

South Slough Reserve REU project ideas

Eelgrass (*Zostera* sp.) habitat has been declining at South Slough National Estuarine Research Reserve (NERR) monitoring sites since 2015/2016, but sites monitored by Reserve partners in the Coos estuary still have abundant eelgrass. Long-term water quality trends linked with climate change and land-use may be contributing to declines in eelgrass, including increasing water temperature and turbidity and decreasing salinity. In order to understand how these long-term changes in environmental conditions may be impacting eelgrass, the Reserve is interested in investigating the relationships between water quality variables and eelgrass habitat changes. The NERR System-Wide Monitoring Program (SWMP) monitors water quality variables including: water temperature, salinity, dissolved oxygen, pH, turbidity, nitrogen, phosphate, chlorophyll-a, and total suspended solids (TSS) at four sites in the South Slough estuary that are paired with eelgrass sampling sites. In addition, the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) maintain two water quality stations in the Coos estuary that can be paired with some of the Coos estuary eelgrass sites. Changes in water quality (i.e. water temperature, turbidity/TSS, salinity, dissolved oxygen, nutrients, and chlorophyll-a) have been shown to affect eelgrass abundance. Using these environmental data, the Reserve would like to better understand: What water quality variables may be driving the patterns in decreased eelgrass abundance in the South Slough estuary? New data collection will include plant community monitoring at four South Slough eelgrass sites, monthly SWMP water quality sampling (data sonde deployments and exchanges and water grab sampling and processing for nutrients), and sediment data collection and processing. Data analysis will include examining correlations among environmental data and eelgrass abundance. Students will learn numerous data collection and analysis methods over the course of their project.



Salt marsh bird's beak (*Chloropyron maritimum*) is an endangered wetland plant (endangered primarily due to habitat loss, disturbance, and habitat quality) that occurs in salt marshes from Netarts Bay, OR to Morro Bay, CA with a majority of Oregon populations found in the Coos estuary. It is hemiparasitic (like the terrestrial plant mistletoe), meaning it has chlorophyll and photosynthesizes but it also derives some of its nutrients by being partially parasitic on roots of host plants. The Reserve monitors wetland plant

communities as part of the National NERRS Sentinel Site program to understand the effects of water level and sea-level rise on coastal habitats (i.e. marsh, eelgrass, and Sitka spruce). Because of its observed limited distribution documented at some sites (Distant Water Fleet, Metcalf Islands, Indian Point, Valino Island, and Ferrie Ranch in South Slough estuary; North Spit, Empire, and Pony Slough in the Coos estuary) the Reserve is interested in what might be limiting its distribution, comparing distribution and abundance at South Slough and Coos estuary sites, and how its distribution and abundance might change: What will be the effect of climate change on bird's beak populations? Data collection will include: mapping plant cover of Salt-marsh bird's beak along with other co-occurring salt marsh plant species, measuring stem density and height, assessing sediment characteristics and accretion rates (surface elevation tables and feldspar marker horizons), measuring groundwater level in wells, and measuring water quality at the Reserve's network of Sentinel tidal marsh and water quality stations.



The **European green crab** (*Carcinus maenus*) is an invasive species in the South Slough estuary. We are interested their change in abundance over time (seasonal and annual) and their effects on other species. The South Slough Reserve could use research help this summer to answer two questions: 1) Are green crabs increasing in abundance in the Coos estuary? and 2) Can green crabs outcompete other crab species for scarce resources (food and shelter)? The student researcher will continue an ongoing project monitoring crab populations; analyzing abundance data from present and past monitoring efforts and conducting experiments to look at the interactions among different crab species (green crabs, shore crabs (*Hemigrapsus spp.*), red rock crabs (*Cancer productus*), and Dungeness crabs (*Cancer magister*)). Crab monitoring data collection will include setting and retrieving crab traps at various locations around the Coos Bay estuary and recording the species and size data for crabs caught. Experiments will take place in sea water tables on the OIMB campus. The student researcher will study the interactions among

crabs by pairwise placing of crabs of differing relative sizes and species together in controlled microcosms and observe how they compete for a resource (food or shelter). This monitoring and experimentation will help us understand the effect of green crabs on PNW estuarine ecosystems.

