

ROCKY INTERTIDAL FIELD TRIP
Saturday November 14, 1:00-3:00pm

Schedule: Please meet at the Fitzgerald Marine Reserve Visitor Center promptly at 1 pm. You may want to arrive early, as at 1pm we will be meeting with a docent to begin our tour of the reserve. Because parking is limited, you are encouraged to carpool. We will explore the tide pools during the low tide and have the opportunity to visit each tidal zone and observe specific features of each, commenting on the invertebrates and algae that inhabit this rocky community. You will hand-in your observations the next week (November 17).

What to Bring: You should dress in layers, as weather is changeable at the coast. We will explore the tidepools even if it is raining, so dress appropriately. Tide pool surfaces can be very slippery, so wear appropriate footwear. You may want to bring a change of clothing in case you get wet. Please bring this handout, a notebook and pencil.

Safety: When at the shoreline, never turn your back on the ocean, especially while we are in the lower rocky intertidal zone. Always work/observe in a group, never on your own. At the ocean, especially during storms, irregularly large waves can sweep over the intertidal zone, even in the high tidal zone. So please, make sure that someone in the group is looking out to sea as a “wave watch”. Please warn others if you see a large wave approaching. Also, remember that the rocks are very slippery (but with the sharp edges of barnacles), so watch your footing.

Tidepool Etiquette:

1. no collecting
2. be gentle with the organisms and do not remove them
3. if an animal can not be easily picked up—don’t
4. if you turn a rock over, turn it back when done looking at it
5. wet your hands before handling organisms
6. Harbor seals use the reserve for pupping (Mar-June). Please keep a large distance between yourself and the harbor seals. Harbor seals are protected by law and any disturbance to them is not allowed (includes flushing them or even causing them to raise their head). Of course, you are welcome to observe them from a distance.

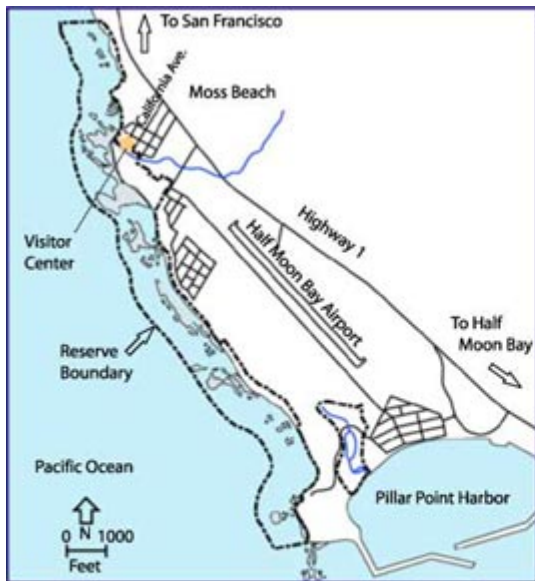
Assignment (due November 17):

1. Select two microhabitats in the rocky intertidal that differ in physical characteristics and setting (e.g. surge channel, under rock, on south/north side or bottom/side/top of rock, tidal pool, crevice). Be sure that the areas are in different tidal zones (low, mid, high).
2. For each microhabitat answer the following:
 - a. What are the major biological and physical factors affecting the microhabitat?
 - b. Describe the animals and algae found in the microhabitat.
 - c. How do physical and/or biological factors influence the animals and algae that are present in this microhabitat?
 - d. What special adaptations allow organisms to persist or thrive in this microhabitat?

Directions:

The Fitzgerald Marine Reserve is located on the San Mateo County coast in Moss Beach south of San Francisco. The entrance to the Reserve is at the western end of California Avenue off Cabrillo Highway (State Highway 1). Look for the large highway sign "California Avenue," and the smaller sign "Marine Life Refuge," just below it.

Moss Beach is serviced directly by buses from the San Mateo County Transit Service (SamTrans route 294) and can be picked up at the Hillsdale Shopping Center in San Mateo (**please double check any transit information, as it may change**). The Hillsdale Shopping Center offers an easy connection with Caltrain.. From the north, SamTrans Route 294 begins in Pacifica at the Linda Mar Park and Ride, where it continues south to Moss Beach. SamTrans route 112 connects Linda Mar Park and Ride to the Colma BART station and can also be picked up in the Serramonte Shopping Center.



Fitzgerald Marine Reserve
at Moss Beach, California



The Natural History of the Fitzgerald Marine Reserve

(Excerpts from a chapter by Bart Oxley and Bob Breen)

The Marine Reserve's history records the existence of pre-historic animal life and early Native Americans as residents of San Mateo County. Until its designation as a reserve in 1969, there was unlimited removal of wildlife from its tidepools, and at one time, overflow crowds from San Francisco rushed to its shores to experience its touted reputation as a health spa.

