

GMP Impacts Workshop Schedule - January 2009

Golden Gate National Recreation Area • Muir Woods National Monument



| | Monday Jan 19 | Tuesday Jan 20 | Wednesday Jan 21 | Wednesday Jan 21 | Thursday Jan 22 | Friday Jan 23 |
|----------------|----------------------------|--|---|---|--|---|
| | <i>Concurrent Sessions</i> | | | | | |
| 8:30 | MLK Jr. HOLIDAY | <i>(Inauguration Day)</i> | Cultural Resources Division (Lower Fort Mason Room C210) Environmental Consequences Workshop continues | Interpretation & Planning Divisions (Lower Fort Mason Room C210) Environmental Consequences Workshop begins | Natural Resources Division (Lower Fort Mason Room C210) Environmental Consequences Workshop continues | GMP Steering Committee (Location TBA) 8:30-10:00am |
| 9:00 | | | | | | |
| 10:00 | | | | | | |
| 11:am | | GMP Steering Committee (Location TBA) 11:00am-1:00pm | Lunch | Lunch | Lunch | |
| Noon | | | | | | |
| 1:00 | | Cultural Resources Division (Lower Fort Mason Room C210) Environmental Consequences Workshop begins | Natural Resources Division (Lower Fort Mason Room C210) Environmental Consequences Workshop begins | Interpretation & Planning Divisions (Lower Fort Mason Room C210) Environmental Consequences Workshop continues | Natural Resources Division (Lower Fort Mason Room C210) Environmental Consequences Workshop continues | |
| 4:30 | | | | | | |
| Other Meetings | | | | | | |
| | | Mgmt Zone Changes 8 to 8:30 am Transportation, Mike Savage 9 to 10 am GMP Coordination meeting 2 pm to 5 pm NH, BA, SN | Climate change, Laura Castellini 10 to 11 am Native Americans, Scolari 3 to 5 pm | | GMP Coordination meeting 2 pm to 5 pm NH, BA, SN | |

GMP Steering Committee's Agenda:

1. Coordinate the work calendar for 2009.
2. Topics: new management zone, boundaries, climate change, trail policy, low mission assets, Native American policy, finalize alternatives.

Agenda for the Environmental Consequences Workshops:

1. Discuss impact topics (retained and dismissed)
2. Discuss organization of EIS, tiering
3. Review, affirm, or add to DSC's list of potential impacts concerning your resource of expertise.
4. Information sharing and strategy for accessing specific data, plans, and reports.

GMP Steering Committee: O'Neill, Bartling, Hatch, Hornor, Kenkel, Levitt, Aviles, Mannel, Ruan, Hurst, Powell, Savidge

Suggested Participants List: Please review and add or subtract participants.

Nat. Res.: Hatch, Merkle, Fong, Williams, Fritzke

Cult. Res.: Kenkel, Fisher, Haller, Scolari, Hagin

Interp. & Planning: Levitt, Viets, Aviles, Savidge, Hornor, Monroe

DSC: Nofield, Malone, Unrau

DRAFT – FOR INTERNAL REVIEW ONLY

Boundary Adjustments and the GMP

Chapter 1

Law and Policy

NPS *Management Policies 2006* (Section 2.3.1.1) and NPS Park Planning Program Standards require general management plans to address changes to a park's boundary. The boundary of a national park unit may be modified only as authorized by law. For many parks, such statutory authority is included in the enabling legislation or subsequent legislation that specifically authorizes a boundary revision. Where park-specific authority is not available, the [Land and Water Conservation Fund Act of 1965](#), as amended, provides an additional but limited authority to adjust boundaries.

The LWCF Act provides for boundary adjustments that essentially fall into three distinct categories: (1) technical revisions; (2) minor revisions based upon statutorily defined criteria; and (3) revisions to include adjacent real property acquired by donation, purchased with donated funds, transferred from any other federal agency, or obtained by exchange. Adjacent real property is considered to be land located contiguous to but outside the boundary of a national park system unit.

NPS *Management Policies 2006* (Section 3.5) state that

“the Park Service will identify and evaluate boundary adjustments that may be necessary or desirable for carrying out the purposes of the park unit. Boundary adjustments may be recommended to

- protect significant resources and values, or to enhance opportunities for public enjoyment related to park purposes;
- address operational and management issues, such as the need for access or the need for boundaries to correspond to logical boundary delineations such as topographic or other natural features or roads; or
- otherwise protect park resources that are critical to fulfilling park purposes.”

If the acquisition will be made using appropriated funds, and it is not merely a technical boundary revision, the criteria set forth by Congress at [16 USC 4601-9\(c\)\(2\)](#) must be met. All recommendations for boundary changes must meet the following two criteria:

- The added lands will be feasible to administer considering their size, configuration, and ownership; costs; the views of and impacts on local communities and surrounding jurisdictions; and other factors such as the presence of hazardous substances or exotic species.
- Other alternatives for management and resource protection are not adequate.

These criteria apply conversely to recommendations for the deletion of lands from the authorized boundaries of a park unit. For example, before recommending the deletion of land from a park boundary, a finding would have to be made that the land did not include a significant resource, value, or opportunity for public enjoyment related to the purposes of the park. Full consideration should be given to current and future park needs before a

recommendation is made to delete lands from the authorized boundaries of a park unit. Actions consisting solely of deletions of land from existing park boundaries would require an act of Congress.

