



2021 Cooperative Summer Internship Program

USGS Project Scientist	Susan De La Cruz, Isa Woo
Project start date	5/16/2021
Duration	3 months
Location	Virtual
Type of Intern	GIS
Title of Project	Habitat classification and change detection Willapa and Billy Frank Junior National Wildlife Refuges, WA
Background	<p>A GIS intern (ideally with a GIS certificate) will have the opportunity to contribute to one or two projects involving habitat classification and evaluating habitat changes in two dynamic estuarine sites: Willapa Bay along the coast of WA and the Nisqually River Delta in south Puget Sound, WA. Willapa Bay is a critical stop-over and staging area for Pacific Flyway migratory birds, especially shorebirds and waterfowl. Despite the great importance of the estuary, the Willapa National Wildlife Refuge (Refuge) and other natural resource managers lack fundamental information on ecosystem condition, species status and distribution, and ecological relationships necessary to make informed management decisions to benefit avian species. USGS is conducting spatially-explicit waterbird surveys and contracting aerial flights to support habitat suitability modeling for waterbirds. Habitat classification of bare mudflat and eelgrass presence will form the basis of waterbird models for habitat suitability. The Billy Frank Junior Nisqually National Wildlife Refuge and Nisqually Tribe have formed a unique partnership to protect and restore the Nisqually River Delta and together almost 900 acres have been reconnected to Puget Sound in 2009, representing one of the most significant advances to date towards the recovery of Puget Sound. The restored habitat mosaic is comprised of freshwater to saltwater transitional wetlands and forests, tidal marshlands, mud flats, and eelgrass beds with the ultimate goal is to increase the capacity of the estuary to support a diversity of wildlife, waterbirds, and native fish such as the Nisqually Fall Chinook (<i>Oncorhynchus tshawytscha</i>), a population listed as threatened under the federal Endangered Species Act. USGS leads the monitoring and assessments of physical metrics and processes as well as documenting biological responses as a result of estuarine restoration. TopoBathy LiDAR of the delta is being acquired in December 2020 through the USGS Geospatial Products and Services group. These data, along with an aerial flight conducted in summer 2019, will be the basis of assessing elevation, morphological, and habitat-level changes after 10 years of large scale restoration.</p>
Objectives	<ol style="list-style-type: none"> 1. At Willapa Bay, aerial imagery of the waterbird survey areas have been acquired in the spring and fall seasons, with concurrent ground truthing efforts. USGS will conduct hierarchical habitat classifications, using existing imagery and elevation datasets. These

	<p>habitat classifications will form the basis of habitat association models for waterbird at Willapa Bay. 2. The Billy Frank Junior Nisqually National Wildlife Refuge, the Nisqually Indian Tribe, and USGS have conducted interdisciplinary research, monitoring, and adaptive management studies on the impact of delta restorations on estuarine processes, habitat structures, and functions. Multiple products are in analyses and draft or have been published using these extensive monitoring and applied research datasets (Woo et al. 2019; Davis et al. 2018a, b; Woo et al. 2018; Ballanti et al. 2017; Davenport et al. 2017). As part of our monitoring assessment, topobathy LiDAR is being collected in December 2020. This 2020 LiDAR dataset will form the bases of assessing habitat change compared with the 2011 LiDAR. We anticipate change detection analyses to shed light on spatial patterns of sediment deposition and vegetation establishment within the estuary.</p>
<p>Intern Tasks</p>	<p>The GIS student intern (ideally with a GIS certificate) will be virtually-based or at Fremont, California. The GIS intern will be supervised by USGS personnel and should be familiar with standard aerial classification techniques and change analyses over time. The intern will have the opportunity to explore the imagery and create habitat classification maps using a hierarchical approach, and explore change detection of geomorphic features (i.e., tidal channels, microtopography) or drivers of vegetation colonization rates following restoration.</p>
<p>Expected Results and Benefits to the Intern</p>	<p>This internship provides the opportunity to work existing aerial photography and topobathy imagery datasets (ArcGIS Pro) to assess tidal marsh restoration progress and help create a base layer for habitat association models. The intern will learn how remote sensing can contribute to suite of monitoring tools and techniques to assess the effectiveness of estuarine habitats and restoration actions and the role of imagery in informing managers and stakeholders. Interns will use variety of GIS skills to refine their remote sensing skills (habitat classifications, NDVI to assess vegetation colonization) and data management skills that will be transferable to many other industries or research involving remote sensing technology and aerial photo interpretations and analyses, and topobathy LiDAR datasets.</p>
<p>Skills and Interests of Candidates</p>	<p>Applicants should have a solid foundation in GIS, a GIS certificate or previous work in imagery classifications or LiDAR datasets is a plus. Candidates should have excellent record keeping skills, strong desire to learn about coastal ecosystems and applied science, and interest in using imagery to qualitatively and quantitatively help understand tidal marsh ecosystems and tell a story about restoration progress. The successful candidate will be interested in estuarine or restoration science and ecology, be self-motivated to learn new skills, a fast and quick learner, and a self-starter that tries to anticipate needs.</p>
<p>Project Type</p>	<p>Office Work;</p>
<p>Project Discipline</p>	<p>GIS;Ecology;Field Mapping;Modeling;</p>