Prehistory

Animal fossils and human artifacts are not uncommon at Moss Beach. The oldest fossil of record is a baleen whale estimated to be between two and five million years old. The fossil was excavated in 1996 when Jean DeMouthe, a geologist with the California Academy of Science, and fellow geologist Tony Summer removed it from a hill of sandstone. Since the time this whale lived and died, this portion of the coast at the edge of the Pacific plate has moved at least 40 miles northward from its original location along the San Andreas fault. At that time the coast range was covered by a shallow and quiet sea, with Montara mountain the only exposed land in the area.

During an archeological excavation at the reserve in 1994, scientists found a crescent of stone that is believed to have been used by early Native Americans. Mark Hylkema, archeologist, dug the tool out of the soil at the reserve's cypress forest. The rock is about 5,700 years old predates other artifacts previously discovered in San Mateo County, and predates the Ohlones, a coastal Native American tribe formerly believed to be the country's earliest inhabitants. The Ohlones first lived here beginning about 4,000 years ago.

Recent History : Wienke and the Development of Moss Beach

In 1881, a German immigrant, Juergen F. Wienke, left his job as a farmer and mining engineer in Germany to find the promise of a better future in America. It wasn't long before he found opportunity in a lonely coastal community south of San Francisco, formerly owned by the Francisco Guerrero family, and at the time in bankruptcy. Learning that a railway was to be built from San Francisco to Santa Cruz, the ebullient Wienke immediately purchased what was to become Moss Beach. He told friends that it was "love at first sight." Legend has it that while inspecting the reefs of his newly-acquired purchase he saw algae growing there that he called "moss." Shortly after his purchase he married and brought his bride, Meta Paulson, to the "mossy" beach home.

A man of vision and ambition, Wienke saw the area as a vacation attraction and health spa for city dwellers in San Francisco. A year after his arrival he built his dream, a beach resort called the Moss Beach Hotel. The advance publicity of the hotel, and the "stimulating, health-producing" air of Moss Beach soon brought overflow crowds. The only direct route from San Francisco to the coastal communities in those days was a dirt road around San Pedro Mountain that had been constructed in the late 1870s.

In 1911, the Moss Beach Hotel burned down and was not rebuilt. But this did not dampen Wienke's enthusiasm for Moss Beach. He planted hundreds of cypress trees on the cliffs overlooking Moss Beach. He later became mayor of Moss Beach, was a member of the school district, and created Wienke Way, once an avenue bordered by a thick, tall wall of cypress trees.

World War II Leaves Its Mark on Moss Beach

Many visitors to Moss Beach have asked about the concrete tower that projects above the surface of the water at the southern end of the Reserve. Questions and opinions have ranged from a damaged pier piling to a memorial monument. Actually, this storm-battered bastion is a relic of World War II when it served as a marker and warning for aircraft and commercial fishing boats in the area during gunnery practice.

During this period, the United States Navy built an airport at Half Moon Bay. The airport is still in operation today for small airplanes. The Navy flew PBVs on patrol as well as providing target towing aircraft over Moss Beach for gunnery practice. When target practice was scheduled, a red flag would be hoisted over the marker as a warning to other aircraft and approaching commercial fishermen in the area. Anti-aircraft guns situated at Montara would proceed to blast away at the target sleeve being towed. Today, the only function of the marker after more than half a century is that of a roosting shelter for gulls and cormorants. But the structure, a forgotten sentinel of the past that has survived storm and time, represents another milestone in the colorful history of Moss Beach.

Moss Beach Becomes a Reserve

In 1969, the San Mateo County Board of Supervisors, led by its president, James V. Fitzgerald (for whom the Reserve was named), passed a bill officially designating the Moss Beach tidepool area as a Reserve. There was strenuous opposition to its reserve status. Most of the resistance opposing the proposal came from sports fishing and scuba diving associations. But after the urging of teachers, scientists, the Sierra Club and local residents, the bill was passed by the Assembly and Senate in Sacramento, and the three-mile area of tidepools became officially known as the James V. Fitzgerald Marine Reserve.

Following its designation as a Reserve, Bob Breen, a naturalist with San Mateo County Department of Parks and Recreation, became Fitzgerald Marine Reserve's first naturalist in November 1969. Within the first year of management, more than 800 incidents of persons illegally removing intertidal life for food, aquarium specimens or curios were reported. One person was said to have had 42 Ochre sea stars he planned to boil, dry out and put on his family room walls.

Friends of Fitzgerald Marine Life Refuge Formed

In 1985, a group of citizens met to discuss the formation of a new volunteer support group for the Fitzgerald Marine Reserve. Virginia Welch, who had worked as a volunteer for 20 years with the San Mateo Park system, became its president. At the time, she described the goals of the newly-formed organization as "The protection and preservation of the Marine Reserve as a unique intertidal environment, and the promotion of educational activities for school children, residents, visitors and researchers, to see and touch many elements of a variety of wildlife ecosystems."

