to terrestrial/freshwater and marine/estuarine resources and systems are discussed and analyzed separately, one conclusion is presented for water resources as a whole.

The following impact thresholds have been developed for analyzing water resources:

Negligible: Stream character, water quality, watershed processes, wetlands, and floodplains would not be impacted, or the impacts would be either undetectable or if detected, the effects would be considered slight, localized, and short-term. Any measureable changes would be within the natural range of variability.

Any impacts to marine/estuarine water quality and opportunities for ocean stewardship and management would be slight, localized, and mostly inconsequential.

Minor: Impacts (chemical, physical, or biological) to stream character, water quality, watershed processes, wetlands, and floodplains would be small, short-term, and localized. Natural processes, functions, and integrity would be temporarily affected, but would be within the natural range of variability. The impacts would only affect a few individuals of plant or wildlife species dependent on one or more of these water-related resources. Any changes would require considerable scientific effort to measure and have barely perceptible consequences.

Any impacts to marine/estuarine water quality and opportunities for ocean stewardship and management may be noticeable and would be short-term – it would require considerable scientific effort to measure and have barely perceptible consequences.

Moderate: Impacts (chemical, physical, or biological) to stream character, water quality, watershed processes, wetlands, and floodplains would be readily apparent, long-term, and localized. Natural processes, functions, and integrity would be affected, but would be only temporarily outside the natural range of variability. The impacts would have a measurable effect on plant or wildlife species dependent on one or more of these water-related resources, but all species would remain indefinitely viable within the parks.

Any impacts to marine/estuarine water quality and opportunities for ocean stewardship and management would be noticeable and may be long-term.

Major: Impacts (chemical, physical, or biological) would have drastic and permanent consequences for stream character, water quality, watershed processes, wetlands, and floodplains, which could not be mitigated. Species dependent on one or more of these water-related resources would be at risk of extirpation from the park. Changes would be readily measurable, outside the natural range of variability, would have substantial consequences, and would be noticeable on a regional scale.

Any impacts to marine/estuarine water quality and opportunities for ocean stewardship and management would be readily noticeable, long-term, and would cause permanent damage or benefit.

Air Quality

Negligible: Impacts would result in a change to local air quality, but the change would be so slight that it would not be of any measurable or perceptible consequence. These changes would not affect the attainment status of the airshed, and would be consistent with the airshed designation of the parks. Emissions would be substantially less than any applicable air emissions regulatory thresholds.

Minor: Impacts would result in a detectable change to local air quality, but the change would be small and of little consequence. These changes would not affect the attainment status of the airshed, and would be consistent with the airshed designation of the parks. Emissions would be considerably different than any applicable air emissions regulatory thresholds.

Moderate: Impacts would result in a change to local air quality that would be readily detectable. Impacts could affect the attainment status of the airshed, and could be inconsistent with the airshed designation of the parks.

Major: Impacts would result in a change(s) to regional air quality that would be severe. These changes would affect the attainment status of the airshed, and/or be inconsistent with the airshed designation of the parks.

Carbon Footprint

Methods and Assumptions for Analyzing Impacts

Certain actions included in the alternatives of the plan would have an effect on the parks' total greenhouse gas (carbon dioxide - CO2) emissions, known as the carbon footprint. Since some of the actions could increase CO2 emissions, like the construction of new facilities; and other actions could reduce CO2 emissions, like providing alternative transportation and reducing visitors' dependency on personal automobiles, it is important to evaluate the impact that these actions could have on contributing to global warming. Although the NPS would pursue sustainable practices whenever possible in all decisions regarding operations, facilities management, and development in the parks, and the parks' focus on using renewable energy is a continuation of current management trends, the changes in energy consumption, energy availability, or costs compared to current conditions is of interest to NPS managers and the public.

The analysis of the effects of actions contained in this plan on the parks' carbon footprint is based on a comparison with existing conditions. The baseline that is used for comparison is the carbon footprint (total greenhouse gas emissions) of the no-action alternative, which is included in Chapter 3, "Affected Environment". GOGA inventoried its emissions in 2006 as part of their Climate Change Action Plan using the NPS and EPA Climate Leadership in Parks (CLIP) tool. The CLIP tool converts emissions of various greenhouse gases into a common "metric tons of carbon equivalent" unit, which provides a basis for comparison among gases and simplifies reduction tracking. The conversion of a greenhouse gas to metric tons of carbon equivalent is based upon how strongly that particular gas contributes to the greenhouse effect, and how many tons of carbon emission would have the same effect.

