

Research

Goal: Continue to seek out and promote research opportunities that are consistent with identified information needs.

Objective: Cooperate with the Pacific Northwest Experiment Station (PNW) in pursuing the high priority information needs identified in Appendix B of the Forest Plan through the intra-agency agreement entitled "Joint Studies for Improved Future Tongass National Forest Planning" and other means, such as recommendations from the Forest Leadership Team.

Background: Appendix B of the Forest Plan identifies priority research important for further Forest Plan amendment or revision, and lists additional data and information needs that will help to implement the Forest Plan. While not essential to the completion of the Forest Plan, results of the priority research items will substantially strengthen the scientific information base needed to support alternative development. An important element of the priority research items and additional information needs is an "adaptive management" feedback loop to evaluate current plan direction, design monitoring programs to measure effects, and adjust future management activities to better address economic, social, and environmental concerns on the Tongass.

Research Question 1: Have identified high-priority information needs been fulfilled?

Monitoring Results

As first mentioned in the 2004 Monitoring Report, most of the high priority information needs listed in Appendix B of the 1997 Forest Plan have been met or are well on the way of being met. The Tongass Leadership Team, in cooperation with the Pacific Northwest Forest Experiment Station (PNW), developed additional research needs on October 10, 2002. Refer to the 2003 Tongass Monitoring Report for a complete list of these new research needs.

The research results developed from these needs will contribute to substantially strengthening the scientific information base needed to support alternative plan development. The research will contribute to the adaptive management feedback loop for the Forest. This feedback will contribute information to evaluate the current plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns.

The following are some of the recent publications from priority research needs listed in Appendix B of the Forest Plan and the additional research needs developed in 2002 as well as subsequent information needs:

Cervený, Lee K. 2007. Sociocultural effects of tourism in Hoonah, Alaska. Gen. Tech. Rep. PNW-GTR-734. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 115 p.

Everest, Fred H.; Reeves, Gordon H. 2007. Riparian and aquatic habitats of the Pacific Northwest and southeast Alaska: ecology, management history, and potential

management strategies. Gen. Tech. Rep. PNW-GTR-692. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 130 p.

Fellman, J.B. and D.V. D'Amore. 2007. Nitrogen and phosphorus mineralization in three wetland types in southeast Alaska. *Wetlands* 27:44-53.

Fellman, J.B., D.V. D'Amore, E. Hood, and R.D. Boone. *In Press* Fluorescence characteristics and biodegradability of dissolved organic matter in forest and wetland soils from coastal temperate watersheds in southeast Alaska. *Biogeochemistry*.

Nicholls, David; Roos, Joseph. 2007. Red alder kitchen cabinets- How does application of commercial stains influence customer choice? Res. Note. PNW-RN-556. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 9 p.

Rojas, Thomas D. 2007. National forest economic clusters: a new model for assessing national-forest-based natural resources products and services. Gen. Tech. Rep. PNW-GTR-703. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 33 p.

U.S. Army Corps of Engineers. (2006). "Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region," J. S. Wakeley, R. W. Lichvar, and C. V. Noble, eds. ERDC/EL TR-06-3, US Army Engineer Research and Development Center, Vicksburg, MS. <http://www.usace.army.mil/cw/cecwo/reg/erdc-el-tr-06-3-web.pdf>

Research projects designed to help fulfill the knowledge needs of managing the Tongass National Forest that are underway:

1. **Tongass-Wide Young-Growth Studies or TWYGS** – The objective of this study is to test whether silvicultural treatments, applied at various stages of stand development, are effective in improving understory plant diversity and abundance, deer forage, and wood quality. A secondary objective is to assess the accumulation and subsequent decay of slash created by thinning and pruning treatments.
2. **Winter Harbor Wildlife Thinning Project.** The objective of this study is to determine the methodology and feasibility of doing wildlife thinning and get a small log byproduct.
3. **Alternatives to Clear cutting or ATC** – The objective of this study is to learn about the ecological effects, economics, and social impacts of silvicultural systems other than clear cutting in southeast Alaska. There is a short-term retrospective study and a longer term, operational-scale study. The retrospective portion studied stands partially harvested from the early 1900s to present. The retrospective study is completed. The operational-scale study will look at tree regeneration, growth, mortality, plant diversity and abundance, tree damaging agents, deer habitat quality, bird diversity and abundance. headwater stream ecology. ground water changes, slope stability, visual quality, and social acceptability. Refer to the following publication:
McClellan, Michael et al. 2000. Alternatives to clear cutting in the old growth forests

of southeast Alaska: study plan and establishment report. Gen. Tech. Rep. PNW-GTR-494. Portland, OR: U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 40 p.