Biodiversity at the Edge of the Sea

Fitzgerald Marine Reserve is a place to investigate the diversity of life in the sea. Low tides expose rocky pinnacles, reefs, and pools that are home to hundreds of kinds of animals and algae.

The Reserve is described as a semi-protected, outer coast, rocky intertidal habitat. The protection derives from a series of offshore subtidal reefs and rocky terraces that blunt the full impact of incoming waves that regularly batter the coastline. The reef consists of various kinds of sedimentary rock that are twisted and worked by geological processes through time, and are constantly weathered by wave action. These powerful forces sculpted varied surfaces -- tidal flats strewn with boulder fields, craggy outcroppings, deep surge channels with undercut banks, and tidal pools of a variety of sizes and depths. This highly diverse topography combined with the Reserve's protected setting, allows for a myriad of nooks and crannies for organisms to attach and find shelter. Not surprisingly, Fitzgerald Marine Reserve is noted by many as one of the richest, most biodiverse intertidal environments on the California coast.

Many visitors to the Reserve consider tidal pools to be the most interesting of all the intertidal subhabitats because the pools show the high biodiversity. Formed by depressions in the reef that trap water at low tide, tide pools provide a habitat that frees organisms from one of the most stressful intertidal factors, drying out. Thus, tide pools may contain a more diverse and often different association of organisms than found on adjacent exposed surfaces.

Tide pools vary in depth and volume and therefore, consist of a continuum of subhabitats rather than a single habitat, depending on the particular situation of the individual pool.

In all but the highest pools some form of coralline algae occurs. These red algae are called "coralline algae" because they incorporate calcium carbonate into their cell walls, which gives the plant a rigid, coral-like texture. Corallines occur as pale, pastel encrusting patches or sheets on the sides and bottoms of tide pools, while other species grow upright from holdfasts and have joint-like regions along their length. Because of their crusty texture, coralline algae are tough fodder for most intertidal herbivores and as such, their presence in tide pools is more assured compared to the softer, more palatable species of algae.

Another plant that may be seen here is known as surfgrass (*Phyllospadix* spp.). Surfgrass is not an alga. It is a flowering plant like the terrestrial grasses from which it has evolved. As such, it requires soil into which it can sink its roots to acquire the nutrients needed for growth. Therefore, surfgrass only is found in pools with sediment on the bottom.



Enteromorpha



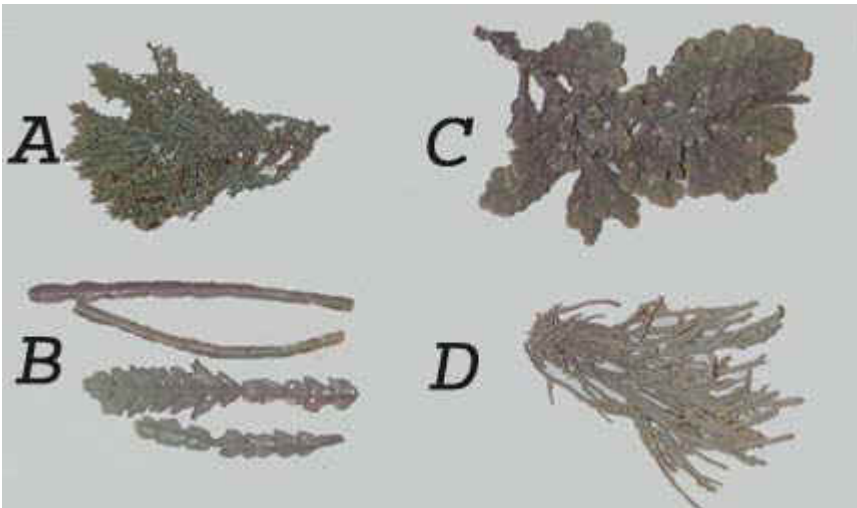
Silvetia (brown algae)



Ulva



Cladophora



Three samples of the Corallionioideae: *Corallina* (A), *Calliarthron* (B), and *Bossiella* (C)--and a member of the Amphiroidea---*Lithothrix* (D).



Mazzaella

Porphyra



Prionitis

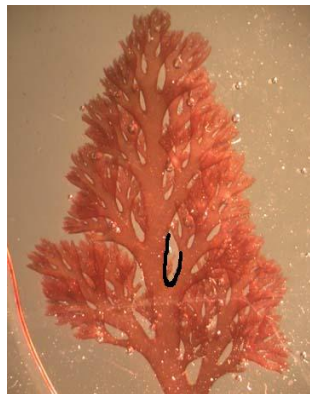


Mastocarpus

Chondracanthus
("iridea")



Microcladia



COMMON ROCKY INTERTIDAL RESIDENTS:

