



Geologic Resource Evaluation of the San Francisco Bay Area Network (SFAN)

Importance: *The Bay Area has among the most active and complex geology worldwide, and climate change may intensify local geologic hazards.*



White lines on the map show major Bay Area faults

The San Francisco Bay Area has among the most active and complex geology worldwide. Tectonic plate movements have brought a remarkable mix of rocks to the region, as well as the Point Reyes peninsula and the spires and crags of Pinnacles National Monument. To help protect and manage geologic resources, the National Park Service (NPS) Geologic Resources Division assesses geologic formations, processes and hazards in parks nationwide.

Geologic Resource Evaluation (GRE) Program: *NPS evaluates geologic resources, hazards, and management issues, and provides digital maps for 270 parks.*

The GRE provides 270 parks with scoping meetings and reports that evaluate existing geologic maps and identify geologic management issues, digital geologic maps that facilitate monitoring changes and hazards, and final reports that include key geologic features, processes, and management challenges and possible solutions. As of 2008, NPS had completed 221 geologic scoping meetings, 138 digital geologic maps and 50 final geologic reports.

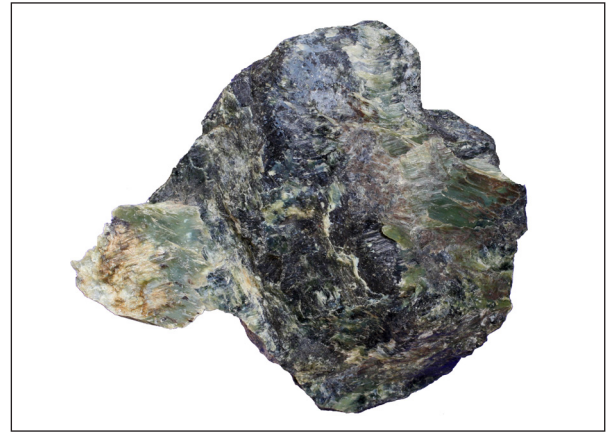
Status and Trends: *Geologic hazards in SFAN parks include flooding and landslides in coastal areas, and flash floods that can transport huge boulders in Pinnacles National Monument.*

Eugene O'Neill National Historic Site, Port Chicago Naval Magazine National Memorial, and Rosie the Riveter World War II Home Front National Historical Park:

No bedrock is exposed at any of these East Bay cultural parks. The Eugene O'Neill house was built on a large landslide deposit. Port Chicago is built on fill composed of bay mud and Rosie the Riveter is on artificial fill.

Golden Gate National Recreation Area:

Geologic resources include the Franciscan Complex's mix of rocks that scraped off an oceanic plate as it slid under the North American plate, perhaps 100 sea caves, and serpentine, California's state rock. Rich in heavy metals that make it toxic to many plants, this bluegreen rock supports rare plants that grow nowhere else. Management concerns include bluff failure, and increased risk of coastal flooding, erosion, and landslides due to climate change.



Serpentine, the California state rock

John Muir National Historic Site:

While bedrock exposures are limited in John Muir National Historic Site, sandstone underlies both the historic John Muir house and portions of Mt. Wanda. The highest point in the local area, Mt. Wanda is prone to gullying and erosion. The nearby Hayward Fault, a major branch of the San Andreas Fault, caused the first great "San Francisco earthquake" in 1868, which was one of the most damaging earthquakes in the nation's history.



Rock spires at Pinnacles National Monument

Pinnacles National Monument:

Geologic resources include rocky spires and crags that can reach 1,000 feet high—remnants of an ancient volcano split by the San Andreas Fault. The park also has caves that formed through erosion and when boulders fell during large earthquakes that provide habitat for bats. Management concerns include the likelihood of moderate earthquakes in the near future, and higher-intensity winter storms due to climate change. These storms could increase severe flooding, which can transport 2-ton boulders.

Point Reyes National Seashore:

Geologic resources include the San Andreas Fault zone that lies between the peninsula and the mainland, sea caves, and sand dunes that are home to 11 federally listed species including the threatened western snowy plover (*Charadrius alexandrinus nivosus*) and the endangered Tidestrom's lupine (*Lupinus tidestromii*). Management concerns include unstable cliffs and bluffs formed of crumbly rocks, and increased risk of coastal flooding, erosion, and landslides due to climate change.



A fence at Point Reyes National Seashore that was once connected shows the 25 foot displacement that occurred during the 1906 earthquake

Additional Resources:

NPS Geologic Resources Inventory Publications http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

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