Federal fee-simple ownership (all of the rights associated with real property) provides the National Park Service with the greatest ability to protect and manage resources and provide for public use and enjoyment. Less-than-fee interests (some of the rights associated with real property) require a federal commitment to monitor and enforce the Service's interest in the affected property. Acquisition of less-than-fee interests may be appropriate in instances in which the Service needs only a specific interest in land, or in which it needs to modify uses of the land to protect resources or values but full fee ownership is not required or possible.

Acquisition of fee-simple interests is a critically important and effective land protection method for lands within park unit boundaries. The Service may employ, as appropriate, a broad strategy to protect land and resources, including innovative techniques; partnerships; participation in the planning and decision-making processes of other federal agencies; and vigilance at the regional and local levels of government where nonfederal land use decisions are generally made.

Authorizing Legislation for GOGA

The park's enabling legislation (PL 92-589) states that "the Secretary may make minor revisions of the boundaries of the recreation area when necessary by publication of a revised drawing or other boundary description in the Federal Register." This law also states that "within the boundaries of the recreation area, the Secretary may acquire lands, improvements, waters, or interests therein, by donation, purchase, exchange, or transfer. Any lands, or interests therein, owned by the State of California or any political subdivision thereof, may be acquired only by donation. When any tract of land is only partly within such boundaries, the Secretary may acquire all or any portion of the land outside of such boundaries in order to minimize the payment of severance costs."

The authorized boundary of the recreation area has been adjusted many times since the passage of PL 92-589 in 1972. Most of the boundary adjustments have been codified through law. However, acquiring a property that is adjacent to, and contiguous with, the boundary of the recreation area could be considered a minor boundary adjustment, which would only require approval from the Secretary of the Interior and then publishing a notice in the Federal Register.

Chapter 2

General Guidance (common to all alternatives)

GGNRA will develop a land protection plan based on the GMP preferred alternative that will enable the park to

- play a partnership role in regional land protection efforts
- coordinate land acquisition opportunities with other public land managers adjacent to GGNRA when goals and objectives are shared
- critically evaluate potential acquisition lands to ensure that the park is not accepting liabilities or undue management burdens that are unrelated to park goals
- explore funding opportunities to support the rehabilitation and long-term stewardship of all newly acquired properties.

Boundary Adjustment Notes by Alternative

Alt 1 – Connecting People with the Parks

Vision:

A diversity of park settings and opportunities would encourage, attract and welcome diverse current and future populations while maintaining the integrity of the park's ecosystems.

Goals:

- Connectivity between communities (~~including underserved communities~~) and park sites is assured and enhanced through acquisition or protection strategies for lands, trails, trailheads, and hubs that support park access
- ~~Public lands adjacent to GGNRA managed lands are protected to provide enhanced recreation or protection of existing park settings that enhance visitor experience~~
- Rural, wild landscapes and marine areas are preserved to enhance the scenic and recreational setting and increase visitor opportunities in the park or in local communities

Notes & Ideas to Evolve the Goals:

- Relevancy to people
- See Haller's list of important cultural resources for San Mateo County
- Point Montara Lighthouse
- State Lands leases (matching to park boundary, contiguity)
- Preserving rural landscape/heritage (i.e., Tomales Bay)
- Urban infill – brownfields to parks
- Regional trail gaps
- Improve access to parks [trails, trailheads, remote parking (i.e., Marin City, Manzanita PNR, San Bruno trailhead)]
- Connections to communities with visitor serving facilities (Sharp Park, Lincoln Park)
- Connecting important resources, missing pieces (Corral de Tierra)

Alt 2 – Preserving and Enjoying Coastal Ecosystems

Vision:

Coastal ecosystems are enhanced by filling habitat gaps, creating habitat linkages, and providing for recovery of special status species and survival of wide ranging wildlife. Land protection would be guided by a science-based approach that builds on the goals of cooperative regional efforts.

Goals:

- Reconnect fragmented habitat within and adjacent to both parks to restore landscape-level processes and increase ecosystem resiliency to climate change and urban pressures.
- Optimize recovery of special status species and survival of wide-ranging wildlife.
- Restore natural processes and/or allow these processes to evolve unimpeded to the greatest degree feasible.
- ~~Emphasize sites and stories about coastal resources, including shipwrecks, archeological sites, agricultural lands and uses, coastal defense, and lighthouses.~~
- Identify opportunities to integrate the science and goals of the following programs into the acquisition strategy: Upland Goals, SF Baylands and Subtidal Goals, Marine Protected Areas.
- Expand management of nearshore marine environment to protect critical marine resources and coastal islands and to address natural resource preservation needs that are not included in existing management agreements (BLM Monument; State Lands lease)
- ~~Expand management focus to the watershed level to restore landscape level processes~~

Notes & Ideas to Evolve the Goals:

- Attention to southern lands
- Marine boundary; Marine Protected Areas; Bolinas Lagoon
- State Lands leases (matching to park boundary, contiguity); BLM Monument islands (Daphne, need proper name)
- Cooperative acquisition and management
- Watershed protection (Redwood Creek, Tomales Bay)
- Connecting fragmented habitats (i.e. SF garter snake); connecting islands of land (Milagra Ridge)
- Consider Pillar Point area;
- Point Montara Lighthouse
- Consider the land requirements to support the park as a “center of science”, learning

Alt. 3 – Focusing on National Treasures

Vision:

Sites that contain national treasures or are essential to their preservation are protected.

