Anacortes Community Forest Lands

Forest Monitoring Program

Annual Report 2022

ANACORTES COMMUNITY FOREST LANDS

FOREST MONITORING PROGRAM

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An ongoing study by
Transition Fidalgo and the **City of Anacortes**

Cover photo by Lynn Wohlers

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Compiled by David Peterson and Eric Shen

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The Forest Monitoring Project was envisioned, developed. and financed by Transition Fidalgo, in partnership and with the financial assistance of the City of Anacortes, and with further assistance and coordination from the Friends of the Forest.

It is made possible only by the generous dedication, time, and energy provided by our many volunteers. Thank you, volunteers.

If you have further questions, or wish to become involved, contact us at:
info@transitionfidalgo.org

Fidalgo Island and the surrounding region are the traditional homelands of the Coast Salish people, including ancestors of the Samish Indian Nation and the Swinomish Indian Tribal Community, who have lived on and cared for these lands since time immemorial.

Transition Fidalgo

Transition Off Fossil Fuels!

CITY OF ANACORTES

Introduction

In 2019, Transition Fidalgo, in partnership with the City of Anacortes, initiated a resource monitoring program in the Anacortes Community Forest Lands (ACFL). The ACFL Monitoring Program has three major goals:

- Conduct a long-term monitoring program that provides an overall assessment of the health of ACFL terrestrial and aquatic systems over time.
- Provide an opportunity for community members to develop a deeper understanding of the forests covering Fidalgo Island through hands-on participation in the monitoring program.
- Provide City managers and advising boards with data to make decisions about the use, care, and management of ACFL.

Photo by Eric Shen

This report is the first annual summary of the status of each project. Up until now, the forest monitoring program has been in a state of flux due to the COVID virus, the addition of new projects, and other factors that together delayed the issue of an annual report.

To date, the ACFL Monitoring Program has eight projects. All data are collected by volunteers. Each project has one or more leaders, and scientific oversight is provided by an advisory committee. Data are archived by Transition Fidalgo and analyzed periodically to characterize resource conditions and trends.

In this report, you will find a summary description about each of the projects that make up the ACFL Monitoring Program and a current progress report. These are early days for the monitoring program, so many of the projects will not be able to show significant trends until future years.

This is the start of the fourth year of forest monitoring. There is one conclusion that can be made: our corps of volunteers has been steadfast in going out to do surveys, recording data, and working to iron out wrinkles with the monitoring protocols. A big thank you to everyone working so hard to make this program a success.

Photo by Jack Hartt

Dynamics and Health Project

Project lead

Dave Peterson

Overview

This project quantifies the long-term conditions (including health and vigor) of selected locations in the ACFL. Some forest areas of the ACFL have experienced significant stress, dieback, and tree mortality, phenomenon observed in much of western Washington — presumably associated with recent dry summers. Recent stress symptoms in forests may indicate the early stages of forest modification associated with extreme weather and perhaps a long-term response to climatic variability and change.

Data on forest composition and structure are collected at two locations:

- Six plots adjacent to Trail 201 (near Whistle Lake), where recent tree mortality and dieback have been observed. Dominant tree species are Douglas-fir, western hemlock and red alder.
- Six plots adjacent to Trail 304 (east of Heart Lake), where forest health appears to be good and recent mortality and dieback are not apparent. Dominant tree species are Douglas-fir, western hemlock, grand fir, red alder, and bigleaf maple.

Progress report

Data were collected from the forest plots in 2019 and 2021. The upland forest plots near Trail 201 have experienced a significant amount of stress from dry summers that have occurred since 2015. This has apparently increased mortality and decreased vigor in western hemlock and western redcedar, mostly in smaller trees, acting as a natural "thinning" of the forest. The dominant Douglas-firs have not been affected much. This forest still has a relatively high density of trees and appears to be functional despite recent changes. Crown density (a measure of vigor) increased slightly between 2019 and 2021.

The forest plots near Trail 304 have experienced no apparent effects of recent dry summers, likely because of the deeper, moister soils in this area. This stand has a relatively high density of trees, and although some natural dieback of the hardwoods can be expected in the future, there are many western redcedars in the understory that may grow into the canopy in the future. Overall, this appears to be a healthy, productive forest.

