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# Tongass National Forest 2015 Annual Monitoring and Evaluation Summary

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## Monitoring Overview

The 2015 Annual Monitoring and Evaluation Report summarizes specific monitoring completed during fiscal year (FY) 2015 in accordance with the Tongass Land and Resource Management Plan (forest plan). Chapter 6 of the 2008 forest plan specified an annual written summary of forest-wide monitoring programs.

Some monitoring protocols and questions were updated to better define and focus monitoring work during the completion of the 2008 Forest Plan amendment. Monitoring work is currently underway for most of the questions in this report. Monitoring is completed through years of data collection and evaluation. This report serves as the annual written summary of forest-wide monitoring program. A five-year summary of forest plan monitoring was completed in 2012. Changes relative to recommendations in the five-year evaluation and a transition to comply with the 2012 Planning rule is ongoing.

The 2012 Planning Rule requires a biennial monitoring report instead of an annual report. The next scheduled monitoring report will cover FY 2016 and FY 2017; this first biennial report is part of a national pilot for monitoring reports under the 2012 Planning Rule. New reports should be more concise than in the past. They are intended to convey new information that is relevant to helping the responsible official determine if changes may be necessary in the Forest Plan, a particular management activity, or the monitoring program itself such as questions or indicators used in monitoring.

With this in mind, this FY 2015 report is condensed from previous years and is only a summary of the monitoring that occurred; additional information is available at the Tongass Forest Supervisor's office in Ketchikan, Alaska. However, more current information will be released within a few months of this summary.

If you have questions or comments about this report, please contact Cathy Tighe at the Tongass National Forest Supervisor's Office, 907-228-6274, or cathy.tighe@usda.gov.

## Monitoring and Evaluation Program

Monitoring and evaluation are quality control processes for implementing the Tongass forest plan. These processes provide the public, the Forest Service, and other agencies with information on the progress and results of plan implementation. Monitoring and evaluation comprise an essential feedback mechanism within an adaptive management framework to keep the plan dynamic and responsive to changing conditions. The evaluation process also provides feedback that can trigger corrective action, adjustment of plans and budgets, or both, to facilitate action on the ground.

The forest supervisor is responsible for coordinating the preparation of the annual monitoring and evaluation report. This report summarizes the monitoring activities and results from FY 2015. It addresses and evaluates each of the questions listed in the monitoring plan.

Generally, the focus of the annual report is on the information gathered during the year and identification of issues requiring immediate attention. A more comprehensive evaluation process takes place every fifth year. The evaluation includes recommendations for remedial action, if necessary, to make management activities and their effects consistent with the forest plan.

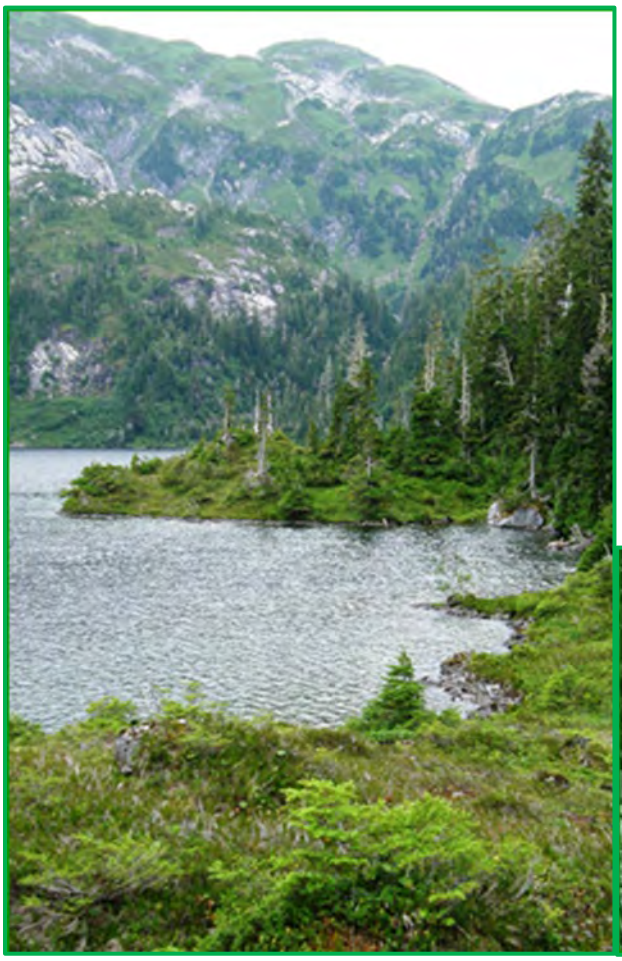
# Physical and Biological Environment

## 1. Air Quality

### Is air quality being maintained?

The City of Juneau, Mendenhall Valley area is in maintenance status for PM 10 and is not on the national list for nonattainment for PM 2.5 National Ambient Air Quality Standards (NAAQS). Forest staff will continue to periodically review the ADEC and EPA status across the Tongass.

We will continue to seek funding to conduct lichen air quality sampling in wilderness at consistent 8 to 10 year intervals, which will allow us to monitor trend data and environmental conditions.



**Lake in S. Etolin Wilderness near where permanent air quality lichen monitoring plots reside. Photo by Karen Dillman**

**Collecting lichen tissue for contaminant analysis in South Etolin Wilderness. Photo by Karen Dillman**

# 2. Climate Change

## What are the long-term changes to the permanent snowpack and how does it affect the physical and biological environment?

### Climate Change

Long-term climate trends and decadal climate cycles have been observed in Southeast Alaska, which are influencing air temperature and precipitation (Neal et al. 2002). There is a growing body of literature on the topic of climate change and likely effects on aquatic and terrestrial ecosystems on the Tongass National Forest (Bryant 2009, Hodgkins 2009, Hood and Berner 2009, Haufler et al. 2010, Wolken et al. 2011, Hennon et al. 2012, Shanley et al. 2014, 2015). Haufler et al. (2010) anticipates climate change impacts on the Tongass National Forest and surrounding lands to include:

- changing sea level,
- increasing ocean temperatures and changing circulation patterns,
- increasing ocean acidification,
- increasing storm intensities,
- changing stream temperatures and flows,
- receding glaciers,
- changing wetlands,
- changing temperature and precipitation, and
- increasing numbers and varieties of invasive species.

Shanley et al. (2015) projections suggest a lengthening growing season and rising freezing elevation for substantial portions of the winter. The change in temperature and precipitation are expected to impact the distribution, timing, and quantity of snowfall and resulting runoff.

### Snowpack Changes - Glaciers

Most glaciers in Alaska and British Columbia are shrinking substantially. This trend is expected to continue and has implications for hydropower production, ocean circulation patterns and fisheries (U.S. Global Change Research Program 2014). Glaciers in Southeast Alaska are particularly vulnerable to climate change due to their relatively low elevation (Larsen et al. 2007). On average, Alaskan glaciers are experiencing a trend of accelerating mass loss (Van Beusekom et al. 2010, Arendt 2011, Loso et al. 2014), with tidewater glaciers losing mass at substantially slower rates than other glaciers in Alaska (Larsen et al. 2015). Glaciologists have estimated a loss of roughly 16.7 cubic kilometers of ice from Southeast Alaska between 1948 and 2000: a rate of loss more than twice that previously reported (Larson et al. 2007). Rapid thinning and retreat at Juneau's Mendenhall Glacier has increased calving (Boyce et al. 2007). Similar accelerated glacial retreat has been observed on Baranof Island (Hughey and Giese 2012).

### Snowpack Changes – Permanent and Seasonal Snowpack

Permanent and seasonal snowpack in Southeast Alaska is also vulnerable to climate change. Long-term and cyclical changes in snow lines and snow depth affect terrestrial and aquatic resources. For example, reduced snow depth during a cyclical warming trend in the 1970s and 1980s is the likely cause of extensive yellow-cedar mortality in Southeast Alaska (Hennon et al. 2012).

### *Partners*

Snowpack monitoring in the Tongass National Forest is conducted in cooperation with USDA Natural Resource Conservation Service (NRCS). Forest Service personnel from Juneau, Wrangell and Petersburg Ranger Districts collect seasonal snowpack data at eight snow courses on the Tongass National Forest following NRCS protocols. The Douglas Island and Petersburg snow courses were established in the late 1970s. The Wrangell Island snow courses were established in 2009 (USDA Natural Resource Conservation Service 2015). Alaska Snow survey information (i.e., snow courses, SNOTEL sites, and data) is available online: http://go.usa.gov/xDwKx.

### Streamflow

The direct relationship between snowpack and streamflow in Southeast Alaska is well known and has implications for salmon life stages (Neal et al. 2002, Taylor 2008, Bryant 2009, Hodgkins 2009, Goode et al. 2013), hydropower facilities (Cherry et al. 2010), and effects of timber harvest (Grant et al. 2008). With the temperature of coastal temperate rainforest of the southeast Alaska projected to increase by 1.7-3.7°C by the end of the century, researchers from the University of Alaska Fairbanks are seeking to better understand sources of variation in stream temperature regimes in the regions salmon bearing streams. A warming climate will have a variety of effects on landcover and hydrology in the Tongass National Forest, with the long-term potential to alter the physical characteristics of aquatic habitats in coastal streams within the region. In a study funded by the Alaska Experimental Program to Stimulate Competitive Research (EPSCoR) Program, University of Alaska Fairbanks graduate student Michael Winfree is working to understand how watershed thermal regimes vary spatially across the landscape of southeast Alaska. In particular, Winfree is studying how a stream's thermal regime responds to its environment and localized climate by analyzing how stream temperature is affected by the interaction of air temperature with landscape controls such as forest cover, lake cover, and watershed slope. Beginning in May 2014, stream temperature sensors were deployed in selected watersheds throughout the entire forest, from Ketchikan to Yakutat. This collaborative effort has resulted in a stream temperature monitoring network of over fifty watersheds.

### *Partners*

The U.S. Geological Survey's Alaska Climate Science Center hosted by the University of Alaska partners with the Forest Service to provide expertise in climate science, ecology, and modeling. The Alaska Southeast Climate Science Center provides scientifically valid resource management information and tools, applied to produce local and regional assessments that are widely used by policymaking partners, including the Forest Service (Alaska Climate Science Center 2015b). The Alaska Southeast Climate Science Center has funded interdisciplinary research to quantify glacial runoff from watersheds along the Gulf of Alaska (including the Tongass National Forest) and assess impacts on coastal ecosystems (Alaska Climate Science Center 2013). Additionally, a vulnerability assessment of aquatic resources occurred in 2015 with a challenge cost share agreement with EcoAdapt.