Goals:

- 1) Land acquisition is focused on maintaining park significance and supporting the park’s fundamental resources and values.
- 2) Identify and acquire fundamental resources outside of park boundaries that would serve as showcased “national treasures” (e.g., Angel Island, lighthouses, viewsheds, offshore marine areas and islands)
- 3) Identify resources outside of park boundaries that contribute to the showcased sites and protect them through cooperative management arrangements or technical assistance.
- 4) Identify alternative management arrangements (including land exchange) for park lands that do not fully contribute to promoting the national treasures.

Notes & Ideas to Evolve the Goals:

- Controlled access point for Alcatraz
- See Haller’s list of important cultural resources for San Mateo County; Do we have all of the nationally significant resources? (acquisition or cooperative mgmt)
- Requirements for museum collections facility
- Park entrance - Ft. Mason – gas house cove marina
- Viewsheds; Watersheds (Tomales Bay, Bolinas Lagoon)
- Point Montara Lighthouse
- State Lands leases (matching to park boundary, contiguity)
- Muir Woods Park neighborhood
- Tourist Club
- Van Ness pump station as entrance
- Fort Point maintenance areas
- GG bridge
- Doyle Drive

Alt. 4 – Collaborating Regionally

Vision:

A seamless corridor of protected lands would be connected by local and regional parks, open spaces, and communities.

Goals:

- Visitor Experience
 - Use “gap analysis” to identify seamless public corridor and those key properties that would help fill breaks in this connection.
 - Develop land protection strategy that would make sense logistically and can range from acquisition to cooperative management to management by others-- any management entity would appear seamless to the public.
 - Identify major transportation hubs, trails, portals, etc. that would connect communities and parks both inside and outside NPS lands.
- Natural Resources
 - Partner with current regional planning efforts that are identifying key habitats and locations for protection (e.g., Upland Goals Project, Baylands and Subtidal Goals Project)*
 - Locally, use “gap” analysis to identify key natural resources within Park lands (e.g., SF garter snake and salmonids) that require habitat connectivity both inside and outside NPS lands
 - Develop land protection strategy that would make sense logistically and can range from acquisition to cooperative management to management by others-- any management entity would appear seamless in terms of resource protection (e.g., joint BMPs for roads and trails).

* think about whether regional planning effort link should be science-based or political (e.g., Upland Goals vs. Green Vision)

Notes & Ideas to Evolve the Goals:

- Change in wording from public to protected in vision statement is deliberate → there may be private lands with conservation easements that would meet seamless connection concept
- Transportation hubs; joint facilities (cooperative mgmt)
- Connecting trails and transit; remote parking
- Entrance portals to park (East near the pump house on Van Ness)
- Connections to inner city
- Wildlife connections through cities (over/underpasses)
- State Lands leases (matching to park boundary, contiguity);
- Contiguous habitat
- Watersheds and viewsheds

DRAFT

Addressing Climate Change in the GMP

CHAPTER 1: INTRODUCTION

PLANNING ISSUES – CLIMATE CHANGE

The GMP needs to address the issue of climate change because law and policy requires the NPS to do so and because climate change is likely to affect the park and its visitors during the planning horizon of this GMP (15-20 years). The effects of climate change are described in more detail below, but include variables that could have direct implications to resource management and park operations and could influence the way visitors use and experience the park.

The plan will provide guidance on how to assess, respond to, and interpret the impacts of global climate change on park resources, and will identify objectives for reducing the carbon footprint.

Context

Climate change is perhaps the most far-reaching and irreversible threat the National Park System has ever faced (NPCA 2007). Climate change in this context refers to a suite of changes occurring in the earth's atmospheric, hydrologic, and oceanic systems. These changes, including increased global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level, provide unequivocal evidence that the climate system is warming (IPCC 2007). While a warming trend, commonly referred to as global warming, is discernable over the entire past century and a half, recent decades have exhibited an accelerated warming rate with eleven of the last twelve years ranking among the 12 warmest years on record. Most of the observed temperature increase can be attributed to human activities that contribute heat trapping gases to the atmosphere (IPCC 2007). These "greenhouse gases", particularly carbon dioxide from the burning of fossil fuels, cause Earth's atmosphere to act like a blanket and trap the sun's heat. While the insulating effect (or greenhouse effect) of our atmosphere is important to living systems, the rapid increase in greenhouse gases since the mid 19th century has turned the thermostat up higher than what our systems are adapted to.

While climate change is a global phenomenon, it manifests itself differently in different places. One of the most dramatic effects of global warming is the impact on extreme weather events. A disrupted climate could affect natural and cultural resources, and is likely to interfere with public use and enjoyment of the parks. Although many places in the world have already observed and recorded changes that can be attributed to climate change (including a 7 inch rise in sea levels recorded at Fort Point), the range of impacts to GOGA and MUWO have not been specifically determined and the actual implications within the lifespan of this general management plan are unknown. The IPCC affirms that climate change is occurring; however, the rate and severity of impacts at the parks is not yet known. Climate change is a long-term phenomenon, and the likelihood that significant effects will be seen during the life of this GMP (15-20 years) is unknown at this time; however, acceleration of climate change impacts could have a more immediate effect on park resources and values.

Relevant Laws and Policies

Executive Order 13423 - Issued on January 24, 2007 by President George W. Bush, it requires federal agencies to "conduct their environmental, transportation, and energy-related activities under the law in support of their

respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.” It includes requirements for the reduction of greenhouse gases and other energy and water conservation measures. The order requires agencies to reduce greenhouse gas emissions by 3 % annually through the end of fiscal year 2015, or 30 % by the end of fiscal year 2015, relative to the baseline of the agency’s energy use in fiscal year 2003.

DOI Secretarial Order 3226 – Issued on January 19, 2001, the order ensures that climate change impacts are taken into account in connection with Departmental planning and decision making.

NPS Management Policies 2006 –

Section 4.7.2 states that “Parks containing significant natural resources will gather and maintain baseline climatological data for reference.” Management Policies also state that “The Service will use all available authorities to protect park resources and values from potentially harmful activities...NPS managers must always seek ways to avoid, or minimize to the greatest degree possible, adverse impacts on park resources and values.”

Section 9.1.1.6 discusses sustainable energy design, requiring any facility development to include improvements in energy efficiency and reduction in greenhouse gas emissions for both the building envelope and the mechanical systems that support the facility. Additionally, projects that include visitor centers or major visitor services facilities must incorporate LEED (Leadership in Energy and Environmental Design) standards to achieve a silver rating.

Section 9.1.7 requires the NPS to interpret for the public the overall resource protection benefits from the efficient use of energy, and to actively educate and motivate park personnel and visitors to use sustainable practices in conserving energy.

NPS Pacific West Region Directive PW-047 – Adopted on October 31, 2006, this managerial directive encourages the use of renewable energy to minimize the contribution of greenhouse gases by parks.

NPS Pacific West Region Directive PW-xxx – Adopted on _____, this managerial directive establishes a goal for all parks within the Pacific West Region to be “carbon neutral” by 2016.

GOGA Climate Change Action Plan – Adopted on _____, this plan establishes the framework and actions needed to reduce greenhouse gas emissions in the park and be “carbon neutral” by 2016.

Other Recommendations

As an environmental leader, the park plans to make an effort to go above and beyond legal requirements in greenhouse gas emissions, and therefore takes into consideration the goals set forth by other relevant agencies and advisory boards.

San Francisco’s Climate Action Plan (2004) – San Francisco’s Department of the Environment and Public Utilities Commission completed a Climate Action Plan in 2004. The reduction target established in this plan is 20 % below 1990 levels by 2012.

California Global Warming Solutions Act of 2006 (AB32) – California has committed to reducing its greenhouse gas emissions to 2000 levels by 2010 (11 % below business as usual), to 1990 levels by 2020 (25 % below business as usual), and 80 % below 1990 levels by 2050.

Western States Initiative (2007) – The states of Arizona, California, New Mexico, Oregon, Utah, and Washington, as well as the Canadian provinces of British Columbia and Manitoba agreed to a regional greenhouse gas emissions target of 15 % below 2005 levels by 2020 (33 % below business-as-usual levels).

Issues & Known and Predicted Changes

The GGNRA is one of the top twelve western national parks most at risk from climate disruption (The Rocky Mountain Climate Organization 2006). Climate change is expected to affect human health; damage infrastructure; alter crop production, animal habitats, and many other features of our natural and managed environments. The loss of beaches and historical and archaeological resources could also occur in the park. The next section describes the major issues resulting from climate change, and the known and predicted changes related to those issues. Following this discussion, there is a description of the potential impacts that could be realized as a result of these issues.

Issue: Sea level rise

Known Changes:

- During the past century, sea levels along California's coast have risen about seven inches. (California Climate Change Center 2006, and National Oceanic and Atmospheric Administration). A 7-inch rise in sea level was observed and recorded at NOAA's Fort Point station over the last 150 years (NOAA).

Predicted Changes:

- Rising mean sea levels in combination with increasingly severe winter storms and high tides is expected to cause more frequent and severe flooding, erosion, and damage to coastal systems and structures.
- If carbon emissions continue and temperatures rise, sea level could rise an additional 22-35 inches by the end of the century (California Climate Change Center 2006).

Issue: Temperature increases

Known Changes:

Predicted Changes:

- The IPCC reports that global average temperatures will increase over this century even if greenhouse gas emissions are kept at 2000 levels (November 16, 2007 Report).
- Average temperatures in California are expected to rise between 3 and 10.5 degrees Fahrenheit by the end of the century, depending upon the level of emissions; in the next three decades, temperatures are expected to rise between 1 and 2.3 degrees Fahrenheit (California Climate Change Center 2007).

Issue: Increased fire activity

Known Changes:

- The average fire season at Golden Gate has extended due to longer, hotter summers.

Predicted Changes:

- Continued increase in fire season.
- Increase in fires and fire intensity.

Issue: Weather is less predictable and more extreme

Known Changes:

- Since 1950, the world wide number of heat waves has increased, flood events have increased, and many areas have experienced longer droughts (IPCC 2007).

Predicted Changes:

- In a warmer future climate, extreme weather events are likely to increase in frequency and intensity (IPCC 2007).

Issue: Hydrologic Changes

Known Changes:

- Observations show that global changes are occurring in the amount, intensity, frequency, and type of precipitation (IPCC 2007).

Predicted Changes:

- While projections show little change in total annual precipitation in California (California Climate Change Center 2007), even modest changes to precipitation, including changes to the seasonality of rainfall, could cause disruption to ecosystems that are conditioned to historical precipitation levels and patterns.
- Impacts to fog are still debated. (Point Reyes is considered one of the foggiest places in the world, but in 2004 and 2005, the amount and timing of summer fogs were reduced because nearshore waters were warm. The fog patterns changed due to increased nearshore sea surface temperatures.) (Neubacher,)
- The municipal water source for San Francisco, and part of Golden Gate NRA, is from the Hetch Hetchy reservoir in Yosemite National Park. Predicted earlier snowpack melt could result in a longer dry season and jeopardize fresh drinking water in the park. Water supply for other areas of the park are generally from local surface water and groundwater systems which will be affected by changes in precipitation.

Issue: Air quality worsens

Known Changes:

Predicted Changes:

- Air quality is worsened due to increases in ground level ozone and airborne particulate matter, which stem from increased emissions and temperature increases.

Issue: Ocean currents shift and the ocean becomes more acidic (NPCA 2007)

Known Changes:

- In 2005 and 2006, researchers documented very low krill populations off Point Reyes and Golden Gate National Recreation Area, resulting in breeding failure for the seabird, Cassin's Auklet. The low krill levels are a result of later upwelling of the ocean, which brings nutrients to the area. The Cassin's Auklets were not the only species affected, rockfish and penguin-like common murrelets both struggled during these years to find food. Scientists believe these disruptions in the food webs may be climate related, and indeed, climate change forecast models have predicted these events (Kay, San Francisco Chronicle, 2006 and Barth, PNAS, 2007).

Management Goals and Guidance

Sustaining and restoring healthy parks will require the NPS to address many challenges - fiscal, ecological, and threats to the integrity of cultural and natural resources. The GMP describes the policy position that the parks will take to reduce their contribution to climate change, educate visitors on the topic, and adapt to climate change over the next 20 years. This information is independent of the alternatives and is considered park-wide guidance. While the parks are already undertaking projects that address climate change, such as reducing carbon emissions, there is more to be done. GOGA and MUWO aim to exceed legal requirements. The NPS intends to institutionalize the evaluation of climate change impacts into its decision making.

In order for GOGA and MUWO to respond to the issues and potential impacts associated with climate change as described in Chapter 1, the NPS has developed policy goals to guide the way climate change is addressed in the two parks. The park's Climate Change Action Plan is tiered to this GMP and outlines the actions that will be taken to accomplish these broad goals.

1. Reduce - Reduce CO2 emissions

National Parks can demonstrate how to minimize our contribution to global warming through practices such as energy efficiency and use of renewable energy. Since emissions from visitor driving contribute over 90% of the park's emissions at the time of this writing, the park will assist in the reduction of visitor greenhouse gases by providing opportunities for alternative transportation options.

Goal: Become a carbon neutral park by 2016 by: reducing the CO2 emissions of NPS and Partner operations, increasing the use of renewable energy and other sustainable practices, and reducing visitor emissions by lessening dependency on personal automobiles.

2. Educate - Education and interpretation

Through the efforts of employees, partners, and educational and interpretive media, the park can engage visitors on the topic of climate change, provide the latest park research and monitoring data and trends, inform the public about what response is being taken at the park, and inspire visitors to aid in that response.

Goal: Park visitors understand the process of global warming, climate change, the threats to the park, and how they can respond. Visitors are inspired to action through leadership and education.

3. Adapt - Assessing the impacts and responding to changing conditions

Climate change is a global phenomenon, outside the control of the parks. Therefore, the NPS will not have the ability to control the impacts of climate change on the parks through its own emissions reductions and education practices. However, we will do our part to improve conditions and demonstrate environmental leadership.

The NPS will utilize and promote innovation, best practices, and partnerships to respond to the challenges of climate change and their effects on park resources. By using and developing tools and monitoring methods, including seeking outside assistance, the parks can better respond to climate change. The NPS will interpret climate change science and develop management strategies, which may include predicting and projecting expected changes more than it did in the past. The NPS is actively developing tools and strategies to help parks identify and manage climate change impacts. By adopting

the best information on climate change as it becomes available, GOGA and MUWO will be positioned to respond quickly and appropriately to the local effects of climate change.

GOGA and MUWO may choose to use an adaptive management framework to respond to the effects of climate change. Temperature and precipitation changes may require that the parks no longer simply manage for natural communities, but that they manage for native biodiversity and ecosystem function. In most cases the parks would allow natural processes to continue unimpeded, except when public health and safety or the park’s fundamental resources and values are threatened. Scenario planning would likely play a pivotal role in developing the park’s responses to climate change. GOGA and MUWO would also work with other local, regional, and national agencies to collaborate in the effort to assess and adapt to climate change.

Goal: Proactively monitor, plan, and adapt to the effects of climate change by using the best information as it becomes available.

Other Potential Strategies

In July 2006, the World Heritage Committee (WHC), a United Nations body, adopted resolutions outlining a framework of action for protecting the world’s most significant natural and cultural sites from the effects of climate change. The recommendations could apply to GOGA and MUWO.