One of our many volunteer groups for the plot studies in the ACFL
Photo by Jack Hartt

Western Redcedar Mortality Project

Project leads

Eric Shen, Jon Ranney

Overview

Western redcedar has exhibited lower vigor and higher mortality in the ACFL in recent years compared to the past few decades. This project was developed to quantify cedar vigor and mortality in a structured manner to understand the dynamics and health of this species across the ACFL landscape.

Cedars are being monitored with "strip surveys" in which observers walk along ACFL trails and record trees as live or dead, and the crown density and foliage color of each live tree (upper, middle, and lower crown) within a 10-m wide band. This approach allows for a large area to be covered with moderate effort using controlled and repeatable observation and documentation. Nine trails are sampled at locations with different moisture environments, aspects, and cedar densities. Although trails were formerly sampled multiple times per year, they are now sampled once per year.

Progress report

Surveys for all trails were completed at least once in 2019. Five trails have at least one survey completed in both 2020 and 2021 as well. The remaining trails have at least one additional survey after 2019. So far, there is little change in the average density and color values over time on any of the trails.

Going forward, surveys will be done once per year on each trail during the summer. Further organization and analysis of the survey data will be necessary to assess any trends.

Our forest science advisor and hands-on teacher, Dave Peterson, instructs new volunteers in forest studies. *Photo by Jack Hartt*

Fire Effects and Forest Dynamics

Project lead

Jon Ranney

Overview

In August 2016, the Little Cranberry Lake fire burned 16 acres in the Cranberry Lake unit of the ACFL. Although relatively small, it got the attention of Anacortes residents who were surprised that a fire would occur so close to town.

The fire provided a learning opportunity for ACFL managers, students, and the public. The effects of the fire on trees and other vegetation can be documented, and forest structure and recovery processes following the fire can be quantified over time.

Qualitative monitoring of the post-fire landscape is being conducted through repeat photography at designated photo points. This approach is documenting revegetation of the site, including regeneration of tree seedlings. Quantitative data collection may be considered in the future to document tree growth, forest structure, and soil conditions.

How the forest looked in 2016 as the fire still smoldered.
Photo courtesy of City of Anacortes

Progress report

Photos at the eight selected locations were taken on a quarterly basis from June, 2019 through January, 2022. Going forward, we plan to take the photographs only once per year, in July.

Photograph file names have been changed so that the photos for each view at a given site will automatically group together in chronological order, for convenient review of re-growth over time.

How the forest looks in 2022.
Photo by Jon Ranney

Plant Phenology

Project lead

Keith Magee

Overview

Phenology is the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant life. Several plant characteristics, such as bud break, leaf expansion, flowering, and leaf fall, vary from year to year based on weather-related phenomena such as temperature, precipitation, and soil moisture.

These phenological occurrences can be readily observed and recorded, with long-term data providing insight on the potential effects of year by year variation in weather and multi-decadal variation in climate.

Data are collected on three individuals of each target species in the ACFL: Douglas-fir, western redcedar, red alder, bigleaf maple, Indian plum, salmonberry, and oceanspray. This requires repeated observations in the spring and fall to ensure that the timing of phenological characteristics is accurately recorded and that observations are consistent from year to year.

Progress report

Data have been collected for two years. Observations have improved over time as volunteers gain experience in documenting plant phenology using photo guides. Unfortunately, some of the plants in this project have died, requiring a shift to different plants. Additional data will be needed to characterize climate-plant relationships and potential trends.

Soil Moisture

Project lead

Eric Shen, Adam Erie

Overview

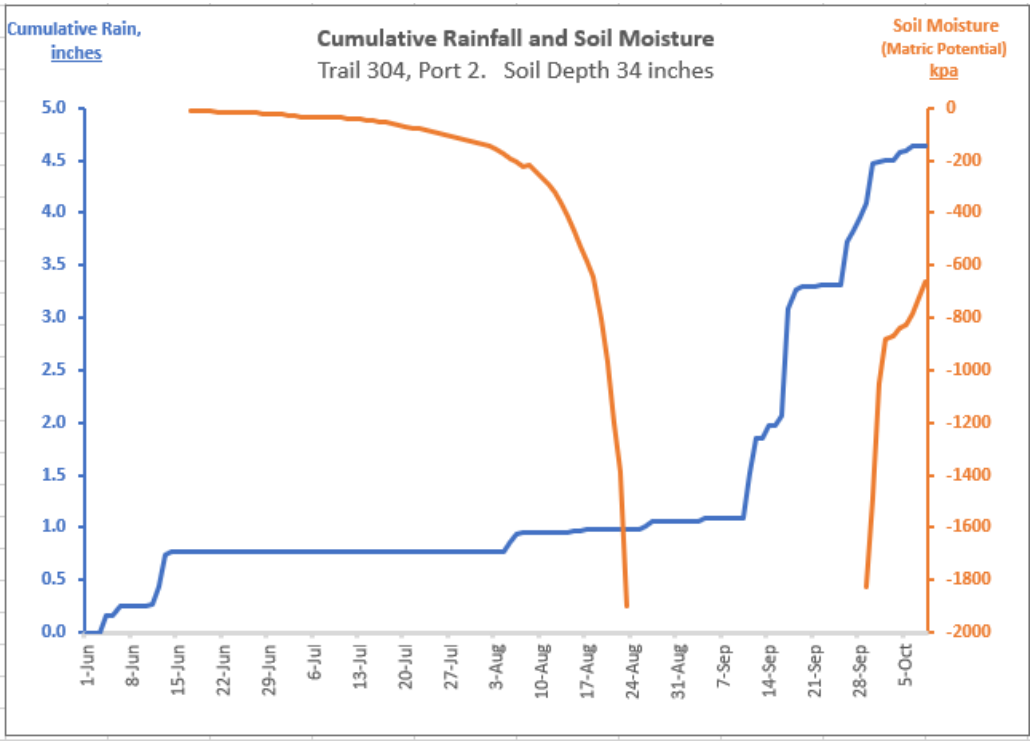
Soil moisture is the most critical factor for tree growth during dry summers in western Washington. Long periods of low soil moisture cause physiological stress. Low soil moisture during very dry summers since 2015 is the most likely cause of recent mortality and reduced vigor in some trees in the ACFL. This stress is exacerbated by the typical low annual precipitation in the ACFL and by shallow, well-drained soils in some locations.

Since July 2020, soil moisture instruments have been installed adjacent to the permanent forest monitoring plots along trail 201, featuring upland, shallow soil, and trail 304, which has lowland, deeper soil. At trail 201, sensors are placed at 11 inches and 30 inches below the soil surface. At trail 304, sensors are placed at 6 inches, 34 inches, and 60 inches below the soil surface (this lowest sensor installed in July 2021).

Sensors measure soil moisture and temperature twice a day, with data stored on a data-logger and downloaded quarterly to a laptop computer.

Progress report

Data for the shallow soil moisture sensors have been what was expected: from mid-June to mid-October, the soil dries out to the point that plants no longer have access to water. At the 34-inch depth at the trail 304 site, soil drying was delayed and was shorter in duration; low soil moisture lasted from mid-August to early November. However, at the 30-inch depth at the trail 201 site, the soil remained moist throughout the year. This suggests that there is a source of water near the moisture sensor, perhaps subsurface water flow. At the trail 304 site, the limited data we have so far at the 60-inch depth indicate that the soil remains moist throughout the year.



Soil moisture data have been graphed together with weather data, showing when rainfalls occur and quantity per event. In the upper part of the soil profiles, the graphs match closely, with the first sustained rainfall of the season restoring higher soil moisture levels. At the deeper levels, the soil moisture vs. rainfall plots showed a delay or did not correspond much, the soil staying moist all year round.

Bird Populations

Project lead

Evelyn Adams, Jack Hartt

Overview

Forest ecosystems in the ACFL landscape provide a variety of avian habitats across 2,800 acres—a significant "habitat island" between Puget Sound, urban development, and agriculture. Forest habitat is influenced by plant species and forest age, structure, and vigor. These factors in turn influence food sources, nesting opportunities, predator-prey relationships, and microclimate. Birds are also a source of interest and enjoyment for people who observe birds in the ACFL and other locations in the Skagit region.

Birder volunteer Neil O'Hara observes birds at Cranberry Lake in the ACFL.
Photo by Jack Hartt

Starting in February 2021, the Fidalgo Forest Stewards began monitoring bird populations at three locations in the ACFL: Little Cranberry, Beaver Ponds, and Heart Lake. Each volunteer is responsible for a monthly count of bird species and numbers for one of the above locations, using both visual and call/song identification. Data are recorded in an Excel spreadsheet and are also entered through an online account in eBird. Although these are monthly snapshots of bird populations, they provide a good record of seasonal changes, and over time will provide trend data for specific ACFL habitats.