The U.S. Geological Survey (USGS) has collected and managed streamflow data from over 200 different sites on the Tongass National Forest since the early 1900s; some stream gauges have over forty years of record. The Forest Service has contributed significant funding and logistical support to the USGS streamflow program, though declining budgets have whittled the active stream gauges down to about a dozen. The historical and active stream gauges represent glacial-, snow-, transient snow-, and rain-dominated systems, all of which have relevance to assessing climate trends. Publicly accessible, real-time data are available from some stream gauges. Many results include continuous stream temperature and other water quality parameters in addition to streamflow (U.S. Geological Survey 2015). Data and site information are available at http://waterdata.usgs.gov/ak/nwis/.

As of 2015, three USGS stream gauges in the Tongass National Forest are at least partially funded by the Forest Service (compared to five in 2008). Staney Creek and Old Tom Creek are the highest priority for the forest due to their length of record and potential for evaluating effects of timber harvest (Neal 2010). The USGS and other partners continue to fund other stream gauges in the Tongass National Forest.

## 3. Biodiversity – Restocked Harvested Forest Lands

### Are harvested forest lands restocked within 5 years after harvest?

The 2008 forest plan requires that all harvested stands be restocked within 5 years of timber harvest. All harvested lands were examined following treatment. Typically, natural regeneration occurs on 100 percent of harvested stands. If natural restocking does not occur, artificial regeneration is required, but this has not occurred in the past several decades on the Tongass. All stands harvested in FY 2010 were certified as restocked in FY 2015 or an earlier fiscal year. All lands harvested prior to FY 2010 have also been certified as re-stocked.

**Young Alaska yellow-cedar tree. Photo by Shelia Spores**

**Fully stocked unit. Photo by Shelia Spores**

## 4. Biodiversity – Habitat for Old-growth Associated Species

### Following young-growth treatments, is the change in understory vegetation providing improved habitat for key old-growth associated species?

#### Young-growth Studies

The staff of the Tongass National Forest have been working to improve the value of young-growth stands for wildlife and for future harvest. We have accomplished this using a wide variety of precommercial thinning, and sometimes pruning treatments, under the guidance of the Tongass Young Growth Management Strategy (USDA Forest Service 2015). Some of the objectives of this strategy include greater integration of young-growth management to meet multiple resource needs, and continuing to increase our knowledge of young-growth management treatments through programs such as Tongass-Wide Young-Growth Studies (TWYGS).

Based on the Forest Service Activity Tracking System (FACTS) database, 8,659 acres of young growth forest on the Tongass was precommercial thinned in FY 2015. Of this, 0 acres were designed with a

wildlife habitat enhancement focus (FACTS Activity Code 6103). No acres of openings were created for wildlife (FACTS Activity Code 6130). No slash treatments were done in FY 2015. Over the last ten years (2005 – 2015), a total of 66,457 acres have been precommercially thinned on the Tongass National Forest, including 4,085 acres with a wildlife emphasis. In that same time, 680 acres of openings were created for wildlife and 392 acres of slash were treated.

### *TWYGS: Tongass-Wide Young-Growth Studies*

During FY 2015, two interns were hired to analyze the extensive data collected from TWYGS Experiment 4. Initial results suggest that thinning in older young-growth stands provides a delayed understory response as compared to the TWYGS Experiments 2 and 3.

Future work planned for TWYGS is as follows:

- Analysis of 10-year post treatment measurement of TWYGS experiment 4 will be completed.
- Fifteen-year remeasurements will begin in 2017 in Modules 2 and 3.

### *POW Commercial Thinning Study*

**Long-Term Response to Thinning and Pruning Trials.** Data was last collected in FY 2012 and 2013. Data collection included field measurement of understory vascular plant cover and biomass, overstory tree growth and condition, epicormic sprouting on Sitka spruce, overstory canopy cover, and evidence of deer use. Analyses will include estimating available deer forage and deer habitat capability with the FRESH-Deer model (Hanley et al. 2012), and using the Autosaw wood quality model [1] (Todoroki 1990) to estimate the effects of pruning on wood quality and to assess the economics of pruning. In addition, vascular plant cover data collected in 1999 (6 to 9 years post treatment) that has not been published will be analyzed and reported along with the results from 2012. As with the 2012 data, Juneau Forestry Sciences Laboratory will use biomass regression equations to convert the cover data collected in 1999 to biomass to estimate deer forage availability with FRESH-Deer. We have not received the analysis results.

With the anticipated transition to second growth harvest on the Tongass, our understanding of the understory response to commercial thinning is equally important. Like the TWYGs, the Prince of Wales Commercial Thinning Study will provide a scientifically credible, replicated, long-term experiment that will greatly inform the Tongass transition to harvesting young growth, including its effects on the value of the understory for deer.

- Data from the first 5-year post-treatment will be analyzed during FY 2016
- Treatments and the controls will be measured every 5 years.

### Small Mammal Response to Young-Growth Treatments

The availability of small mammals as prey can influence the abundance and distribution of northern goshawk (Salafsky et al. 2005) and marten (Thompson and Colgan 1987; Weckworth and Hawley 1962; Flynn and Schumacher 2009). In other parts of the Pacific Northwest, small mammals respond to forest succession following timber harvest with a short-term increase in abundance during the early stages of succession, but declining abundance as the canopy closes (Carey and Wilson 2001; Sullivan and Sullivan 2001; Sullivan et al. 2001; Wilson and Carey 2000; and Yahner et al. 1992). There is little information about small mammal dynamics on the Tongass and the response of small mammals to successional forest development in harvested stands. The small mammal response to young-growth study is designed to

[1] Autosaw is a computer model that divides a virtual tree into merchantable lumber grades. The clear wood is the most valuable, but the model provides the full range of lumber types and grades.

assess the features of the understory in young-growth to which small mammal prey respond. This information may inform future habitat monitoring to assess effectiveness of different young-growth treatments and adapting management to monitoring results of vegetation features that are not currently measured in the TWYGS.

### Future

Field sampling is complete and analysis of data continues. Near-term plans are as follows:

- Data analysis of habitat and vegetation characteristics of all sampling stands, including tree height, d.b.h., basal area, and plant and fungi biomass is completed. Data summaries will be included in a random forest modeling framework to assess the effects of landscape and local scale factors on population dynamics of mice and shrews.
- Carolyn Eckrich will complete data analyses and her dissertation. She was expected to defend her dissertation in the fall of 2015, however that has been pushed to FY 2016 because of data analysis, and the Tongass will be provided a copy of the final work.

## 5. Biodiversity – Young-growth Treatments

### Are young-growth treatments improving other key habitat components for old-growth associated species?

Similar to the results for 2013, species richness remained greater on all old-growth stands compared to the paired younger stands. Of the paired units, all of the old-growth paired units had higher diversity and different species richness than the young-growth units at the same sites based on the Shannon diversity index.

**Mycologist surveying at Staney Creek. Photo by Karen Dillman**

#### Terrestrial Fungi in Young-growth Stands

Results from 2014 macro-fungi surveys (Hamill and Stone 2014) indicate that Prince of Wales forests are diverse in macro-fungi. Old- and mid-seral forests share some species as well as possessing unique macro-fungi communities that provide important ecosystem services to many forest organisms and promote nutrient cycling in the soil. Of the areas surveyed, old-growth forests possess greater species richness of macrofungi than the mid-seral counterparts of similar soil type. The evidence of greater mycophagy in the old-growth units may indicate that the species wildlife key in on for nutrition may

occur in greater abundance in old-growth compared to mid-seral. It could also indicate that more wildlife use the old-growth over mid-seral habitats.

## 6. Insects and Disease

### Are destructive insects and disease organisms increasing to potentially damaging levels following management activities?

At this time, management activities do not appear to be exacerbating insect and disease problems in the Tongass National Forest. Hemlock dwarf mistletoe and many stem decay pathogens generally become uncommon in stands following harvest. However, young-growth yellow-cedar decline, hemlock canker, and shoot diseases are issues to watch for in young, managed stands. Stem decays may become prevalent in managed stands as they age due to bole wounding caused by partial harvest or commercial thinning treatments. It is possible to promote or maintain stem decays and mistletoe in stands managed for non-timber objectives.

Yellow-cedar decline is a leading example of the impacts of changing climate on a tree species. The completed Climate Adaptation Strategy for Conservation and Management of Yellow-cedar in Alaska provides guidance for 33 management zones in Alaska that contain yellow-cedar. Management can favor yellow-cedar on sites with deeper soils or sufficient snowpack to meet conservation goals for this valuable species. Prospects for the salvage of dead yellow-cedar are promising in some areas with concentrated yellow-cedar snags, road access, and land-use designations that permit harvest or salvage.

The Early Detection Rapid Response program monitors several invasive insects that present a threat to Alaskan Forests. The Sitka spruce weevil is an insect species to watch carefully, as it occurs close to our southern border, has been found in Anchorage and its populations are influenced by temperature. Damage from already established, non-native spruce aphid may increase under a warming climate scenario. The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Protection group, and Tongass National Forest silvicultural staff is sufficient to assess threats and impacts from insects and diseases.

**Inchworm. Photo by Shelia Spores**

## 7. Invasive Species – Status and Trends

### What are the status and trends of areas infested by aquatic and terrestrial invasive species relative to the desired condition?

In 2015, no monitoring for invasive terrestrial animal species was conducted on the Tongass. No occurrences of Atlantic salmon were detected in the waters of the Tongass by the Alaska Department of Fish and Game (ADF&G) or the Forest Service. According to ADF&G, European green crab have not yet been detected in southeast Alaska waters. Between May and August, 2015, the ADF&G and the Smithsonian Environmental Center, Marine Lab deployed domes on the seafloor at 30 test sites where

they investigated the effects of salt, chlorine and cement dust to control the invasive didemnum tunicate (carpet sea squirt).

Five sites with high risk of invasive plant impacts were monitored in 2015. Four sites had one or more infestation of invasive plant species that are a high priority for control on the Tongass National Forest. Infestations recorded at the sites covered a total of 3.24 acres, including 2.89 acres of high-priority invasive plant species such as oxeye daisy (*Leucanthemum vulgare*), reed canarygrass (*Phalaris arundinacea*), black bindweed (*Polygonum convolvulus*), and field sowthistle (*Sonchus arvensis*). Other invasive plant infestations at the sites included perennial cornflower (*Centaurea montana*), lady's-mantle (*Alchemilla mollis*), and bishop's goutweed (*Aegopodium podagraria*).

**Black bindweed (*Polygonum convolvulus*), an invasive plant. Photo by Rick Turner**

## 8. Invasive Species – Prevention and Control

### How effective were our management activities, including those done through partnerships, in preventing or controlling targeted invasive species?

A total of 177.8 acres of invasive plant treatments were completed in 2015. By comparison, 64.2 acres were treated in 2014. Approximately 100.8 acres of infestations were treated by mechanical and physical means, such as digging, hand-pulling, or covering with tarps. An additional 77 acres of infestations were treated using herbicides, with the majority of the acres treated within the Wrangell Ranger District under its recently completed invasive plant management environmental assessment (EA). This analysis addressed all treatment options for high priority invasive plant species and sites within both ranger districts, including wilderness areas.