The WHC identified options for planning and managing natural protected areas faced with climate change:

- Creating new protected areas
- Enlarging existing protected areas
- Creating replicates of existing protected areas
- Designating “stepping-stone” or corridor protected areas
- Creating buffer zones of natural habitat around protected areas
- Increasing habitat heterogeneity within protected areas (e.g. Altitudinal, latitudinal, and topographic)
- Restoring, regulating or maintaining disturbance regimes
- Removing or reducing invasive alien species
- Reducing other environmental stresses
- Restoration or rehabilitation of natural habitat
- Translocation, reintroduction or introduction of species

The WHC addressed protected cultural heritage sites by noting that more needs to be done on monitoring, research, and maintenance for cultural heritage than the natural heritage which has already recognized the impact of climate change. The process recommended includes choosing the site, describing the evidence of climate change, defining responses to climate change, and developing best practices. (UNESCO)

IMPACT TOPICS

| Impact Topic | Retained or Dismissed | Rationale | Relevant Law, Regulation, or Policy |
|--|-----------------------|--|---|
| Natural Resource Impact Topics | | | |
| Air Quality/ Carbon Footprint | Retained | Certain actions included in the alternatives of the plan would have an affect 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; | Clean Air Act; EO 13423; DOI Secretarial Order 3226; NPS <i>Management Policies</i> |

| Impact Topic | Retained or Dismissed | Rationale | Relevant Law, Regulation, or Policy |
|---|---|--|--|
| | | 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. Therefore, this topic was retained and will be analyzed in detail. | 2006; NPS Pacific West Region Directive PW-047 |
| Energy Requirements and Conservation Potential | Dismissed?? [Depends on the outcome and integration of asset mgmt. planning and facility decisions in the GMP] | None of the alternatives presented in this plan would result in a major change in energy consumption, energy availability, or costs compared to current conditions. The parks' focus on using renewable energy is a continuation of current management trends. The National Park Service would pursue sustainable practices whenever possible in all decisions regarding operations, facilities management, and development in the parks. Whenever possible, the National Park Service would use energy conservation technologies and renewable energy sources. Overall, the impact on energy requirements and conservation potential as a result of the actions included in this plan would be minor. Therefore, this topic was dismissed from detailed analysis. | NPS <i>Management Policies 2006</i> |

CHAPTER 3 - AFFECTED ENVIRONMENT

Carbon Footprint

[Note: Define carbon footprint and list and describe greenhouse gases. Discuss the existing conditions of the carbon footprint for the two parks - current state of total greenhouse gas emissions (use figures from the inventory in the Climate Change Action Plan). Briefly describe the relationship between carbon footprint, global warming, and climate change.]

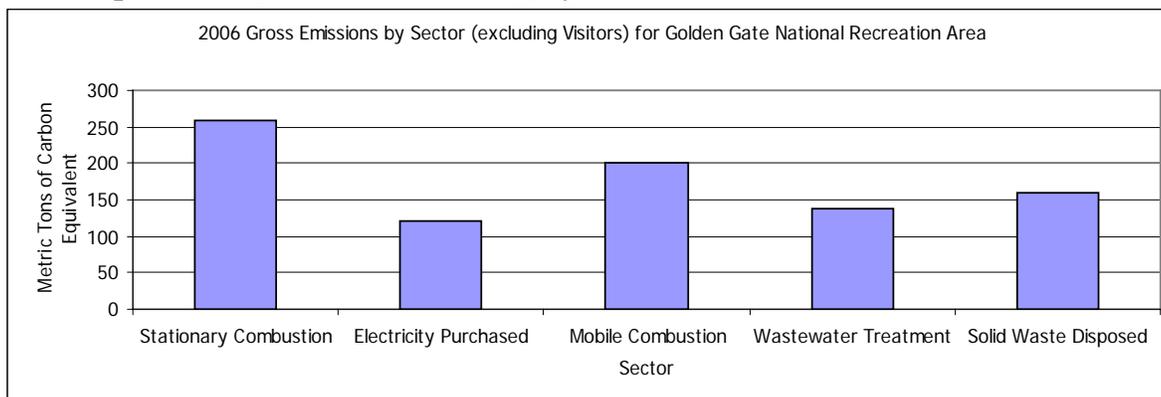
A “carbon footprint” is a measure of the impact human activities have on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide. The greenhouse effect is a natural phenomenon that keeps the earth’s temperature stable at an average of 60 degrees Fahrenheit. Without this natural warming effect our planet would be uninhabitable at an average temperature of 14 degrees Fahrenheit. However, human actions are disturbing this balance through over-production of large amounts of two main greenhouse gases, carbon dioxide (CO₂) and methane (CH₄). The increase in greenhouse gases is causing an overall warming of the planet, commonly referred to as *global warming*. The term *climate change* describes the variable consequences of global warming over time.

The parks have the goal of reducing their contribution to global warming and climate change through emissions reductions. To begin tracking the results of their efforts, GOGA inventoried its emissions in 2006. They did this 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.

Visitor emission totals consist of an approximation of how much gasoline is consumed while driving to various park locations. Using annual visitor vehicle counts to many of the different locations in the park, the total number of miles driven by visitors was approximated (based on the assumption that they were driving from somewhere in the Bay area). The resulting total vehicle miles driven by visitors was put into the CLIP tool. The CLIP tool then used assumptions about the different types of cars and the miles per gallon each had to determine approximate fuel consumption.

The following figure shows how GOGA’s own emissions are distributed among sectors when visitor emissions are excluded.

