



Climate Change Research in Southeast Alaska

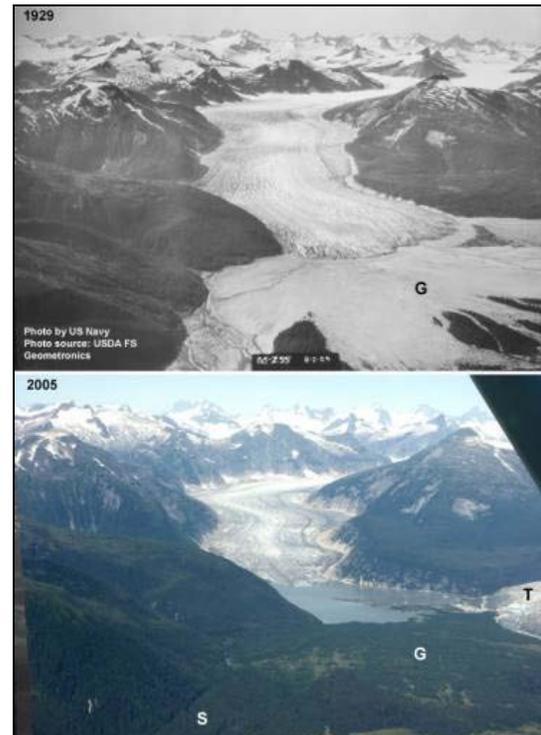
Background

The Tongass National Forest is located in the largest intact area of coastal temperate rainforest in the world. The watersheds of this maritime forest host many of the remaining healthy wild salmon stocks, abundant large mammals, birds, and other unique and valued wildlife species. Water defines the Tongass, from the glaciers and snowfields of the alpine areas, to the estuaries and beaches that occupy the 11,000 miles of coastline.

Coastal temperate rainforests such as the Tongass sequester large amounts of carbon in waterlogged soils and wetlands, with about 7% of the carbon in national forests in the U.S. occurring in this one forest. This carbon plays a pivotal role in the regional carbon balance by offsetting a portion of anthropogenic carbon emissions.

The climate of the Tongass is poised at the rain/snow precipitation threshold making it sensitive to relatively small temperature changes. In this mountainous terrain, small increases in winter temperature amplify the impact of warming by driving the snow line up to higher elevations. Glaciers are receding and winter snowpack within watersheds is decreasing. Changes to soil moisture, the root zone environment, and stream hydrology combine to alter the fundamental structure of the forest and aquatic habitats.

One important result is a change in the distribution of major vegetation types as local conditions favor new species at the expense of existing ones. The current decline of yellow cedar is one of the leading examples of climate change effects to a forest ecosystem. Salmon will also be affected through changes in habitat, flood intensity and temperature. Anticipating and mitigating the effects of changing climate, and influencing the rate of global warming present huge challenges to the management of the Tongass. Forest managers have a portfolio of mitigation and adaptation activities in place to address climate change in Southeast Alaska. Forest managers and research scientists at the Forestry Sciences Laboratory are collaborating to tackle several key aspects of the climate change challenge in the region.



High Priority Research

The following key research questions are currently under investigation. Details of each research priority are available in individual briefing papers.

Yellow cedar decline: The loss of this valuable species is the first dramatic indicator of climate change impacts on forest structure. Research plans are to:

- Conduct landscape and climate modeling to determine areas suitable for conservation and active management of yellow-cedar given climate projections.
- Evaluate which tree species to favor in the dead and dying cedar forests, including those that received salvage harvest to capture the extremely valuable dead cedar wood.
- Develop silvicultural techniques to promote yellow-cedar on climate-suitable habitat.

Carbon cycling and sequestration: The flow of carbon is an integrative measure of ecosystem behavior and impacts greenhouse warming. Steps will be taken to:

- Refine carbon flux values for soils and streams at stand, reach and regional scales.
- Obtain carbon flux estimates for representative coastal temperate rainforest watersheds.
- Measure carbon sequestration magnitude in young-growth forests and response to different thinning regimes throughout the stand development chronosequence.



Hydrology: Water is the common denominator in the response of most Tongass habitats. Needs are to:

- Develop better models to predict changes in snow cover and rainfall
- Refine models of watershed discharge patterns to anticipate flood scour and sediment movement
- Understand impact of changing hydrology and temperature on salmon and other aquatic species.



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