#### Prevention

Invasive plant prevention measures were implemented on the Forest during FY 2015 as part of projects and other activities.

- The Wrangell Ranger District procured weed-free gravel for a trail reconstruction project at the Anan bear viewing site.
- The Forest, Wrangell Girl Scout Troop #4156, and Alaska Herpetological Society conducted "Camp'Phibian," at the Twin Lakes cabin on the Stikine River in the Stikine-LeConte Wilderness; a program for monitoring all amphibian species identified on established transects. As part of the field work, all participants cleaned their boots prior to traveling from one location to another to prevent the accidental transport of weed seeds to uninfested areas, and they also cleared their campsite of invasive dandelion plants prior to setting up camp.

- The Sitka Ranger District posted an invasive plant educational flyer at the Forest Service White Sulphur Public Recreation Cabin and Bathhouse, and provided a digging tool to encourage cabin users to assist with removing invasive dandelion around the cabin.
- The city of Sitka conducted monitoring for invasive plants at the Blue Lake hydroelectric project on the Sitka Ranger District during the summer of 2015. According to the monitoring results, certain weed prevention measures specified in the project's noxious weed (invasive plant) management plan were not implemented. This included covering of soil overburden and gravel stockpiles at the dam construction site, to prevent infestation of these materials by weeds, which could then be spread to other areas when the material is moved.

### Partnerships

Partnerships and educational activities are helpful in prevention and control efforts for invasive plants, both on National Forest System lands and lands outside agency jurisdiction. Invasive plant education and partnership activities were conducted on six ranger districts in 2015.

## Future

The Sitka Community Weed Plan should be finalized spring of 2016. This will likely provide new opportunities for partner organizations to collaboratively manage invasive weeds in the community.

The Forest Service has recommended that the city of Sitka treat any weed infestations on overburden and gravel stockpiles at the Blue Lake hydroelectric site, and keep the piles covered afterward until they are fully utilized or otherwise properly disposed of.

If funding and resources allow, work will begin in 2016 on environmental analysis for integrated invasive plant management on the Juneau, Hoonah, Sitka, and Yakutat Ranger Districts and Admiralty National Monument. As with the integrated plan for the Wrangell and Petersburg Ranger Districts, this analysis will address all treatment options for high priority invasive plant species and sites, including in wilderness areas.

**Clipped Scotch thistle seed heads for disposal**

**Tarp over orange hawkweed along the roadside on Zarembo Island, Wrangell Ranger District**

## 9. Biodiversity Ecosystem – Old-growth Associated Species and Subspecies

**Is the old-growth habitat protected under the forest plan being maintained to support viable and well distributed populations of old-growth associated species and subspecies?**

A non-significant forest plan amendment to modify the small old-growth reserve in value comparison unit (VCU) 7470 was considered in the Saddle Lakes EIS. The Record of Decision did not include the proposed amendment and therefore no changes to the conservation strategy occurred in the 2015 reporting cycle. The amount of productive old-growth, including large-tree and low elevation productive old-growth, interior forest acres, goshawk and marbled murrelet nesting habitat, and deer and marten winter habitat remains the same within the old-growth reserve system.

## 10. Biodiversity Ecosystem – Change in Old-Growth by Biogeographic Province

**Are the effects of biodiversity shown through the cumulative change in old-growth by biogeographic province consistent with the estimates of the forest plan (change could include effects of timber harvest, land exchanges or conveyance, windthrow, insect and disease, climatic change, etc.)?**

There have been changes in land use designations due to land exchange or conveyance since signing of the 2008 forest plan. Based on our analysis in a GIS, 649 acres of productive old-growth (POG), 794 acres of high volume productive old-growth (HPOG), and 83 acres of SD67 (stands with well-distributed trees over 40 inches diameter) were harvested (by all silvicultural systems) during FY 2015 across 3 biogeographic provinces.

The effects on biodiversity shown through the cumulative change in old-growth by biogeographic province are consistent with the estimates of the forest plan (USDA Forest Service 2008a appendix K).

### Lichen Monitoring

Analysis 1 yielded a super-regional lichen–climate gradient model spanning thirty degrees of latitude in the four North Pacific Rim states demonstrating that lichens can be used to model large geographic areas representing various climatic zones. The climate in Southeast Alaska is very different from California and the lichen indicator species for the climate zones illustrate these differences (Smith et al. in prep, 2016).

Analysis 2 compared the performance of two different survey methods used in the past, and showed that the lichen community data from the smaller Tongass plots are not compatible with the larger forest inventory and analysis (FIA) sized plots. Average species richness was significantly lower in the Tongass sized plots. Therefore, if more lichen work with forest inventory and analysis is considered in the future, the Tongass plots could be enlarged at the next scheduled visit to equal the forest inventory and analysis size.

Analysis 3 consisted of a survey of historical data from Region 10 plots remeasured over time and detected no changes in lichen communities due to climate in the 28 years of monitoring of 50 plots. Many of these locations with three visits are in the low elevation hypermaritime climatic zone, which is less likely to display major changes over a short time in epiphytic lichens due to the buffering of climatic extremes from the Pacific Ocean. In these locations biodiversity of lichen communities in old-growth forests has not changed.

However, the forests of coastal Alaska are expected to have the largest increase in frost-free days of anywhere in North America (Meehl et al. 2004) during the 21st century as the winter climate crosses the

snow-rain threshold. This snow-rain threshold may not have a detectible impact on the epiphytic lichen communities in the hypermaritime and mild, moist oceanic zones. However, the cool, moist subcontinental and the cool dry continental zones of the Tongass such as on the mainland, at higher elevation forests (*Tsuga mertensiana*) and in areas near Skagway may very well experience epiphytic lichen changes due to warming temperatures and increased precipitation. More plots should be placed in these climate zones to use as reference plots for future biodiversity estimates and climate change impacts.

The lichen indicator species in analysis 4 (for the three main climatic zones delineated in the model for the Tongass) are found in varying frequencies across the forest. The six climatic zones contain approximately 51 species (out of a pool of 273 species) that have indicator values based on relative abundance and relative frequency in 366 plots across the region. The final report by Smith et al. is anticipated to be available for review in 2016.

### Future

- Review the final report by Smith et al. by Forest ecologists.
- Print the general technical report.
- Determine a course of action to include lichen communities as part of the biodiversity question for the forest plan.
- Develop a map in GIS of the climate zones based on this work to be used as an overlay for other projects, and how they relate to biogeographic zones already in place.
- Determine if certain indicator lichens identified in this work may be candidate focal species for forest plan monitoring and as a measure of the biodiversity goals and objectives to maintain healthy forest ecosystems by maintaining a mix of habitats at different spatial scales capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

**Old man's beard lichen *Usnea longissima* and others of similar morphology. Photo by Karen Dillman**

## 11. Biodiversity Ecosystem – Old-Growth Matrix

### Is old-growth structure retained in the matrix adequate and is it representative of old-growth types across value comparison units and across the Forest?

The amount of protected old-growth in the matrix is influenced by the implementation of the legacy standard and guideline. This standard and guideline from the 2008 forest plan amendment replaces the 1997 forest plan American marten standards and guidelines for value comparison units in higher risk biogeographic provinces (WILD112 XVI.2).

The legacy standard and guideline applied to 850 acres of the 1,747 acres of timber harvest completed in FY 2015. The legacy standard and guideline was not applicable to 897 acres for the following reasons, as listed in the 2008 forest plan and record of decision:

- The units harvested occurred in value comparison units that were not listed as retention of legacy structure required because less than 33 percent of productive old-growth habitat was harvested (USDA Forest Service 2008b, page 4-90);
- The units harvested were less than 20 acres in size (USDA Forest Service 2008b, page 4-90); or
- The timber sale was under contract before the effective date of the 2008 forest plan (ROD Category 1, USDA 2008a, page 68-69);

Since implementing the 2008 forest plan, much of the harvest that has occurred in high-risk value comparison units was exempt from application of the legacy standards and guidelines as category 1 timber sales listed in the 2008 forest plan record of decision. Much of the harvest of these category 1 timber sales has been completed. It is likely there will be at least some timber harvested by category 2 timber sales in high-risk value comparison units in the future.

### Future

The percent of original productive old-growth harvested in value comparison units 5770 and 6220 may have risen to 33 percent or greater since the 2008 forest plan. The forest plan review and amendment currently underway will review these value comparison units for inclusion in the legacy standard guidelines. Eligibility for legacy standards and guidelines should be checked at project implementation.

An approach for monitoring the implementation and effectiveness of the legacy standards and guidelines has been developed by Northern Ecologic, LLC and will be assessed for application by forest resource specialists. The protocol includes on-site review of legacy stands and spatial analyses in GIS to assess the representativeness of productive old-growth retained in the matrix at various spatial scales.

- Complete the monitoring protocol.
  - ♦ Develop a mechanism for tracking legacy retention.
  - ♦ Develop a method to assess changes to lands protected in the matrix.

## 12.Biodiversity Ecosystem – Rare Plants

### What are the cumulative effects of changes to habitats that sustain rare plants?

#### Prince of Wales Island Rare Plant Population Monitoring

Lesser round-leaved orchid population density:

- 2011 = 398 per hectare

- 2015 = 94 per hectare

Whiteflower rein orchid population density:

- 2011 = 1220 per hectare
- 2015 = 108 per hectare

The rate of decline during the monitoring period in the population density of lesser round-leaved orchid and whiteflower rein orchid species, and frequency of occurrence in lesser round-leaved orchid is a cause for concern. However, the sample size for both species is small, resulting in high variation among the sample plots. A larger number of sample plots would be needed to reduce this variation.

The downward trends observed during the monitoring period cannot be directly attributed a specific cause. However, possible factors could include long-term climate trends, impacts from management activities such as timber harvest and road construction, or a combination of both. The tendency of these species for some individuals to periodically become dormant could also be a factor. It is uncertain whether these factors, alone or in combination fully explain the downward trend in the populations over multiple years.

Large yellow lady's slipper population.

- 2014 = 27 individuals
- 2015 = 28 individuals

Census results for large yellow lady's slipper showed an apparent upward trend in the monitored populations. However, these are very small populations located close to actively used forest roads or rock pits, so they may be at some risk of damage or loss from vehicle traffic or road maintenance activities.

**Large yellow lady's slipper. Photo by Kristen Lease**

***Henderson's Checkermallow***

The 2015 survey is the second in three years in which no individuals of this species were located. Since the geographic location of this documented population is known precisely, the individuals there may have been lost to mortality. If this is the case, a potential causal factor for such a loss is currently unknown.

**Future**

Work will continue in the revision of the transition of the forest plan monitoring to the 2012 planning rule, including evaluating the need for this monitoring question relative to the criteria established in the

rule. If needed, a revised rare plant monitoring question will be developed along with revisions to the monitoring protocols.

#### *Prince of Wales Island Rare Plant Population Monitoring*

2015 was the last year planned for monitoring Prince of Wales rare plant populations.