A cedar waxwing pauses while feeding on the berries of a shrub in the ACFL
Photo by Jack Hartt

Progress report

With just over one calendar year of observations, it is not yet possible to evaluate year to year variation and trends, but we are establishing baselines of data that will provide future insights into possible changes in bird populations. We also aim to establish annual training sessions for observers to continually improve observational skills.

Weather and Climatology

Project lead

Jon Ranney

Overview

Daily, monthly, and annual weather data provide the basis for assessing potential relationships between physical drivers (temperature, precipitation, soil moisture) and resource conditions. Long-term weather data, the climate, provides the context for assessing the potential effects of future climatic variability and change.

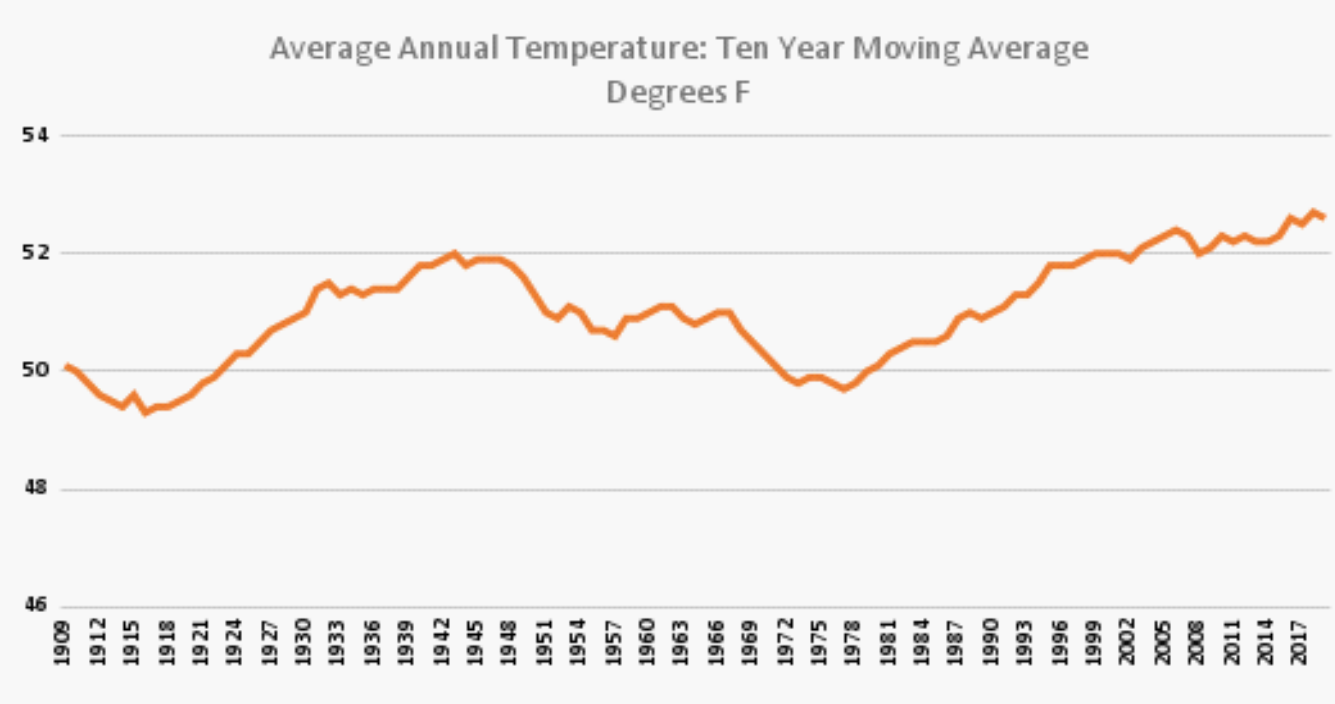
This project is focused on a database containing a long-term record of temperature and precipitation on Fidalgo Island. This can be used, in conjunction with data from other components of the forest monitoring project, to evaluate the effects of weather extremes and changes in our climate.