The impact of greenhouse gas emissions for all actions under each of the alternatives is assessed in comparison to existing conditions. The nature of the impact assessment is general and qualitative, providing a general determination of whether or not the actions would have a beneficial, neutral, or adverse impact on the parks' carbon footprint.

The thresholds to determine impact intensity are defined as follows:

Negligible: The action would result in a change in total greenhouse gas emissions, but the change would be at the lowest level of detection, or not measurable.

Minor: The action would result in a slight, but detectable, change in total greenhouse gas emissions.

Moderate: The action would result in a modest change in total greenhouse gas emissions.

Major: The action would result in a substantial change in total greenhouse gas emissions.

Natural Lightscape (Dark Night Skies)

Waiting on info. from Chad Moore – NPS Night Skies Program

Natural Soundscape

Negligible: The natural sound environment might be affected, but the effects would be at or below the level of detection, or changes would be so slight they would not be of any measurable or perceptible consequence to wildlife or visitors.

Minor: There would be a detectable change in the natural sound environment, but the effects would be small, local, and of little consequence to wildlife or visitors.

Moderate: A change in the natural sound environment would be readily detectable, affecting the behavior of wildlife or visitors in a large area.

Major: A severely adverse or exceptionally beneficial change in the natural sound environment would be obvious and would affect the health of wildlife or visitors; or cause a substantial, highly noticeable change in the behavior of wildlife or visitors in a local or regional area.

Habitat (Vegetation and Wildlife)

- Terrestrial (including: freshwater and wetland plant communities and wildlife)
- Marine and Estuarine (including: aquatic vegetation and wildlife)

Methods and Assumptions for Analyzing Impacts

Vegetation and wildlife are addressed together in this section, because an analysis of potential impacts to wildlife typically involves a discussion of wildlife habitat, which consists of various vegetation and aquatic communities found within the parks. Threatened and endangered species associated with these resources are discussed under a separate impact topic. The effects of the alternatives on marine resources and habitat are analyzed based on the possibility of impacts resulting primarily from facility development and visitor use.

The thresholds to determine impact intensity for these resources are defined as follows:

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within natural fluctuations. Improvements to native biodiversity would be imperceptible.

The impact to marine/estuarine resources is barely detectable and/or would result in no measurable or perceptible changes. Impacts to individual species or biological communities would be slight. Changes in behavior or disruptions to habitat would be well within the natural range of variability.

Minor: Impacts would be detectable, but they would not be expected to be outside the natural range of variability and would not be expected to have any long-term effects on native species, their habitats, or the natural processes sustaining them.

Population numbers, population structure, genetic variability, and other demographic factors for species might have small, short-term changes, but long-term characteristics would remain stable and viable. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, or other factors affecting population levels.

Key ecosystem processes might have short-term disruptions that would be within natural variation. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species. Improvements to native biodiversity may be detectable, but would not result in measurable improvements in ecosystem resiliency.

The impact is slight but detectable, and/or would result in small but measurable changes to marine

resources. There could be impacts to individuals or communities in a relatively small area, but the change would not affect the integrity of the resource and would be within the natural range of variability.

Moderate: Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the parks.

Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability for short periods of time. Population numbers, population structure, genetic variability, and other demographic factors for species might have short-term changes, but would be expected to rebound to pre-impact numbers and to remain stable and viable in the long term. Frequent responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, or other factors affecting short-term population levels.

Key ecosystem processes might have short-term disruptions that would be outside natural variation (but would soon return to natural conditions). Sufficient habitat would remain functional to maintain viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat for sensitive native species. Improvements to native biodiversity would be detectable and could result in measurable improvements in ecosystem resiliency.

The impact is slight but detectable, and/or would result in small but measurable changes to marine resources. There could be impacts to individuals or communities in a relatively small area, but the change would not affect the integrity of the resource and would be within the natural range of variability.

The impact is readily apparent and/or would result in easily detectable changes to marine resources and habitat. There could be impacts to individuals or communities that extend beyond the original point of disturbance or impact, but the change would not affect the integrity of the resource and would be expected to be within the natural range of variability.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability for long periods of time or be permanent.

Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines, with long-term population numbers significantly depressed. Frequent responses to disturbance by some individuals would be expected, with negative impacts to feeding, reproduction, or other factors resulting in a long-term decrease in population levels. Breeding colonies of native species might relocate to other portions of the park.

Key ecosystem processes might be disrupted in the long term or permanently. Loss of habitat might affect the viability of at least some native species. Improvements to native biodiversity would be detectable and permanent and would result in substantial improvements in ecosystem resiliency.