#### *Henderson's Checkermallow*

A long-term plan for managing the Henderson's checkermallow population is currently under evaluation.

#### *Kruzof Island Dune Tansy*

Dune tansy (*Tanacetum bipinnatum* subsp. *huronense*) is an Alaska Region sensitive plant that is known to occur only on Kruzof Island on the Sitka Ranger District. It is under threat from natural erosion of its upper beach habitat, as well as damage by off-road vehicles. In 2014, the population was monitored, and plants in imminent danger of loss due to beach erosion were salvaged and transplanted to nearby suitable beach habitat. In 2016 we will assess the documented population, and determine if the rate of natural beach erosion will likely lead to the eventual loss of the population. A long-term plan for managing the dune tansy population is currently under evaluation.

## 13.Stream-Fish Habitat – Management Indicator Species

### Are the trends in abundance of the fish management indicator species (Dolly Varden char, cutthroat trout, coho salmon, and pink salmon) related to changes in habitat associated with forest management, climate change or other factors?

#### Resident Dolly Varden Char and Cutthroat Trout Monitoring

A thorough statistical analysis of an 11-year resident fish dataset is now complete and a manuscript should be finalized and peer reviewed by winter 2015. The focus of the manuscript is landscape-scale drivers of resident Dolly Varden char and cutthroat trout presence, abundance, and size across the Tongass. We expect results of this analysis to provide insight on future resident fish monitoring efforts.

Because of the short duration of monitoring efforts under the newly revised protocol, no detailed analysis of results is practical at this time. Sampling efforts are planned to continue.

#### Coho Salmon Abundance Monitoring

Coho salmon occur in nearly 4,000 streams in Southeast Alaska. Annual wild commercial harvest of coho salmon in Southeast Alaska is reported by the Alaska Department of Fish and Game, and the Forest Service evaluates these estimates for trends. The 2015 wild coho salmon harvest was 1.42 million fish, down from the 2014 wild catch of 2.45 million fish. The 2015 total coho salmon harvest was 2.1 million. This total coho harvest came in less than the recent 10-year average harvest (80 percent) and ranked 24$^{th}$ of the 54 years since 1962 (Brenner and Munro 2016).

The Alaska Department of Fish and Game calculated an index of total wild coho abundance in Southeast Alaska coastal waters based on the estimated wild troll catch divided by an index of the troll exploitation rate. The 2015 overall wild coho abundance of 3.27 million comes in at 79 percent of the recent 10-year average and fourth lowest since 1995 (Shaul 2016). The abundance estimates are thought to be a better indicator of actual abundance trend rather than the commercial catch because exploitation rate (all gear types) dropped substantially after 1999, because of economic pressures (Shaul et al. 2011).

Per Alaska Department of Fish and Game, 2015 coho salmon escapements for the 13 systems in Southeast Alaska with formal escapement goals met or exceeded the desired escapement objectives (Alaska Department of Fish and Game 2015).

***Future***

Continue to evaluate Alaska Department of Fish and Game's commercial harvest and escapement statistics.

Project work in 2016:

- Continue to implement the current monitoring protocol that includes fish numbers and in-channel habitat measures with an expansion of fish population estimates to reaches within selected watersheds for specified watersheds based on rotating panel approach. A total of five watersheds will be sampled annually for a total of 14 watersheds over an 8-year period.
- Include watershed scale features in the analysis to provide additional information on the distribution of fish and interpretation of observed trends in fish numbers.
- A statistician will be consulted to evaluate the study plan and number of reaches per watershed.

No changes to forest plan standards and guidelines are recommended at this time.

**Coho salmon fry**

**Pink Salmon Abundance Monitoring**

According to Alaska Department of Fish and Game data, the total 2015 estimated southeast Alaska (including Yakutat area) pink salmon harvest of 35.1 million fish was below the recent 10-year average (86 percent) and ranked 22nd largest harvest since 1962 (Brenner and Munro 2016). A strong odd-year, weak even-year return pattern developed following a sharp harvest decline in the 2006 season. That pattern continued until 2015 with the 2015 pink salmon return at its lowest odd-year return since 1997 (Brenner and Munro 2016). The 2015 pre-season harvest forecast had been predicted to be in the

excellent range at 58 million fish with an 80 percent confidence interval of 37-79 million fish and Alaska Department of Fish and Game noted the prediction to be exceptionally challenging because of the record harvest of 95 million pink salmon in the parent year of 2013.

According to Alaska Department of Fish and Game, the total 2015 pink salmon escapement index of 12.4 million fish ranked 18th since 1960, and was the lowest odd-year index since 1995 (Alaska Department of Fish and Game 2015). During 2015, all three sub-regions (demarcated as Southern Southeast Subregion, Northern Southeast Inside Subregion, and the Northern Southeast Outside Subregion) biological escapement goals were within or exceeded.

***Future***

Continue to work with Alaska Department of Fish and Game to review the annual pink salmon commercial harvest and escapement index data.

No changes in the forest plan standards and guidelines are recommended at this time.

## 14.Streams-Fish Habitat – Aquatic Habitat Condition (Fish Passage)

### Is the natural range and frequency of aquatic habitat conditions maintained?

The 2015 field season focused on adding reference sites from other projects and collating and organizing the data. We were able to add data from 8 management indicator species monitoring project sites and 6 watershed restoration effectiveness monitoring sites that were sampled in 2015. While those channel types were not targeted specifically in the reference reach project, increases in sample size – especially when they improve our geographic distribution of reference reach sites (White and Walker 1997) – improve the strength of the overall data set.

This project set aside FY 2015 to focus on data entry and analysis. We standardized and validated the raw field data, enabling queries to extract the summary metrics. Currently, we are working to incorporate legacy habitat data into the NRIS environment. We are also developing the reporting tools to extract summary statistics from each survey.

#### Future

In FY 2016, we will continue to focus on data entry and analysis creating a useful and available analytical product. We are working with the Pacific Northwest Research Station to refine analysis methods and metrics. The goal for this project is to produce an interactive suite of statistics generated from data relevant to project needs. As any new site is surveyed, it will be compared to the existing suite of statistics and added to the overall dataset. The complete dataset summary, currently a static product, will be a user-generated output.

#### Fish Passage at Road Crossings

Thirty-three (14 percent) of the 228 culverts monitored to date and assessed via the Alaska Region juvenile fish passage criteria matrix do not meet State of Alaska passage standards (red) and may to some extent impede the passage of juvenile fish. The 33 crossings determined not to be consistent with juvenile passage standards can be generally attributed to several different reasons.

1. Six of the 33 red culverts were known fish stream crossings requiring passage considerations but were installed without fish passage design considerations due to project personnel apparently being unaware of the aquatic passage objective.

2. Six of the red crossings were installed without passage considerations because they were not identified as crossings requiring fish passage until after construction was completed.
3. Six of the culverts not meeting juvenile passage standards are simplified stream simulation-designed culverts and have not accumulated enough bedload within them to provide adequate roughness and moderate water velocity. These culverts will potentially continue to accumulate bedload overtime.
4. Two of the red culverts are stream simulation designed culverts that have had sections completely scoured free of bedload.
5. One stream simulation designed culvert is not providing adequate passage because it is blocked by woody debris.
6. Eleven are red due to inadequate fish passage design considerations.
7. One culvert is still red after being retrofitted.

In an effort to reduce the significant costs associated with designing and installing culverts which provide fish passage, the Tongass National Forest is evaluating an approach coined simplified stream simulation design. Similar to stream simulation design, the goal is to create fish passage conditions in the culvert which attempt to mirror that of the natural channel as much as possible by matching stream gradient, width and bedload roughness. Compared to stream simulation design, simplified stream simulation design typically involves less comprehensive stream survey and engineering analysis and relies to some degree on natural stream bedload mobilization to infill the culvert. Due to these differences there may be an inherently greater risk of not achieving or maintaining fish passage and greater associated maintenance costs.

Results from this monitoring indicate that six (21 percent) of the 29 installed simplified stream simulation culverts are red and not meeting juvenile fish passage standards. By comparison, 2 percent of the 126 monitored stream simulated designed culverts are red.

The Forest Service's Washington Office Virtual Aquatic Organism Passage Design Team reviewed the nine simplified stream simulation designed culverts installed during 2012 and 2013. The review was a critique of the existing installations and it provided recommendations for modifications to the design approach (Gubernick and Weinhold 2015).

#### *Future*

Recommended actions:

1. Continue to monitor all new and recent culvert installations in fish streams including annual monitoring of all simplified stream simulation culvert designs.
2. Review the economics and value of simplified stream simulation design.
3. Continue to improve upon the simplified stream simulation design.
4. Improve the accessibility of Tongass aquatic organism passage data.
5. Continue using a Tongass aquatic organism passage interdisciplinary design team for new fish crossing survey and design.

**Culvert Inlet, Road 3015250, Milepost 0.030**

**Culvert bedload, Road 3015250, Milepost 0.030**

## 15.Streams-Fish Habitat – Riparian Vegetation

### Is riparian vegetation maintained or restored to a condition that supports key riparian functions?

The windthrow mortality measured in buffers adjacent to harvest units has yet to be compared to that found naturally within riparian areas adjacent to un-harvested forest stands. We have low elevation aerial images of un-harvested forest stands up and downstream of many of the monitored buffers that we will use as control stands. When completed, this comparison will help us determine if windthrow has been exacerbated beyond that found within the natural range of variability. Initial observations of the control stands suggest that there is significantly less windthrow than in the treated stands. Therefore, current windthrow abatement practices may not be 100 percent effective.

Based on the monitoring results to date, timber harvest has likely exacerbated the rate of windthrow in the monitored areas beyond the natural range of variability. However, the data suggests that a large majority of the monitored buffers have remained mostly in natural conditions. No windthrow has been detected in 44 percent of the monitored areas and the average amount of cumulative windthrow is 6.8 percent. The cumulative windthrow mortality in the buffers is highly variable and ranges from zero to 85 percent. To date, 72 percent of the buffers in which windthrow has been measured have less than five percent windthrow mortality, 82 percent have less than 10 percent windthrow and 97 percent of the buffers have less than 50 percent windthrow.

Results from the long-term nature of this monitoring suggest that the rate of windthrow diminishes over time. Others who have measured windthrow have found that most windthrow occurs within the first few years after harvest and that windthrow diminishes the longer the buffer is standing (Andrus and Froehlich 1992, Moore 1977, Alexander 1964). Trees within the edge of a buffer become more windfirm over time as their root structure adjusts (Stathers et al. 1994, Urban et al. 1994).