4. **Forage Resource Evaluation System for Habitat or “FRESH-deer”** – This project is intended to determine quality of habitat for deer based on the digestible protein and digestible energy present on the site. There is a fully functional model for this subject but it has to incorporate more data for it to be fully usable on the Tongass. The PNW has 500 freeze dried vegetative samples of deer forage which they will have analyzed for digestible protein and digestible energy. The study will also provide a test of the significance of digestible protein as a potential limiting factor for deer on the Tongass and may have major implications for reducing the amount of future effort directed at nutritional analysis. The lab test data will be run through a statistical analysis and interpretation. The results will be incorporated into the FRESH-deer system.
5. **Prince of Wales Commercial Thinning Study** – The primary objective of this study is to evaluate the feasibility and effects of commercial thinning in even-aged western hemlock-Sitka spruce stands in southeast Alaska. It will assess effects on understory plant diversity and abundance, deer forage availability, light availability, forest structure, stand growth and yield, tree damage agents, and soil disturbance. Additional objectives could address harvesting costs and product yields.
6. **Coho Monitoring Protocol** – This protocol was developed to monitor the effectiveness of the Tongass Land Management Plan (TLMP) management standards for maintaining fish habitat. -- A 3-year pilot study was conducted to develop detailed methods to estimate juvenile salmonid populations, measure habitat that could be used to quantitatively determine trends in juvenile coho salmon abundance. The pilot study provided data for a priori criteria for type I and type II error rates, effect size, and sample sizes for the protocol. The protocol is designed to detect trends in abundance of coho salmon parr, as well as coho salmon fry and Dolly Varden (*Salvelinus malma*), in small streams managed according to TLMP standards and guidelines and to compare these to trends in unmanaged (old-growth) watersheds.
7. **Carbon Cycle Science Research**— A series of basic and applied research studies have established baseline terrestrial and aquatic fluxes of carbon from wetlands and uplands in several watersheds at several scales in the coastal temperate rainforest of southeastern Alaska. The research work provides information on fundamental terrestrial and aquatic ecosystem processes related to the flow, sequestration, and fate of carbon. This information is essential for addressing concerns regarding carbon cycles in old-growth forests and provides a framework for establishing a collaborative adaptive management program between the Tongass and PNW for elucidating carbon cycles in second-growth forests. This will increase our capacity to address the carbon sink/source relationships in young-growth forests on the Tongass.

Silviculture and Ecology Team of the RMP program and ALI Aquatic Ecology and Hydrology Team in Juneau have been addressing carbon cycle science in a study of baseline terrestrial and aquatic fluxes of carbon and proposes to expand their work. The research is primarily funding through a USDA-NRI grant. Expanded carbon-

cycle research will establish and test methods for quantifying fluxes of carbon from terrestrial and aquatic ecosystems across a gradient of ecosystem types. Along with the intensive baseline measurements at existing sites and the experimental forest, the research work will incorporate a case study of harvested and unharvested forest stands to test methods for manipulating carbon storage in young-growth forests. This will increase our capacity to address the carbon sink/source relationships in young-growth forests on the Tongass.

8. **Wetland Functional Assessment Research** --The wetland research program at the Juneau FSL RMP/ALI programs has also addressed the information needs for wetland functions on the Tongass. Wetlands have little overstory production due to limited nitrogen and phosphorus mineralization. However, these systems export a large portion of this N and P to aquatic ecosystems where it may be used as part of the primary production in streams and rivers. Therefore, wetlands function as a potential support system for characteristic terrestrial vegetation, but also support adjacent aquatic habitats. This information can be used for justification for protection of wetland ecosystems on the Tongass.

Along with this research, PNW assisted in the review and production of a revised wetland delineation guide for Alaska. The 1987 US Army Corps of Engineer's (USACOE) manual for wetland delineation did not provide regionalized guidelines for plants, soils and hydrology. Due to the vast diversity of habitats and ecosystems covered by the guide, the USCOE Waterways Experiment Station worked with experts in Alaska to devise a regional adaptation to the guidebook. The new guidebook streamlines the indicators and provides useful information on specific conditions in Alaska's ecosystems.

Fellman, J.B. and D.V. D'Amore. 2007. Nitrogen and phosphorus mineralization in three wetland types in southeast Alaska. *Wetlands* 27:44-53.

Fellman, J.B., D.V. D'Amore, E. Hood, and R.D. Boone. *In Press* Fluorescence characteristics and biodegradability of dissolved organic matter in forest and wetland soils from coastal temperate watersheds in southeast Alaska. *Biogeochemistry*.

U.S. Army Corps of Engineers. (2006). "Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region," J. S. Wakeley, R. W. Lichvar, and C. V. Noble, eds. ERDC/EL TR-06-3, US Army Engineer Research and Development Center, Vicksburg, MS. <http://www.usace.army.mil/cw/cecwo/reg/erdc-el-tr-06-3-web.pdf>

9. **Ecosystem Service Studies** --The objective of this work is to associate land management, treatment, and restoration options to quantified and marginal changes in ecosystem service flows over time. The analysis pertains to supply-side, demand side, and life-cycle assessments. Evaluation includes market, non-market, and prospectus on emerging markets for ecosystem services. Ecosystem service appraisal, valuation, and alternative valuation methodologies are employed.

Action Plan

The Tongass National Forest and the PNW will continue the studies related to these additional needs.