The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to marine resources and habitat; the effect would be regional in scale. Impacts would result in a reduction in species numbers, alteration in behavior, reproduction, migration, or survival. Severe adverse impacts would alter or destroy habitat in such a way that would prevent biological communities that inhabited

the area prior to the action from establishing themselves. These impacts are expected to be outside the natural range of variability and may be permanent.

Special Status Species

(including: Federal and State-listed threatened and endangered species, and federal candidate species) [MUWO = Northern spotted owl, coho salmon, steelhead; ALCA = chinook (has designated critical habitat in waters around Alcatraz); GOGA Marin County = California red-legged frog (critical habitat), Mission blue butterfly, tidewater goby, California brown pelican, Chinook (critical habitat in SF Bay), Northern spotted owl, coho salmon (critical habitat), steelhead; GOGA SF County = snowy plover, Chinook, bank swallow (state-listed), San Francisco lesingia; GOGA SM County = San Francisco garter snake, Mission blue butterfly, San Bruno elfin butterfly, California red-legged frog, steelhead, Montara Manzanita (state-listed)]

Methods and Assumptions for Analyzing Impacts

Federal and state listed threatened and endangered species are addressed together in this section, because many of these species (1) have dual federal and state special status, (2) occur together in the same habitats, or (3) would be impacted similarly under each alternative. However, for federally listed and candidate species, impact thresholds are defined based on terminology from Section 7 of the Endangered Species Act (ESA), as described below:

No effect: When a proposed action would not affect a federal listed species, candidate species, or designated critical habitat.

May affect, not likely to adversely affect: Effects on federal listed or candidate species are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or are completely beneficial.

May affect, likely to adversely affect: Adverse effects to a federal listed or candidate species may occur as a direct or indirect result of proposed actions and the effects are either not discountable or completely beneficial.

Likely to jeopardize proposed species/adversely modify proposed critical habitat (impairment): The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies situations in which the proposal could jeopardize the continued existence of a federal listed or candidate species or adversely modify critical habitat to a species within or outside park boundaries.

The following impact threshold definitions are used to describe the severity and magnitude of changes to federal and state listed species under each of the alternatives. Each threshold definition references the Endangered Species Act determinations for Section 7 consultation described above.

Negligible: Adverse impact — There would be no observable or measurable impacts to federal or state listed species, their habitats (including critical habitat designated under the Endangered Species Act), or the natural processes sustaining them in the proposed project area. For federal listed species, this impact intensity would equate to a determination of “no effect”.

Beneficial impact — There would be no observable or measurable impacts to federally-listed species, their habitats, or the natural processes sustaining them in a park site. For federal listed species, this impact intensity would equate to a determination of “no effect”.

Minor: Adverse impact — Impacts would not affect critical periods of life-cycle processes (e.g. reproduction) or their habitat. Individuals may temporarily avoid areas. Essential features of critical habitat would not be impacted. For federal listed species, this impact intensity would equate to a determination of “may affect, not likely to adversely affect”.

Beneficial impact — Impacts would result in slight increases to viability of the species in the park as species-limiting factors (e.g. habitat loss, competition, and mortality) are kept in check. Non-essential features of critical habitat in a park site would be slightly improved. For federal listed species, this impact intensity would equate to a determination of "may affect, not likely to adversely affect".

Moderate: Adverse impact — Individuals may be impacted by disturbances that interfere with critical life-cycle processes or their habitat; however the level of impact would not result in a physical injury, mortality, or extirpation from the park. Some essential features of designated critical habitat would be reduced; however the integrity of the habitat would be maintained. For federal listed species, this impact intensity would equate to a determination of "may affect, likely to adversely affect".

Beneficial impact — Impacts would result in slight increases to viability of the species in the park as species-limiting factors (e.g. habitat loss, competition, and mortality) are reduced. Some essential features of critical habitat would be improved. For federal listed species, this impact intensity would equate to a determination of "may affect, not likely to adversely affect".

Major: Adverse impact — Individuals may suffer physical injury or mortality or, in extreme adverse cases, populations may be extirpated from the park. Essential features of designated critical habitat would be reduced affecting the integrity of the designated unit. For federal listed species, this impact intensity would equate to a determination of "may affect, likely to adversely affect".

Beneficial impact — Impacts would result in highly noticeably improvements to species viability, population structure, and species population levels in the park, as species-limiting factors (e.g. habitat loss, competition, and mortality) are eliminated. All essential features of critical habitat would be improved. For federal listed species, this impact intensity would equate to a determination of "may affect, not likely to adversely affect".