Wind and rain are major factors in windthrow. Southeast gales are the most damaging fall and winter storms that occur in Southeast Alaska. These storms originate in the northern Pacific and rotate counterclockwise as they move northeast across Southeast Alaska (Harris, 1989). Due to this dominant storm track the southeast and southwest outer edges of islands are more susceptible to windthrow than northeast edges of the islands (Harris 1989, Moore 1977, Kramer 2000, Nowacki and Kramer 1998). Inland stream buffers may be less susceptible to windthrow (Andrus and Froehlich 1992, Kramer 2000,

Kramer et al. 2001, Harris 1989). Localized Bora or Glacier winds have also been known to cause windthrow in forests of Southeast Alaska. The Bora or Glacier winds are associated with major river valleys penetrating the coast range, or with the temperature difference associated with ice fields (Harris 1989, Moore 1977). The Stikine River Valley near Wrangell and the Taku winds near Juneau are two examples of more localized damaging winds (Harris 1989, Kramer 2000). With wind often come rain, and the saturated soil conditions that often accompany a windstorm reduce soil strength and increase the chance for wind throw (Moore 1977, Harris 1989).

**Low altitude digital aerial image of harvest unit and associated stream buffers**

Aspect is another factor in windthrow. Monitoring results indicate that the amount of windthrow in buffers with a general northerly exposure tends to be less than that within buffers with a general southerly exposure. This appears to be in concert with Southeast Alaska weather patterns. Other investigations have provided inconsistent findings in regards to the effect of buffer orientation on windthrow amount. Grizzell and Wolff (1998) found that buffer orientation was not a factor in the amount of windthrow in their study of buffers in the Northern Cascades. Conversely, other studies (Andrus and Froehlich, 1992, Moore 1977, Alexander 1964) indicate that buffers parallel to wind flow may be more windfirm than buffers perpendicular to wind flow. A greater susceptibility to windthrow was observed in buffers located on hill slopes with south and west hill slope aspects versus north and east aspects. The average windthrow mortality in buffers located on north and east facing hill slopes was approximately one-half of that measured on south and west facing slopes. Other studies support that stands with south exposures will be more susceptible to windthrow (Nowacki and Kramer 1998, Kramer 2000, Kramer et al. 2001, Moore 1977). Kramer et al. (2001) suggests that stands on slopes exposed to south facing azimuths between 160 and 220 degrees would be more susceptible to windthrow from cyclonic (southeast gale) wind events.

**Future**

A better understanding of the complex relationship between temporal, spatial and structural variables and riparian windthrow is expected to develop through the continuation of this monitoring effort which may facilitate more effective windthrow abatement prescriptions and move management closer to desired riparian conditions.

Recommendations are to maintain the current monitoring effort and associated activities, implementing refinements and improvements as necessary. Continue to monitor the 256 buffers associated with harvest activity from 2000 thru 2007 as stipulated in the study plan. This schedule includes repeated measurements of tree loss due to windthrow annually for the first five years after harvest and then again ten and fifteen years after harvest. 2016 will provide 15 year post harvest results for units harvested in 2001.

Low elevation imagery has been obtained and initial analysis has been mostly completed for the first five years following harvest for logging activity from 2000 thru 2007. In addition, imagery has been obtained and 10 year post harvest analysis has been partially completed on Riparian Management Areas (RMA) associated with 2000 thru 2004 harvest activity. Continue the analysis on the backlog of acquired imagery. Explore contracting out the geo-referencing of backlogged imagery for cost effectiveness.

Continue to populate a GIS geodatabase containing polygons feature classes of RMAs, Reasonable Assurance of Windfirm (RAW) zones and the harvest unit; a line feature class of the stream, and a point feature class of standing and fallen trees.

Analyze the monitoring results with more statistical rigor, and assess additional contributing variables including soil characteristic, topography, size of harvest unit, shape of harvest unit, quantity of tree retention in harvest unit, and buffer width.

Distinguish the amount of windthrow in the RMAs from that in adjacent RAW zones. Determine the amount of windthrow in adjacent control RMAs to determine if RMAs adjacent to harvested stands are being maintained in a condition found within the range of natural variability.

Continue to develop and improve the data acquisition, interpretation and analysis process.

Conduct on-the-ground monitoring of the consequences of the windthrow detected with the low elevation digital imagery. This monitoring would assess the degree that standards and guidelines addressing natural channel processes are maintained within buffers that have sustained windthrow.

Upon additional completion of this monitoring, update the Tongass National Forest white paper (Landwehr, 2007) that provides direction and guidance for designing RAW zones.

## 16.Wildlife Terrestrial Habitat – Management Indicator Species

**Are population and habitat trends for Management Indicator Species (MIS) consistent with expectations? Are these trends due to changes in habitat conditions or other factors? If they are tied to habitat conditions, is there a direct relationship with forest management, climate change or other factors? Terrestrial MIS include red squirrel, black bear, brown bear, marten, river otter, Sitka black-tailed deer, mountain goat, gray wolf,**

### Vancouver Canada goose, bald eagle, red-breasted sapsucker, hairy woodpecker, and brown creeper.

Population and habitat trends for Forest management indicator species are currently consistent with forest plan expectations. Forest plan standards and guidelines maintain productive old-growth habitats in non-development land use designations and development land use designations (that include portions of the Tongass open to consideration for potential timber harvest). Habitat retained in beach, estuary, and riparian buffers is important to many management indicator species, especially the bald eagle, brown bear, black bear, deer, goshawk, marten, and river otter. In addition, thinning activities have the potential to improve wildlife habitat.

The reduction in productive old-growth habitat in development land use designations has been less than projected in the forest plan. Since 2008, total volume harvested has averaged 32 million board feet (MMBF) annually, only 12 percent of the allowable harvest level of 267 MMBF. The 2008 forest plan Record of Decision (USDA Forest Service 2008a, page 20) states that there is no expectation that timber will be harvested at a continuous rate of 267 MMBF over the next planning cycle of 15 years (reference the Biodiversity Ecosystem section). Even if management occurs at maximum allowable levels for 100 years, the implementation of the forest plan would result in a moderate to very high degree of assurance that there would still be sufficient habitat to support long-term viability of wildlife species. The conservation strategy provides a good to very good distribution of high quality old-growth reserves over the long term (USDA Forest Service 2008a, page 47).

**Black bear and bald eagle at Anan Creek, Wrangell Ranger District**

**Sitka black-tailed deer**

#### Future

Recommendations for follow up on the management indicator species monitoring include:

- Continue monitoring and assessment efforts that are currently in place. Continue to assess population status for management indicator species. Data sources should be reviewed at least every 5 years to assess trends in populations and habitats changes for management indicator species.
- Evaluate the size density habitat models for use in forest plan monitoring and project analyses.

- Continue to monitor changes to the conservation strategy and productive old-growth habitat to assess effects to the population viability of management indicator species. Continue assessments of habitat trend methods.
- Continue assessing methods for estimating population abundance and trends. Continue working with the Alaska Department of Fish and Game to develop and implement non-invasive methods of estimating wolf populations and evaluating movements on game management unit 2 and elsewhere.
- Continue to monitor the implementation and effects of young-growth treatments. The Tongass-Wide Young-Growth Studies (TWYGS) analysis of 10-year post-treatment measurement of TWYGS experiments is expected in the next few years. Data from the first post-treatment measurement for the Prince of Wales commercial thinning study will be analyzed in FY 2016. Data analyses for the long-term response to thinning and pruning trials will be completed and reviewed. Data analysis for the small mammal and carnivore response to Tongass second-growth thinning is underway.

## 17. Wildlife Terrestrial Habitat – Federally Listed Threatened or Endangered and Region-sensitive Species

### Is current management providing sufficient habitat for federally listed threatened or endangered species and Alaska region sensitive species?

No projects proposed in FY 2015 on the Tongass are likely to have an adverse effect to threatened or endangered species.

No proposed projects are likely to cause a loss of viability of Alaska Region sensitive species. The majority of "may adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing" determinations were for the Queen Charlotte goshawk.

**Queen Charlotte goshawk**

### Queen Charlotte Goshawk Nest Surveys

A total of 507 goshawk call station surveys were conducted across two districts in FY 2015. No responses to calls were detected. No new active goshawk nests were found with call station surveys. One probable

new nest location was found on the Petersburg Ranger District. In addition, a non-protocol, multi-day survey on the Juneau Ranger District identified a new active goshawk nest.

***Future***

The forest plan amendment team has reviewed the 2008 forest plan northern goshawk standards and guidelines in light of goshawk nesting in young-growth stands and recommendations may be incorporated into standards and guidelines in the amendment. The forest plan amendment team may incorporate recommendations to include value comparison units 5770 and 6220 in the legacy standards and guidelines.

Review biological evaluations and assessments annually to determine effects of agency actions that may affect threatened or endangered species.

Review new research, inventories, and monitoring related to threatened or endangered wildlife species habitat every 5 years.

## 18.Wildlife Terrestrial Habitat – Geographic Distribution

### What is the geographic distribution and habitat relationships of mammalian endemic species on the Tongass?

#### Island Surveys to Locate Endemic Species (ISLES)

Recent phylogenetic research shows that *Ursus americanus pugnax* (alexander archipelago endemic) may be related to northward range expansion from bears in the Pacific Northwest refugium (Puckett et al. 2015) during the last glaciation period.

#### Small mammal and carnivore response to Tongass young-growth treatments

There is no new information on small mammal and carnivore response to young-growth treatments.

***Future***

Field sampling is complete and analysis of data continues. Near-term plans are as follows:

- Carolyn Eckrich will complete data analyses and her dissertation, and the Tongass will be provided a copy of the final work.

## 19.Soil and Water – Soil Productivity

### Are the soil conservation practices implemented and effective in meeting Alaska regional and soil quality standards and maintaining soil productivity?

Soil quality monitoring in 2015 focused on 1) Revisiting photo points established in root-wad collection areas and on equipment trails created in the Staney gaps stands, and 2) monitoring the amount of soil disturbance caused by off-highway vehicle (OHV) use for meat (game) retrieval on the Yakutat Forelands. Monitoring reports were written for each of the three root-wad removal areas being monitored, the Staney Gaps equipment trails, and the Yakutat OHV Game retrieval. Those reports are Foss 2015a, Foss 2015b, Foss 2015c, Foss 2015d, and Catterson 2015.

#### Root Wad and Strip cut photo points

The Soda-Nick root-wad harvest area photo points were first established in 2010 and have been photographed 4 times. Five photo points were established to monitor the recovery of the site from root-

wad harvest. The steepest two acres of the site were conventional shovel logging, where root-wads were left in place. The remaining 4 acres had 100 percent root-wad removal of trees that met the minimum 18-inch diameter with a 60-foot long log needed for stream restoration. A portion of the stand was logged in 2009; the remainder was logged in 2010. Monitoring began shortly after work was completed in 2010.

Photo points 2 and 3 are located on heaviest used shovel trail in an area where slash was placed to reduce erosion potential. The photos show a slow natural recovery of the site over the past 5 years. The site meets minimum stocking requirements of 300 trees per acre. Small spruce trees are evident in the 2015 photos at each point. The duff layer is largely absent from photo point 3.Small logs and slash dominate the ground cover at photo point 2.