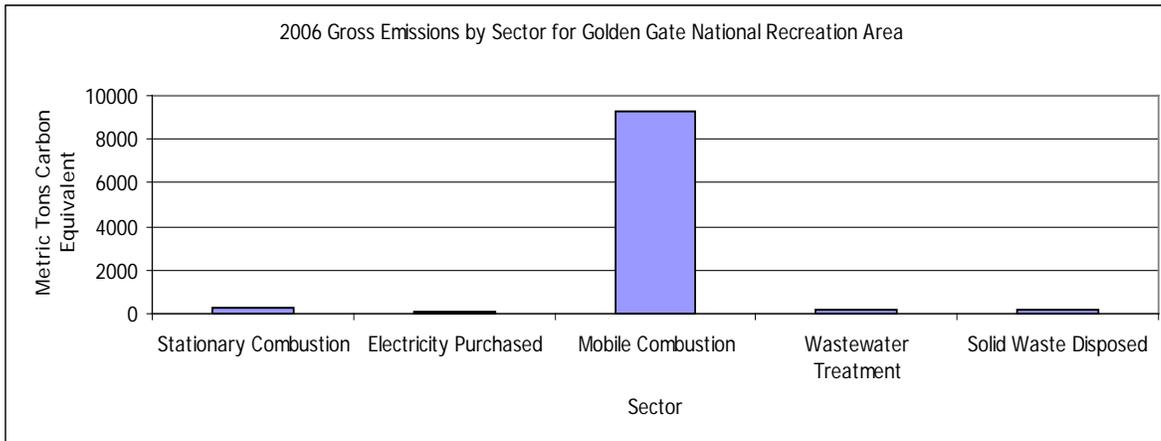
Park operations (i.e. without visitors), by sector:



Source: GOGA Climate Change Action Plan, August 2007

The following figure shows that when visitor emissions are included, the vast majority of GOGA greenhouse gas emissions come from mobile combustion. In fact, 19% of estimated emissions come from visitors driving.

Park emissions by sector, including visitors:



Source: GOGA Climate Change Action Plan, August 2007

The park partners have been encouraged to complete an emissions inventory which would be included in this analysis.

Potential Impacts of Known and Predicted Changes [on various impact topics]

The issues surrounding climate change will have synergistic effects that will result in profound and yet sometimes subtle alteration in our environment. Some of these changes may include:

Potential Impact: Loss of shoreline

- Erosion of GGNRA’s 59 miles of coastal systems could occur.

Potential Impact: Altered terrestrial ecosystems

- Even modest changes in precipitation (including fog patterns), including changes in the seasonality of rainfall, could cause disruption of ecosystems that are conditioned to historical precipitation levels.
- Rising sea levels could infiltrate the fresh water resources, causing ecological and economic impacts.
- Rising sea levels could damage or destroy riparian habitats through coastal storm surges and flooding.
- Subtle changes in temperatures and seasonal variation could change vegetation patterns and influence the integrity of coastal plant communities.
- Ecosystem disruption could include wildlife extinction, invasion by non-native animals, range shifts poleward and up in elevation; stresses on wildlife from changes in seasonal timing, increased mortality due to pests and pathogens, and habitat fragmentation. Loss of beaches would also affect wintering habitat for the federally-endangered Western snowy plover and habitat for bluff bank swallows.
- Earlier, and more intense, stream flow and higher stream temperatures could impact stream and pond ecology.
- Temperature increases, along with precipitation changes could increase the risk of wildfire.
- Deterioration of scenic views and the quality of the night sky could occur.

Potential Impact: Altered marine ecosystems

- Stronger and more frequent El Nino events may promote harmful algal blooms that are toxic to seals, seabirds, and fish, and could poison shellfish (Stephens, UC Santa Cruz, November 2, 2006).
- The ocean temperature could increase and become more acidic, causing species to relocate or die.
- Changes in the timing of upwelling that brings important nutrients and food could adversely affect salmon that feed at sea. Global climate change may undermine extensive restoration efforts by NPS to improve stream habitat for salmon while the salmon starve at sea.
- GGNRA's marine resources contain a highly productive fishery that could be threatened by climate change.

Potential Impact: Damaged or lost assets and facilities

- Beaches could shrink or be lost, affecting both public recreation and enjoyment. A rise of three feet could inundate most if not all of the beaches if beach growth is unable to keep up with sea level rise. Heavily visited beaches to the north include Rodeo Beach, Stinson Beach, and Muir Beach; and to the south include Ocean Beach, China Beach, Crissy Field, and Baker Beach.
- Maintenance of historic buildings and facilities could become more difficult as weather has a greater influence on the sustainability of historic preservation. Rising sea levels could put some facilities and cultural resources partially or wholly underwater and subject them to more intense wave energy. Not only could historical and archaeological sites become inaccessible, but they could be at risk of eroding or falling into the ocean. Examples of vulnerable sites are the Sutro Baths, Fort Cronkhite, Fort Point and the Fort Funston dunes.
- Several park roads, including the road to Fort Point, the Great Highway along Ocean Beach, the road into Fort Cronkhite in the Marin Headlands, and a section of Highway 1 at Richardson Bay in Sausalito, would be in jeopardy and access to park sites and facilities could be compromised or eliminated. Trails next to bluffs and shorelines would also be in jeopardy.
- Increases in fire frequency and intensity would impact the natural and man-made environments, including park facilities and historic structures, and other investments owned by park partners, inholdings, and park neighbors. The financial and staffing implications of this trend are significant, already resulting in an increase in park firefighting staff, supplies, funding, and interagency agreements and response.
- Storm intensity, flooding, etc...

Potential Impact: Disruptions in visitor use

- Reduced visitor access to sites and structures affected by climate change
- Disruption of visitor services and recreational opportunities.
- Severe erosion of sites during rainy season and after a large fire, as well as extended closure of sites after fires.
- Increased social pressures on park resources for consumptive uses and as a refuge from urban living could occur if a storm event made those resources scarce within the San Francisco metropolitan area.
- Changes in recreational use patterns

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

NATURAL RESOURCES

Analysis of natural resources was based on research, knowledge of the area’s resources, and the best professional judgment of planners, resource specialists, and biologists who have experience with similar types of projects. The definitions for impact intensity of all impact topics is included in table 15; however, the criteria for characterizing the severity or intensity, as well as the duration, of certain impact topics is discussed below.