A database has been compiled with historical daily precipitation and high and low temperature observations starting from October 1, 1899. Daily values are updated on a regular basis by downloading from the Internet where possible, or by other means, including manual entry as necessary. In addition, precipitation and temperature data are being collected from an electronic weather station that was installed at the Anacortes Water Treatment Plant in September 2020.

Progress report

Local daily weather observations continues to be recorded. Three three local CoCoRaHS stations included in the have been reporting rainfall data on a regular basis, and our weather station continues to operate reliably for temperature and rainfall.

Hydrologic year 2022 to date has been unusually wet and cool. Total rainfall for October through March was over 27 inches, more than the total annual average. The overall average temperature during that period was well below the average of the last 20 years, due to average daily highs being the lowest since the 1980s, considerably below the 20th-century average.



Heart Lake Stream Flow Measurements

Project leads

Jack Hartt, Beck Pittman

Overview

Aquatic systems in the ACFL—lakes, streams, and wetlands—provide habitat for a wide range of plants and animals that are distinct from the more common upland forest habitats. These systems provide an important source of biological diversity. They are also focal areas for recreation by visitors to the ACFL. Some water resources have been affected considerably by past land-use activities. In addition, a warmer climate is expected to affect water resources in the future, especially small streams and shallow water areas.

In February 2022, in collaboration with Anacortes High School students, we began monitoring the stream flow at the outlet of Heart Lake. The students use a streamflow-measuring device and physical streambed measurements to document the flow rate in three different locations, once a week at the same time of day during the spring months. They also record stream temperature.

Progress report

This initial effort on streamflow measurements began this winter, and has been underway for four months now. Methods and data will be evaluated later this year. Future monitoring will incorporate more detail on the volume of streamflow, providing us with an accurate picture through the coming years of potential changes in the hydrology of this key ACFL water basin.

Anthony Zumpano and Noah Dunham, students at Anacortes High School, record the stream flow out of Heart Lake.
Photo by Jack Hartt

Anthony and Noah measure the stream bed volume at a different location on the Heart Lake outlet stream.
Photo by Jack Hartt

Summary

This report is the first annual summary of the status of each project. Because only a short period of data is available, it is difficult to provide a detailed assessment of resource conditions and to evaluate trends. As data accumulate over time, it will be possible to make connections with physical drivers (e.g., weather, soil moisture), infer potential trends, and understand more about the dynamics and health of ACFL ecosystems.

To date, most monitoring has occurred over a relatively small area of the ACFL. A coarse-level inventory of the entire forested area would help to qualitatively describe the diversity of ACFL forest conditions and suggest other locations where monitoring could be beneficial. In addition, there are several components of the ACFL for which additional information would provide a more complete picture of forest dynamics and health; this includes carbon storage, lichens and mosses, insects, and pathogens. There is also interest in more extensive aquatic monitoring of streams and lakes.

The ACFL Forest Monitoring Program is a dynamic, collaborative effort that can be modified over time to address scientific issues and improve data value. This requires periodic feedback to ensure that data are high quality and relevant to objectives of the program. Feedback from anyone interested in the monitoring program is welcome.

Acknowledgment: The ACFL Forest Monitoring Program runs on volunteer power. Thank you to everyone who has contributed time and energy to data collection and other tasks over the past few years. This is citizen science at work! We also thank the City of Anacortes for providing funding for the program volunteer coordinator, student interns, and equipment.

Photo by Jack Hartt

Our Recent Volunteers

A big **Thank You** to all of our volunteers. Without you, there would be no forest monitoring program.

Adam Erie
Anthony Zumpano
Beck Pittman
Becky Vavrosky
Bob Ross
Dan Miner
Dave Peterson
Eric Shen
Evelyn Adams
Herta Kurp
Jack Hartt
Jan Hersey
Jan Weedman
Jon Ranney
Josh Smith
Kari Bishay
Keith Magee
Laurie Sherman
Mary Campbell
Neil O'Hara
Noah Dunham
Paul Sherman
Rob Adler
Robbie Hutton
Robin King
Rosann Wuebbels
Ruth Bachrach
Sarah Pedersen
Sarah Roberts
Shirley Hoh
Steve Purcer
Taft Perry
Terry Slotemaker
Tom King
Tom Strawman
and others...

Photos by Jack Hartt