Sinkyone Wilderness State Park

Active Fault-Related Features

Active faults at Sinkyone Wilderness State Park include the Whale Gulch Fault and the Bear Harbor Fault zone. The Whale Gulch Fault follows the general trend of Whale Gulch Creek and trends predominantly north of the park. The Bear Harbor Fault is a strike-slip fault and is closely associated with the offshore San Andreas Fault. The Bear Harbor Fault zone is locally well-exposed within the park between the mouth of Whale Gulch Creek and Bear Harbor.

Features and Processes:
Seismic and coastal geomorphology, and garnet sand

Landforms resulting from fault movement include several sag ponds, linear valleys, shutter ridges, wind gaps and dramatic, sheer ocean bluffs. The landforms related to faulting are most obvious when faults disrupt flat marine terraces. Recent activity

What you can see: Sea stacks, garnet sand beaches, fault features, and broad marine terraces are prominent features.

along the Bear Harbor Fault has locally offset the marine terrace—tilting portions of the terrace while leaving other portions relatively flat. At one location near Low Gap Creek, a 4 to 6-foot high fault scarp offsets a marine terrace surface.

Low gradient, linear valleys are most prominent in the northern portion of the park where the Bear Harbor Fault is onshore. The Bear Harbor Fault is part of the nearby King Range Thrust zone and related to the San Andreas Fault, located less than one mile offshore. The Bear Harbor Fault trends offshore near the mouth of Whale Gulch Creek and may be responsible for the very steep and eroding ocean bluff.

Between the area just north of Jones Beach Camp and the mouth of Whale Gulch Creek, the Lost Coast Trail follows an incised linear valley. South of the Visitors' Center, the park road (between Flat Rock Creek and Bear Harbor) is within another linear valley. These fault-related valleys roughly parallel the shoreline and are very close to the ocean bluffs where they are often separated from the ocean by very

Why it's important: Sinkyone Wilderness State Park occupies a very distinguished geologic location near the junction of three of the major plates that make up the earth's crust. These three tectonic plates (the Pacific, North American, and Gorda plates) are bounded by major faults, including the San Andreas Fault just offshore of the park, and the Mendocino fracture zone and Cascadia "mega-thrust" (a subduction zone) offshore and north of the park.

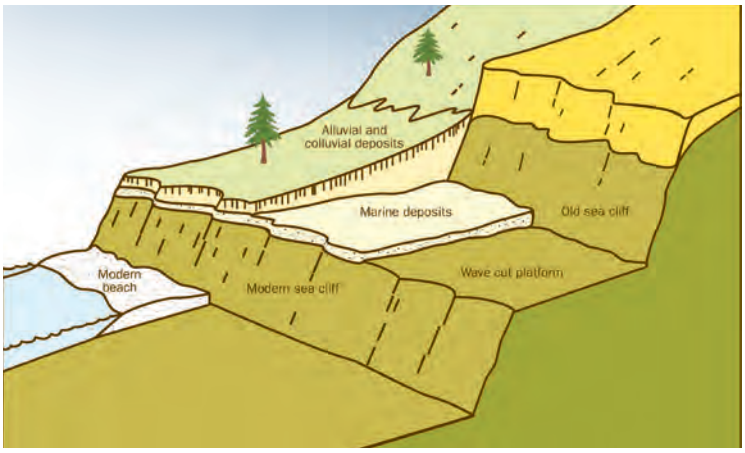
In general, triple junctions are one of the most actively deforming locales in the world—most of which are hidden undersea. The Mendocino triple junction is a broad region that extends onshore into the park and surrounding region—making this one of the most seismically active places in California. There is a long history of very large earthquakes that have thrust this edge of the continent upward.

narrow ridges. In places, water ponds within the linear valleys; these are called sag ponds. Three prominent sag ponds have developed within one linear valley just south of the mouth of Whale Gulch Creek approximately 1.5 miles north of the Visitors' Center. These sag ponds are visible just west of the Lost Coast Trail. The largest sag pond is over 200 feet long and 75 feet wide.

Marine Terraces

As the King Range has been uplifted above the sea over the past million years, ocean waves have constantly eroded the shoreline. Wave erosion created a nearly flat wave-cut platform that extends offshore. With episodic uplift of the area, the wave-cut terraces are raised above sea level and thus isolated from further wave erosion. The ages of the marine terraces and their present elevation above sea level allow estimates of the long-term rates of uplift.

Wave-cut marine terraces are common between Bear Harbor and the mouth of Whale Gulch Creek. These marine terraces have recently (from the geologic perspective) been uplifted and their ocean-facing cliff edges are youthful. Streams have cut through these terraces, as in the example of an unnamed creek at Jones Beach Camp. The terrace surfaces are relatively flat-lying suggesting they were uniformly uplifted while other terraces are moderately inclined possibly due to local deformation.



Marine terraces consist of a wave-cut bedrock platform (bench) with a thin, discontinuous blanket of marine and younger non-marine deposits. The origins of the terraces are tied to changes in climate and associated fluctuations in eustatic (worldwide) sea level during the Pleistocene epoch 11,000–1.1 million years ago. Modified from Weber and Alwardt, 2001.

Sea Stacks

As waves erode the rising land, creating a wave-cut platform and a sea cliff, they encounter harder rocks. The waves remove the softer, less resistant rocks and leave behind the more resistant, harder rocks which protrude as sea stacks.

Sea stacks are most easily observable from the hiking trails and road between Bear Harbor and Whale Gulch Creek near the northern boundary of the park. Needle Rock can be seen from the top of the bluff near the Visitors' Center. Other sea stacks include Cluster Cone Rock and an emerging sea stack that is still partially attached to the mainland at High Tip. Several of the sea stacks have developed caves or tunnels where ocean waves crash and explode.

Pink, Purple, and Black Sand Beaches

Purple and pink sand beaches are extremely rare and ephemeral features. The majority of the beaches are composed of black sand (with tiny rock fragments and magnetic grains, such as magnetite and ilmenite), gravel and small cobbles. The beaches are derived from the local bedrock exposed along the base of the ocean bluffs and from sediment delivered to the ocean beaches from the small streams that drain the upland areas.

At times, unusual purple and pink sand beaches appear within the park and then vanish. This special phenomena occurs on the black sand beaches. During unusual wave and tidal conditions, a thin layer of pink and purple garnet sand with uniform grain sizes covers the more ubiquitous black sand—like the frosting on a cake. Offshore, the sloshing action of the waves sorts sand grains according to density and size. Garnet is relatively dense compared to quartz and feldspar which are progressively winnowed away—leaving a relatively pure garnet deposit that disappears when subjected to high tides and storm waves.

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Final Thoughts

The onshore and offshore faulting and related uplift have produced a dramatic and spectacular coastline that continues to change in response to active tectonic plate interactions and sub-aerial erosive forces.

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