Carbon Footprint

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 impacts 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 course determination of whether or not the actions would have a beneficial, neutral, or adverse impact on the parks’ carbon footprint.

Table 1: Impact Threshold Definitions

| Impact Topic and Duration | Negligible | Minor | Moderate | Major |
|---------------------------|---|--|---|--|
| NATURAL RESOURCES | | | | |
| Carbon Footprint | 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. | The action would result in a slight, but detectable, change in total greenhouse gas emissions. | The action would result in a modest change in total greenhouse gas emissions. | The action would result in a substantial change in total greenhouse gas emissions. |

[Note: The baseline that we will use as a comparison is the total emissions/carbon footprint of the no-action alternative. Analyze the greenhouse gas emissions for all actions under each of the alternatives. Use the CLIP Tool to help quantify emissions (additions and reductions) to the extent possible. If the level of precision is inadequate, then just characterize the impacts qualitatively and discuss the general impact level – is the impact beneficial, neutral, or adverse compared to baseline conditions at the park or within the Bay Area?]

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Trail System Mission:

Provide an extensive and seamless network of trails that (1) connect people to the park's vast and unique natural and cultural landscapes, (2) enhance access to and within the park, (3) support healthy communities and ecosystems, and promote public appreciation of park resources, and (4) are sustainable by being in harmony with the landscape.

Trail System Goals:

1. Locate, design and maintain trails using best practices that **protect and interpret sensitive natural and cultural resources**, such as T&E and special status species, cultural landscapes and archeological resources, wetlands, and unique geologic features.
2. Provide for a **diversity of trail experiences and challenges**, including multiple use and single use trails that could allow for hiking, bicycling and/or horse back riding; trails of varying lengths and loop configurations; trails with varying degrees of difficulty; and trails in different park settings.
3. Seek trail alignments and locations that will provide a **variety of learning, scenic viewing, and recreational opportunities**.
4. Work with neighboring communities to provide **trail connections between local communities, destinations and park sites** to improve access, and enhance alternative modes of travel to and within the park.
5. **Work with surrounding public land managers to coordinate** regional trail connections, allowed uses, and providing accurate trail maps and wayfinding to create a seamless regional network of trails across various public land jurisdictions.
6. Seek trail alignments and locations that are **safe and maintainable and that respect park resources**.
7. **Promote and educate** visitors and neighbors on regional trail access and opportunities through multiple media and community and business partnerships.
8. Develop a **consistent and uniform park identity** along trails through signage for directional, recreational and interpretive purposes.

NATIVE AMERICAN ENGAGEMENT

The park will continue to work with the Ohlones and Coast Miwoks in three broad activity areas: cultural resource management; interpretation and education; and revitalization of community and tradition.

Cultural Resource Management. The park, together with tribal representatives, would conduct field work to survey, identify, and inventory archeological and ethnographic sites, as well as record, test, and preserve these sites. The park could offer cultural resource management and archeological training to tribal representatives as a means of enhancing the professional discourse between the park and the tribes in this arena.

Interpretation and Education. The park would work with park-associated native people to collaborate on a range of interpretive and educational activities. These could include: Indian-led educational programs offered through park visitor centers; permanent and temporary exhibits on native history and culture; annual commemorative festivals with native components; teacher trainings on Native American curricula; and participation of native people on visitor center advisory boards.

Community and Tradition. The park would continue to support the revitalization of Ohlone and Coast Miwok community and tradition. Native people would continue to conduct religious activities in the park; gather natural materials for use in traditional crafts; participate in the study of native histories and genealogies; and work with the park on ethnographic landscape restoration efforts. To provide direction for these activities the National Park Service would work to establish and implement a set of protocols for engaging Native Americans in the park. Each protocol agreement would be tailored to the specific type of relationship that the National Park Service and the tribe have developed or are in the process of developing. Protocols could be developed providing for agreements that may include the following elements or stipulations:

1. Government-to-government relationship with the tribe by first contacting or notifying the tribal chair, president, or governor when issues arise.
2. Contacts by the park superintendent (or designated staff) with specific tribal representatives or tribal council offices designated by the tribal council or tribal chairperson to deal with specific park proposals (or issues) that may arise. The agreement should include a list of the types of proposed National Park Service activities for which the tribe would like to be contacted.
3. Routine notification to appropriate tribal officials (designated by the tribal council or tribal chairperson) by the park regarding park planning, project development, or environmental impact assessments. Appropriate methods for this preliminary notification should be summarized in the agreement (e.g., letter, telephone contact, meeting with tribal chair, cultural committee, tribal council, etc.).
4. Meetings between park management and the tribe on a periodic basis to review upcoming park plans or projects which may impact American Indian resources in or near the park (e.g., once a year, once every six months, etc.).
5. Exchange of information, research results, and technical assistance between the National Park Service and the tribe.
6. Time frame for responding to oral and written communications.

7. Steps for resolving disputes (e.g., alternative dispute resolution processes, third party mediation, or mediation by the Regional Director or Native American Affairs Office Director).
8. Process for amending or modifying the agreement.
9. Time period in which the agreement would remain in effect.
10. Process for ending or canceling the agreement.