



# MOSAICS IN SCIENCE

## Diversity Internship Program

### 2021 Project Descriptions

<b>NPS UNIT: NORTH COAST AND CASCADES INVENTORY &amp; MONITORING NETWORK</b>	<b>PD #: 2021502</b>
<p><b>Project Title:</b> White pine blister rust frequency and detection in whitebark pine in NCCN parks <b>Position Type:</b> Mosaics DHA <b>Primary natural resource discipline:</b> Biological Sciences <b>Project keywords:</b> species distributions, forest pathology, vegetation ecology, threatened species, remote sensing <b>Location:</b> Longmire, Washington</p>	
<b>COVID-19 NOTICE</b>	
<p>As the COVID-19 pandemic continues to change and evolve, project timelines and structure remain flexible and it may be necessary to postpone start dates, begin work remotely, or reformulate the project's description. Should any development in the COVID-19 outbreak impair a project's timeline or results, the SIP Team will work with the park and project mentors to assess the situation and determine the best course of action at that time.</p>	
<b>PROJECT DESCRIPTION AND WORK PRODUCTS</b>	

**Position Description:** Whitebark pine, *Pinus albicaulis*, is a critically important tree species in subalpine and alpine western ecosystems and a candidate for listing under the Endangered Species Act. This pine is threatened by white pine blister rust, *Cronartium ribicola*, a fungus that has led to widespread mortality in the Pacific Northwest in the 100 years since its introduction. The species is also threatened by habitat fragmentation, changes in land management, and accelerating climate change.

In the National Park units in the North Coast and Cascades Inventory & Monitoring Network (NCCN), there are some reported differences between parks in distribution patterns, genetic population structure, resistance to rust and vulnerability to climate change. However most whitebark distribution maps are from the early 20th century and have not been updated to account for high rates of mortality. Modern, stand-specific estimates of disease impacts are from plots based upon these older maps. Understanding the current whitebark distribution and the incidence and severity of rust in each unit in the network is critical for long-term planning, including restoration needs, environmental compliance, and response to large-scale disturbances (i.e. fire or beetle outbreaks). We propose a project to update distribution maps for three park units, develop robust analyses for disease presence and severity, and to test methods of remote sensing to detect disease. This project would build upon existing vegetation inventory and monitoring data and take the first steps in additional analyses to augment plot data collection with periodic landscape image analysis.

The Scientist in Park (SiP) will develop reproducible analysis scripts in R to update projections of species distributions using multiple NCCN vegetation data sources and park-scale abiotic data, including correlations with abiotic predictors (e.g., elevation, aspect, solar exposure). The SiP will develop interactive analyses to determine disease incidence and severity using existing long-term vegetation plot data. The intern may also sample a small area that includes several long-term monitoring plots at Mount Rainier National Park to test detectability of whitebark pine and disease in high-resolution satellite imagery. The SiP will work with NPS mentors to develop data files and a report summarizing the results and will make presentations to brief park managers with project outcomes.

Whitebark pine is a candidate species for listing under the ESA. There are documented areas of high mortality in NCCN parks, yet the data used by natural resource managers is out of date. Updated information about species distribution and disease severity, as well as comparisons between parks, are vitally needed to guide park planning and restoration efforts, as well as to focus the NCCN monitoring efforts and timing (for example, the results of analyses may highlight areas in which further data collection is needed before the first plot revisits). Park units will use this information to make management decisions on wilderness, recreation, and fire management planning, developing restoration goals, and responding to large scale disturbances. The work to begin testing of satellite detection of whitebark and disease within NCCN parks will be an important step in developing the ability to rapidly monitor change on a landscape scale, a critical element in research and planning in a rapidly changing world.

This position is offered through the National Park Service's Mosaics in Science Internship Program in partnership with Environment for the Americas.

**Work Products:**

- Maps and spatial layers to indicate known and predicted whitebark occurrence in three park units
- Reproducible analysis scripts for evaluating whitebark distribution and disease presence in each park, and comparisons between parks
- R analysis script for extracting spectral imagery values from satellite imagery and using

## NATURAL & PHYSICAL WORK ENVIRONMENT

Work will be performed primarily indoors in front of a computer, in a park office building in a shared space or at a remote, home office setting with internet connection.

Optional field work may occur outdoors in a variety of terrain. Fieldwork may require travel on steep rocky slopes, in forests, streams, and wetland environments in a variety of weather conditions in wilderness, surrounding an active volcano.

Mount Rainier National Park is located approximately 2 hours south of Seattle, near the community of Ashford, WA. All services and amenities are available in the nearby communities of Packwood, Eatonville, or Morton. Limited services are available in Ashford, WA. The climate is considered moderate, but frequently overcast and rainy at lower elevations during fall, winter and spring, and early summer. At Longmire, the duty station of this position, substantial snowfall is common from November to May. Summers are normally sunny and pleasant with daytime temperatures ranging from the low 70's to low 80's and low humidity. You may visit the park's website at <http://www.nps.gov/mora>.

## QUALIFICATIONS

SiP candidates should have a Bachelor's degree, or equivalent work experience, in a field related to ecology, natural resource, conservation, geography, or biological science. Ideal candidates will have a year or more of independent work experience or graduate-level course work in similar fields. Candidates should have experience (course work or work experience) in basic statistics and R or another similar programming language. Candidates should expect to become proficient in R programming and several methods of statistical analyses.

The applicant must be a U.S. citizen or U.S. permanent legal resident ("green-card-holder") between the ages of 18 and 30 years old, inclusive, or veterans up to age 35. Prior to starting this position, a government security background clearance will be required.

## VEHICLE AND DRIVER LICENSE REQUIREMENTS

**Applicant does not need a valid drivers license.**

**A personal vehicle is strongly RECOMMENDED but not required for this position.** Applicants can also elect remote work for this position.

## HOUSING

Park housing is available and will be provided at no cost to the participant. Shared housing will be provided at Longmire, the duty station of the position located within the park, or Tahoma Woods, approximately 16 west miles from Longmire. Public transportation is not available in the area and a personal vehicle is recommended for easier access to Longmire from Tahoma Woods and access to any services or recreation. Furnished housing may be in a shared two-bedroom apartment or a 2-3 bedroom house. The participant will need to bring bedding, kitchen supplies, towels, and other household items.

Park housing availability may change depending on COVID-19 restrictions in place in spring 2021. This position can also work remotely or semi-remotely (with shorter term housing options in the park) from their current home or other private housing. Housing can also be found in the neighboring communities of Ashford and Packwood.

**INTERNSHIP START/END DATES**

**Start Date:** 5/17/2021

**End Date:** 7/30/2021

Eleven weeks of the internship will be in the park or completed as remote work. A mandatory Career and Leadership Workshop will be held in Washington, D.C. from August 1 – 5, 2020.

**PLEASE DIRECT ANY QUESTIONS TO ENVIRONMENT FOR THE AMERICAS**

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