**Photo point 2: 2010 and 2015**

**Photo point 3: 2010 and 2015**

Photo point 5 was located on the edge of the stand in an area of conventional stem only harvest. The duff layer is largely intact at photo point 5. Note the recovery of conifer and understory plants is much more rapid at photo point 5 than at photo points 2 and 3. After 5 years of recovery small hemlock and spruce trees and ferns, skunk cabbage and blueberry plants occupy the site.

**Photo point 5: 2010 and 2015**

The Harris River Strip Cuts were established to provide a source of large woody debris for the Harris River Restoration Project and to provide some habitat diversity in a large 50-year-old young-growth stand.

In the 2012 and 2013 photos, red canary grass dominates the photo point in strip A. By 2015, alder and elderberry are beginning to outcompete the reed canary grass in strip A.

**Strip A: 2012 and 2015**

The photo point monitoring from the root-wad collection sites indicates a slower recovery of native vegetation following root-wad harvest than on the stem only harvest areas. The Soda-Nick sites have passed their 3-year stocking requirements. Soil erosion was minor at all root-wad sites due to erosion

control actions taken immediately after harvest. By year 3 after harvest, erosion appears negligible. Plant recovery appears swift where the duff layer was left intact and slower where the duff layer was displaced.

**Staney Gaps Photo point monitoring.**

The Staney wildlife gaps project was conducted in 2010. Landwehr and Silkworth recommended establishing photo points at several of the most disturbed sites to document erosion and recovery at those sites. Foss established nine photo points in 2011 and revisited those sites in 2013 and 2015. Five new photo points were established in 2011.

Photo point 72 shows an equipment rut that is eroding in 2010. This photo point is on 40 percent slopes and soil was eroding when first documented in 2010. Soil water was intercepted and concentrated in the equipment rut. Although the amount of water flowing in the rut was seasonal and minor in volume erosion was easily evident in 2010. As vegetation became established, soil erosion begins to slow down in 2012. In 2013 erosion is still occurring. By 2015 vegetation (primarily ferns and mosses) covers the rut and erosion is a small fraction of what it was in 2010.

**Photo point 72: 2010 and 2015**

***Future***

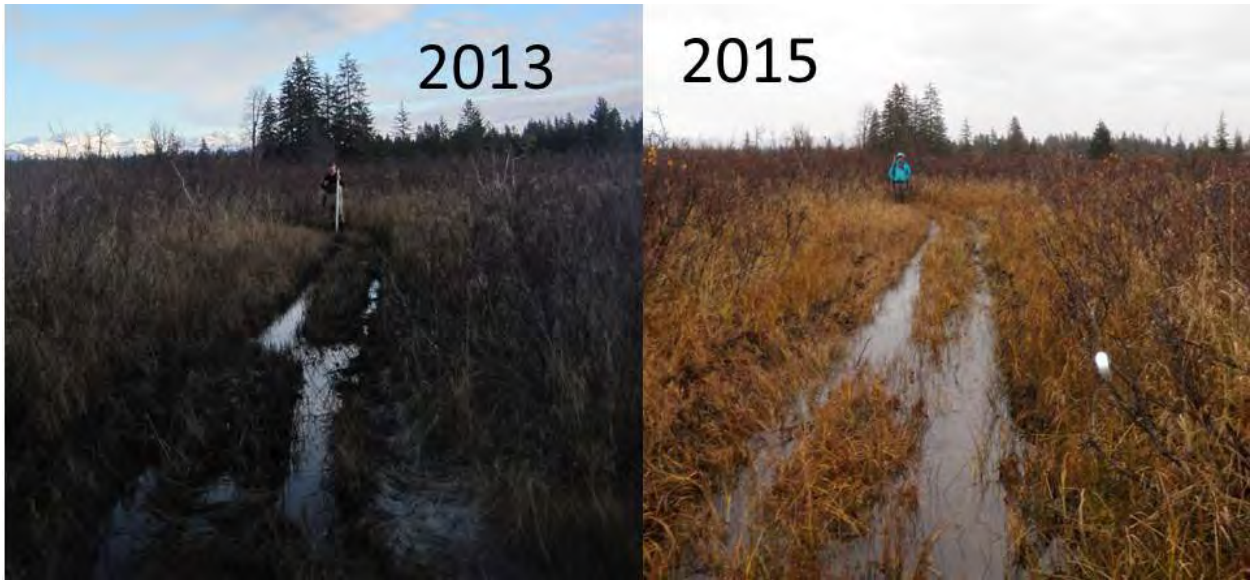
For photo point monitoring in root-wad collection areas and Staney gaps, Foss (2015) recommends re-photographing several sites in 5 years (summer of 2020).

**Yakutat Forelands meat retrieval OHV trails**

In 2015 approximately 1.2 miles of OHV trail were monitored following established protocols. The 10 Mile Bog trail was first monitored in 2013 and monitored again in 2015. The 700 meters of trail that displayed a low level of impact traveled through an area of wet meadow vegetated with low willow and

sweet gale. Signs of the 2013 trail were minimal and without the photo point waypoints retracing the 2013 trail would have been impossible.

The rutted portion of the trail still was heavily impacted. This section of the trail had been used for additional game retrieval in 2015, so it was not possible to properly evaluate the recovery of the more heavily impacted sections of the trail. Similar to the location on the upper Lost River, this trail may have a history of game retrieval over multiple years.




**Yakutat Forelands meat retrieval OHV trail – rutted section - 2013 and 2015**

***Future***

Action plan Yakutat OHV game retrieval trail monitoring

- Continue to monitor game retrieval sites on the forelands including both new trails and those already inventoried.
- Use the information we collect to make recommendations to users, perhaps in the form of a pamphlet, about how to avoid resource damage. The pamphlet is planned and funded in FY 2016.
- Use the new Yakutat vegetation map to identify areas vulnerable to resource damage and consider additional restrictions in those areas.
- If areas that meet the definition of resource damage are observed to fully recover within a year, consider revising the definition of resource damage.
- Consider small restoration projects in areas where resource damage occurred because of OHV use off designated trails.

## 20.Soil and Water – State Water Quality Standards

### Are the soil and water conservation practices as described through the best management practices and site specific prescriptions implemented and effective in minimizing soil erosion and maintaining the State water quality standards?

#### BMP Monitoring

In fiscal year 2015 evaluations were completed at ten sites on six districts representing six resource activities and seven monitoring protocols. All field evaluations of BMP implementation and effectiveness were conducted by interdisciplinary teams following national protocols. For the national target, six sites were randomly selected from forest populations following national protocols. For forest plan monitoring, four sites were randomly selected from a sample of projects logistically near sites selected for national target.

**Table 1. Project Name, Activity and protocol, and Ranger District for 2015 BMP monitoring sites.**

| Project Name | Activity/Protocol | Ranger District |
|---|---|---|
| Tonka Stewardship Contract Unit 305* | Vegetation Management A – Ground-Based | Petersburg |
| Tonka Stewardship Contract Unit 311* | Vegetation Management A – Ground-Based | Petersburg |
| Tonka Stewardship Contract Unit 315** | Vegetation Management A – Ground-Based | Petersburg |
| Road 301822* | Roads B – Completed Road Reconstruction | Thorne Bay |
| Road 2000000 MP 102.907* | Roads B – Completed Waterbody Crossing Reconstruction | Thorne Bay |
| Road 85089** | Roads D – Stored Roads | Hoonah |
| Cinder Cone OHV 7592** | Recreation D – Motorized trail Operation | Sitka |
| Tawah Creek Vegetation Removal** | Aquatic Ecosystems B – Completed Aquatic Ecosystem Improvement | Yakutat |
| WRD Office Compound Weed Treatment** | Chemical Use A – Chemical use Near Waterbodies | Wrangell |
| Thorne Bay Sort Yard Rock Pit** | Minerals B – Active Non-placer Mineral Operations | Thorne Bay |

*Sites randomly selected from subsamples for Forest Plan Monitoring.
**Sites randomly selected from forest populations following protocols for national target.

In addition, a trip to Kensington Mine was completed to document corrective actions that were recommended during BMP monitoring in 2014.

In most cases BMPS were fully implemented and effective and no corrective actions were recommended. Corrective actions are those actions needed to ensure full implementation of BMPs to protect water quality. In the following cases corrective actions were recommended and implemented:

In timber harvest Units 305 and 311 additional grass seeding for erosion control was recommended and implemented after the monitoring trip.

On the 200000 road waterbody crossing the IDT recommend rip-rap on a small area of slumped fill material. On the 85089 Road storage project the monitoring team recommended construction of ditch blocks and other storm-proofing measures to minimize potential road damage and soil erosion.

On the Cinder Cone OHV Trail the team recommended several corrective actions included updating stream mapping, placement of larger bedload at two low water fords, waterbars and drainage improvements.

On the Thorne Bay Sort Yard Rock Pit the Monitoring Team recommended restoration of a drainage ditch and settling pond, this item was completed after the BMP monitoring trip.

The Kensington Mine Site review found that the three corrective actions identified in the 2014 report were corrected and functioning properly.

**Landslide Inventory and Analysis**

In August of 2015, a storm event in Sitka caused over 40 landslides with one of the landslides claiming 3 lives, and destroying and damaging new houses under construction. This event precipitated the formation of a Geo-hazards task force. The task force has brought together local, state and federal agencies with universities and even NASA to support the City and Borough with science based landslide information. The Forest Service is participating on the task force and created a map of landslides from the August 2015 event. These landslides will be added to the forest-wide landslide layer. The National Park Service requested monthly Worldview satellite imagery through Digital Globe for the area around Sitka. The Forest Service updates the landslide inventory with each new set of images. The Alaska Division of Geological and Geophysical Surveys and National Park Service also used year-end money to collect over 50 square miles of Lidar in the affected area behind the community of Sitka. If the City and Borough chooses to do slope stability assessments these new remotely sensed products will be very helpful. The National Weather Service conducted storm event analysis on the January 2014 storm on Prince of Wales and the August 2015 storm in Sitka. There is interest in improving landslide models for southeast Alaska with weather data tied to landslide producing storms.

Updates to the landslide layer were unfunded in 2015. The Sitka landslide inventory and field assessment were funded with monies diverted from other areas of the soil and hydrology program. The Sitka storm event was not a large storm event, and the 24-hour rainfall total was just over 3 inches, which is not spectacular. Further analysis by the National Weather Service shows the intensity of the storm was on the magnitude of inches per hour or minutes. The landslide inventory suggests a relatively widespread storm event that was not isolated to a few landslides around Sitka. The field assessment provided ample evidence that soil macropores were actively eroding during the storm and local areas of soil at the heads of the slides became saturated. Wind speed did not reach a level that would suggest windthrow but turbulence was quite strong according to local observers. Evidence of widespread or even local windthrow was lacking around the slides investigated to date. A similar sized storm at Sitka on September 18, 2014 caused at least 4 landslides in the Starrigavan Valley. Further analysis of soil and storm event conditions are needed to understand why these smaller storms are causing landslides around Sitka. The propensity of volcanic ash soils to form soil pipes (macropores) and the weather conditions required to overwhelm those pipes and saturate soil needs further investigation.

