Park Significance

1. The convergence of the San Andreas Fault, San Francisco Bay at the Golden Gate, and the California coast line creates a dynamic landscape and environment of exceptional scientific value.

Fundamental Resources and Values

1.1 Geologic Resources – The National Recreation Area's geologic resources include faults, plate margins, the subduction zone, a diversity of rock types, and the geologic processes that have shaped the landscape.

Analysis of Fundamental Resources and Values

Importance of the Resources and Values

The continental edge / plate tectonics / plate margin / subduction zone
Coast Range and ridges

The San Andreas Fault, which extends most of the length of California, defines many of the major recognizable landforms in the park. The fault zone in GGNRA is evident along Tomales Bay, the Olema Valley and Bolinas Lagoon in Marin County, then extends offshore and makes landfall again at Fort Funston in San Francisco and is visible south to the lakes and reservoirs within San Francisco Watershed lands in San Mateo County.

Ancient marine and nearshore rocks scraped off the edge of the continent in the subduction zone form the unique geology of the Marin Headlands, that are composed of a diversity of rock types including cherts, basalts, greenstones and sandstones. Other coastal bluffs and headlands – Presidio to Land's End, and Muir Beach to Stinson Beach – formed from serpentine and mélange extruded from deeper within the subduction zone.

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. Terrestrial mammals were fossilized in these formations.

Mori Point, San Pedro Point Headlands ?

Tectonic forces, changes in sea level related to past climate changes, combined with river and stream erosion have created an eroded landscape evidenced by large and small watersheds within and adjacent to the park. San Francisco Bay and the Golden Gate is the largest example. Smaller watersheds at least partially within the park include Lagunitas Creek, Bolinas Lagoon, Redwood Creek, Tennessee Valley, and Rodeo Valley in Marin County; Tennessee Hollow and Lobos Creek on the Presidio; and San Francisquito Creek, Sanchez Creek and Calera Creek watersheds in San Mateo County.

Wind / dunes

The park's geologic resources are of exceptional scientific interest and value with respect to plate tectonics, dynamics of the San Andreas fault, reconstruction of plate margin history, deep plate margin seismicity, earthquake recurrence, paleontological resources, etc. The proximity to educational and research institutions in the San Francisco Bay Area means the park's geologic resources are easily accessible to researchers and educators.

Laws and Policies

NPS Management Policies

The Park Service will preserve and protect geologic resources as integral components of park natural systems.

The Service will protect geologic features from adverse effects from human activity and allow natural geologic processes to proceed unimpeded.

Natural shoreline processes (such as erosion, deposition, dune formation and shoreline migration) will be allowed to continue without interference.

Coastal Zone Management Act of 1972

Fundamental Resources and Values

1.2 Marine Influences – oceanic conditions such as tides, currents, waves, surf, upwelling and sea level influence the coastal environment including weather, climate and the land.

Analysis of Fundamental Resources and Values

Importance of the Resources and Values

Changes in horizontal and vertical movements of water along the coast vary by season and bring changes in local weather and climate such as fog. Upwelling brings nutrient- rich waters to the sunlight zone, resulting in one of the five most productive marine environments in the world. The seasonal changes in coastal current patterns creates dynamic beaches and dunes through the transport and coastal erosion of sand.

The Golden Gate represents the largest topographic break along the coast allowing warm interior California air to mix with cooler ocean air.