### *Future*

For FY 2016 the forest has funded landslide assessments for another 12 to 16 landslides produced in the August 15th storm event at Sitka. The forest has also funded an update to the landslide inventory based on the Worldview Imagery collected because of the Sitka storm event and landslides.

There is interest in updating the landslide layer with specific storm event information. The National Weather Service would like to use the information to inform a weather related landslide model. At this time this work is not funded, but will be incorporated to the extent possible in other funded work.

The current slope layer for the forest (20-meter digital elevation model (DEM)) does not provide sufficient detail to identify the microsites where landslides often initiate. A mapping project is underway to produce 5 to 10 meter DEMs for the entire state of Alaska. The Ifsar (Interfermetric synthetic aperture radar) generated DEMs have been delivered for about 80 percent of the Tongass National Forest. The remainder is expected by mid-2017. At that time, the landslide initiation points should be overlain with the new DEMs to calculate landslide frequency by slope class.

The landslide layer needs additional quality control and periodic updates. At this time, the landslide layer receives updates only in project areas where other forest management activities are occurring.

Once the new and greatly improved DEMs are available for the forest a landslide frequency analysis based on slope class should be conducted. Data from slope and landslide analysis will help improve our ability to identify and map unstable terrain.

In FY 2013, the Tongass National Forest purchased a product called NetMap (Earth Sciences Institute). NetMap is a terrain-based model used primarily to map drainage networks. The NetMap slope stability model uses slope steepness and slope confluence to identify landslide prone areas. The NetMap slope stability model holds promise for better identification of unstable areas especially with the 5 to 10 meter DEM. Forest slope stability specialists should begin familiarizing themselves with the model when the new DEMs become available.

**Landslide at Starrigavan. Photo by John Reed, Harris Air Pilot**

## 21.Soil and Water – Watershed Health

### What is the ecological condition and trend of watersheds in terms of key characteristics (such as soil productivity, water quality and quantity, invasive species, etc.) of watershed health identified in the desired condition (aquatic ecosystem potential) of the plan area?

### How effective are management actions in improving watershed health (maintaining or moving watersheds toward Condition Class I)?

There are seven priority watersheds on the forest (Harris River, Twelvemile Creek, Staney Creek, Luck/Eagle Creek, Saginaw Creek, Sitkoh River, and Sitkoh Creek). Restoration plans and activities to improve watershed health have been focused in these watersheds. Essential projects were completed and watershed condition has since been restored and is considered "functioning properly" in four watersheds – Harris River and Twelvemile Creek on Prince of Wales Island and Sitkoh River and Sitkoh Creek watersheds on Chichagof Island. Projects include young-growth treatments to improve habitat conditions for wildlife and fish, road storage and decommissioning, removing culvert fish passage barriers, and instream treatments to restore and improve channel stability and fish habitat function. Restoration continues in the other priority watersheds. Iris Meadows/Shelikof Creek on Kruzof Island was added to the priority watershed list in 2014.

We sampled 53 reaches on islands throughout the north central, central and southern parts of the Forest from 2013 through 2015, with 18 stream reaches sampled in 2015.

In addition to the watershed restoration effectiveness monitoring Tongass-wide reach-scale extensive post-treatment (EPT) monitoring strategy and the ongoing terrestrial riparian vegetation strategy component, the Twelvemile Creek smolt investigation located on Prince of Wales Island continued through 2015 with spring smolt work followed by fall adult coho salmon recapture work.

Adult steelhead (1995-2015 with missing years) and Coho salmon (2004-2015 with missing years) have been estimated with snorkel surveys.

A 2015 Twelvemile Creek report commissioned by the Forest Service and Sitka Conservation Society using a combination of partner and Forest Service funds provides a critical review of the smolt and adult monitoring program and the ability of the Twelve Mile Creek Restoration Monitoring Project to effectively evaluate restoration actions (Roni and Stroud 2015).

### Stream Physical habitat and Fish Response

We sampled 18 stream reaches during 2015. Interim results can be found in the Watershed Restoration Effectiveness Monitoring 2015 progress report. This was the third year of the eight-year project using the rotating panel design; we do not have sufficient data for establishing trends at this time. Comparisons to the Tongass-wide fish habitat objectives (i.e., metrics) dataset show the relationship of individual sites and the natural range of variation. Group means will eventually be compared for specific physical habitat and fish variables using standard statistical techniques, developed in consultation with a statistician.

### Twelvemile Creek Smolt Investigation

The total smolt production from Twelvemile Creek 2013 to 2015 based on combining the mainstem trap estimate (stratified Peterson) and the catch in culvert and estuary traps ranged from 41,124 to 72,349 with the highest emigration estimate occurring in 2014. Marine harvest, calculated from coded wire tag (CWT) recoveries in the sport and commercial fisheries, was 63 percent and 58 percent in 2014 and 2015, respectively. Long-term trends in adult returns suggest little change since restoration for either Coho or steelhead, though there appeared to be a slight positive trend for Coho adults largely driven by increasing returns since 2011 (Roni and Shroud 2015).

This was the fourth consecutive and final year of operation for the smolt trap. Adult Coho salmon recapture work will continue into fall 2016 to complete the two-event mark-recapture experiment necessary to estimate the 2015 Coho smolt abundance.

### Soil Geomorphology and Terrestrial Riparian Vegetation

Because there has been some uncertainty about the effectiveness of the widely applied prescription of conifer release in alder dominated mixed tree species riparian young-growth stands, with no actual data to base a decision about the application of this treatment, a focused conifer release retrospective study was implemented in 2014. Individual release trees were measured, reach scale plots established, and trees within these plots measured. A study plan was established and applied. Preliminary results of this study show that conifer release led to a growth response across the five observed stands for the period studied to date. A complete summary is in draft form at this time as a Pacific Northwest Research Station general technical report.

**Salmon Creek reference reach**

***Future***

At this time, no changes to the forest plan are recommended. The following recommendations should be considered in the context of continued Watershed Restoration Effectiveness Monitoring (WREM) in the Tongass National Forest:

- Continue restoration plans and activities in priority watersheds in collaboration with partners and stakeholders. A reassessment of Tongass watershed conditions through the Watershed Condition Framework process is due to be completed by April 2016 and may incorporate an all-lands collaborative approach.
- Continue collaboration with Pacific Northwest Research Station to evaluate the effectiveness of restoration activities in improving watershed health.
- When a forest canopy density model is developed for the Tongass, consider its utility for evaluating the effects of forest management on streamflow. Incorporate recent findings on throughfall (Prussian 2010) and analysis of long-term streamflow records (personal communication with Ed Neal 2010).
- Continue to refine the Tongass Riparian Young-growth Strategy to reflect best science and ongoing retrospective monitoring results of riparian stand treatments. Ensure completion of a Pacific Northwest Research Station general technical report, which details field-based sampling and analysis in an experimental context across several riparian stands to better evaluate treatment options and predict future forest conditions in streamside forested communities.
- Compile a comprehensive database of historical riparian young-growth treatment areas to track evolution of riparian forest stands. This database should include information on site conditions and treatment prescriptions across the forest. The riparian soil geomorphic guide can be used to predict the condition in the stand and its estimated trajectory toward future desired conditions.
- Continue with the broader Tongass-wide scope, more focused metrics with less sampling intensity WREM program for the duration of the 8-year rotating panel. Consider further testing of the hydrologic retention metric to determine its usefulness as a measure of channel complexity and nutrient retention in evaluating large wood placement projects.
- Continue long-term adult Coho salmon and steelhead trout monitoring in one restored Tongass watershed (Twelvemile Creek on Prince of Wales Island) to evaluate watershed scale effects of watershed restoration through time and continue with adult coded wire tagged Coho salmon recapture work associated with the smolt project in fall 2016.

- Continue with the forest requirement to collect a suite of routine physical metrics at all major watershed restoration projects as agreed upon in an updated 2014 version of the Alaska Region Core Aquatic Habitat Restoration Monitoring Guidance document. Continue to provide monitoring documents as they are completed.

## 22.Wetlands

### Were the wetland conservation practices implemented and effective to avoid and/or minimize impacts to wetlands to the extent practicable?

The 2014 monitoring and evaluation report is the last report for wetland road monitoring for the foreseeable future. No data was collected in 2015 and no report is planned. Therefore, no new results are available.

Two summary reports (Landwehr 2011, and Landwehr and Dillman 2014) identify several recommendations for future road and wetland monitoring work, if more work is pursued.

The wetland monitoring data collection and analyses will not be included in the new forest plan monitoring plan, but may be added to that plan later if the need arises. Such a need would be driven by increased road construction in wetlands or effects to wetlands from roads – (which are not yet apparent after 30 years of road construction in wetlands on the Tongass). Forest plan best management practices monitoring will continue and may include roads through wetlands.

## 23.Karst and Cave Ecosystems

### Are the biological, mineralogical, cultural, paleontological components, and recreational values of the karst and caves maintained?

Effectiveness monitoring has been historically tied to post harvest monitoring and preliminary cave resource inventories. In FY 2015, a minor amount of logging occurred on karst lands with karst mitigation measures. We monitored some of the small sales on the Thorne Bay Ranger District to evaluate the effectiveness of proposed mitigation. Monitoring of these sites, we found that prescriptions such as partial suspension and buffer windfirmness were achieved. We accomplished limited subsurface monitoring. This included subsequent trips into known cave systems to document changes and pre-harvest inventory of karst features to establish baseline inventories. We documented no substantial changes within the known cave systems because of management activities.

The Edna Bay Municipal Watershed Delineation Project on Kosciusko Island will continue in 2016. In cooperation with the City of Edna Bay and State of Alaska, this project was initiated to define the catchment area of the springs, which provide water to the town of Edna Bay, Alaska.

#### Future

Continue to train and involve karst specialists, hydrologists, soil scientists and other resource specialists as essential in implementation of the karst resources standards and guidelines.

As timber harvest occurs in areas where karst is present and mitigation has been prescribed, effectiveness monitoring will follow as funding allows. Tracer dye studies will continue to further characterize karst groundwater systems.

Thrush Cave moonmilk. Photo by Jim Baichtal

Dall Island epikarst. Photo by Jim Baichtal

# Human Uses and Land Management

## 24. Timber Resources – Economic Timber Sales, Shelf Volume, and Contract Volume

**Is the timber management program meeting the objectives of achieving economic timber sales and rebuilding the volume under contract and shelf volume components of the sale program?**

In FY 2015:

- The Tongass offered 19.8 million board feet (MMBF), sold and awarded 19 MMBF and had 796 thousand board feet (MBF) in no-bid timber sales that remained unsold at the end of the fiscal year.
- The harvest level was 57 MMBF and a remaining inventory of 118.2 MMBF with 3.66 years of volume under contract based on a 5-year average annual harvest of 38 MMBF/year.
- The average bid rate for the timber under contract is $62.29/MBF. At the end of FY 2015, the average bid rate was $108.80 MBF.

The Tongass has not been able to establish sufficient shelf volume to maintain flexibility and stability in the sale program.

**Hoonah sawmill and lumber yard. Photo by Terry Fiske**

## 25.Timber Resources – Standards and Guidelines

### Are timber harvest activities adhering to applicable timber management standards and guidelines relative to: created openings exceeding the maximum size limit for unit harvest, harvest on slopes greater than 72 percent slope gradient, or within the 1,000 feet beach and estuary buffer?

#### Created openings

The 23 created openings had a weighted average opening size of 28 acres, and ranged in size from 4 acres to 100 acres. The majority of openings (74 percent) were 40 acres or less in size. None exceeded 100 acres. Forest plan standards and guidelines for scenery and sensitive species such as Northern goshawk and American marten, and soil and water best management practices emphasize smaller sizes. In addition, emphasis on leaving old-growth (legacy) structure in harvest areas is resulting in smaller harvest openings. Of the 654 acres managed via the even-aged system, 22 percent retained a portion of the original stand structure through retention of leave trees. The remaining 78 percent were traditional clearcuts. The rise in the percent of traditional clearcutting without reserve trees over the last few years is a result of changing from the 1997 forest plan marten standards and guidelines to the current 2008 forest plan legacy standards and guidelines. The former marten standards and guidelines required structure to be left in harvest units in more value comparison units and for smaller openings (over 2 acres) than the current legacy standards and guidelines (openings over 20 acres), meaning that fewer even-aged units are required to have trees retained within the unit under the current forest plan.

In addition to the harvests discussed above, 40 stands were harvested using an uneven-aged silvicultural system totaling 997 acres. Single-tree selection prescriptions were used to implement these uneven-aged silvicultural systems. In addition, two stands totaling 187 acres were commercially thinned.

#### 72 percent slope

In 2015, approximately 56.5 acres of timber harvest occurred on slopes over 72 percent gradient. The steep slope acres were in nine harvest units on the Big Thorne Project Area.

Most of the steep slopes were logged via helicopter and full suspension of logs was achieved. About half of the steep slope acres were a partial cut prescription. The steep slope units were all in either the North Thorne or Luck Lake Watersheds. All steep slope areas were logged according to the prescriptions designed to protect slope stability.

**1,000 foot beach and estuary buffer**

Of the total 2015 harvest, no units harvested fell within the 1,000-foot beach and estuary buffer.

**Logger harvesting a marked tree. Photo by Chris Budke**

## 26.Timber Resources – Allowable Sale Quantity

### Is the ASQ land base consistent with resource information and programmed harvest?

For FY 2005 through FY 2015, the average annual volume sold was 470 million board feet (MMBF) or 18 percent of the annual allowable sale quantity. This information is presented to observe the trend in recent allotment of timber sale allowable sale quantity. The decline in timber sale volume is based on a variety of factors including litigation, economic conditions, and harvest costs.

No action is necessary at this time because the annual volume sold has been, and is expected to continue to remain, well below the allowable sale quantity. Recommendations are to continue to monitor the trend of annual allowable sale quantity sold.

**Tonka sort yard, Petersburg Ranger District. Photo by Carol Seitz-Warmuth**

## 27.Timber Resources – Tongass Timber Reform Act

### Is the timber demand being met within limits of the adaptive management strategy and Tongass Timber Reform Act (TTRA)?

In FY 2015, all timber harvested and offered was from Phase 1 lands. In FY 2015, the Annual Demand Calculation was 127 million board feet (MMBF) using the expanded lumber scenario. In FY 2015, the Tongass offered 19.8 MMBF, sold 19 MMBF and had 796 thousand board feet (MBF) in no-bid timber sales. Timber harvest for FY 2015 was 57 MMBF.

The amount of harvest was less than 100 MMBF and indicates that the Tongass timber harvest planning efforts should continue in Phase 1 areas on the Forest with the exception of small sale opportunities. At the end of fiscal year 2015, there was 118,213 MBF under contract. Approximately 3.6 MMBF is under contract in the Juneau Access Road and the Blue Lake Hydro project out of Sitka has 7.5 MMBF of flooded unavailable timber. Since the demand calculation estimates that there should be an estimated 127 MMBF under contract, the objectives of the Tongass Timber Reform Act are not being met and efforts to establish shelf volume should continue.

**Front loader at a log transfer facility on Tuxekan Island**

## 28.Timber Resources – Adaptive Management Strategy Threshold

**Has a Timber Sale Adaptive Management Strategy threshold been reached, so that it is appropriate to move to the next phase?**

In FY 2015, the Tongass offered 19.8 MMBF, sold 19 MMBF and had 796 MBF in no-bid timber sales. Timber harvest for FY 2015 was 57 MMBF and annual harvest has not exceeded 100 MMBF in the previous decade.

The total volume harvested has not exceeded 100 MMBF in the last decade. Harvest less than 100 MMBF indicates that the Tongass timber sale planning efforts will continue in Phase 1 areas on the Forest.

## 29.Timber Management – Non-interchangeable Components

**Are the non-interchangeable components (NICs) of the allowable sale quantity consistent with actual harvest?**

In fiscal year (FY) 2015 there was approximately 56.8 MMBF harvested from the Tongass. All of the harvest was in non-interchangeable component I areas. For several years, the majority of harvest has been in non-interchangeable component 1 areas.

## 30.Timber Management – Proportional Mix of Non-interchangeable Components I and II

**Is the proportional mix of volume in non-interchangeable components I and II as estimated in the forest plan accurate?**

Non-interchangeable component (NIC) data has been reviewed for the past 17 years. An apparent upward trend was occurring in the proportion of the NIC II harvest component from 1999 through 2001. Fiscal years 2002, 2003, and 2005 show a reverse swing in the NIC trend; however, 2006 and 2007 showed a dramatic increase in the NIC II component. The increase in NIC I for 2002, 2003, and 2005 may be due to the poor timber market and higher fuel costs influencing the purchaser focus toward more conventional harvests. The increase of NIC I component in 2008 and 2009 is likely due to changes in the appropriations law that requires the Tongass timber sale program to only conduct timber sales that appraised positively using the residual value appraisal approach. This trend continued in 2010. The Department of Agriculture placed a moratorium on road building and timber harvest in roadless areas in 2010. The Department implemented an approval process, and in 2010 no timber sales in roadless areas were approved if the proposed activity included activities in roadless areas. If the moratorium and approval process remain in effect, the likelihood of offering a planned mix of NIC I and NIC II components of the allowable sale quantity remains in doubt. The forest plan mix of NIC 1 and NIC 2 is intended to prevent a disproportional harvest of the most economic (NIC 1) areas over the long term. Recent harvest levels are not approaching the annual limits for NIC 1 and therefore it is unlikely the forest will exceed the long-term goal of having economical harvest areas available.

**Active logging operation. Photo by A. Gallo**

## 31.Transportation System

### Are the standards and guidelines used for forest development roads and log transfer facilities effective in limiting the environmental effects to anticipated levels?

#### Roads

The FY 2015 monitoring showed that we were effective in limiting environmental effects as a result of an effective maintenance program on the road system. Sediment transport of eroded materials from the road surfaces was minimal. The road surfaces were in good condition and showed no ruts or water diversion. The culverts monitored were effectively transporting water across the road and no maintenance issues were noted on the culverts, no substantial head cutting or bank erosion was noted.

#### Log transfer facilities

The running surface of the Tonka log transfer facility was in good condition; the surface is graded weekly as needed. The surface is cleared of loose soil and bark debris. The sort yard running surface was well graded and clean of bark. The Tonka sort yard settling pond showed some need for clean-out of fine sediment that is raveling from the backslope of the sort yard. The system of settling ponds is functioning well to filter out the fine sediment. No sediment was noted in the ditch downslope of the settling pond and no sediment was noted in transport to the ocean. The settlement pond at the log transfer facility was functioning well, filtering out sediment in the primary and secondary settling areas.

Maintenance is needed to correct deficiencies on maintenance of the sort yard settling pond at Tonka on Kupreanof Island. The settling pond was cleaned out before the end of the 2015 operating season. The back wall of the sort yard is raveling and action plan for slope stabilization was developed and documented in the storm water pollution prevention plan.

**Tonka sort yard; settling pond. Photo by Carol Seitz-Warmuth**

## 32.Transportation System

### Are the roads and trails maintained in accordance with management objectives?

The roads selected for monitoring in 2015 included roads 6415 and 46096 on the Kuiu road system (Kuiu Island), roads 3018, 3018122, 3018100, 3016600 and 3015635 on the Big Thorne road system (Prince of Wales Island), road 3000 on Sandy Beach (Prince of Wales Island), roads 7544 and 7548 on the Sitkoh road system (Chichagof Island). The INFRA[2] database was utilized to determine which roads were in the selection pool that were recently closed or maintained. These road systems were selected due to the recreation and timber use and random selection of open maintained roads.

All roads monitored in FY 2015 were shown accurately on the motor vehicle use map. Roads with maintenance level 1 designation (closed roads) do not appear on the motor vehicle use map unless they are dually designated as a motorized trail. This was the case with the last section of Road 7544. The road segment that was closed did not appear on the motor vehicle use map, but the corresponding motorized trail, named Trail 317544 appeared in its place. Roads with maintenance level 2 through 5 designations (open roads) appear on the motor vehicle use map as roads. The motor vehicle use map is updated annually to the extent necessary to reflect revisions to travel management decisions (36 Code of Federal Regulations [CFR] 212.54 and 212.56).

#### Closed Roads Maintenance Level 1

Road 7544 has a dual designation as motorized trail 317544 and is being used by off-road vehicles. The motor vehicle use map states that the maximum width of a vehicle on this route is 60 inches. Sitkoh Trail 317544 that extends from the end of the 7544 toward Peril Straits was not maintained to standard and not passable by ATV and OHV vehicles.

The 2015 monitoring effort has shown that the motor vehicle use map has consistently made motor vehicle access prohibitions known. Past monitoring has shown that the map by itself has not been completely effective in eliminating access. In some cases users modify structures to continue accessing roads that are closed and changed to maintenance level 1. Roads where culverts and bridges were

[2] INFRA is a Forest Service database used to manage information on national resources, such as buildings, trails, roads, wilderness areas, and water systems.

removed were effective in eliminating unauthorized motorized use. Unauthorized use by OHVs did not cause any environmental damage or concerns on the routes evaluated.

### Open Roads Maintenance Levels 2-5

Through road maintenance, surface reconditioning, and grading, the road surface and road site erosion has been minimized. The roads were maintained to meet best management practices, regardless of the methods used to obtain the maintenance work. Roads were managed to provide cost-effective support to land use designation objectives and safe travel to users of the system, while protecting the environment, adjacent resources, and the public investment. Consistent with road management objectives, design features were incorporated to protect water quality by minimizing long-term maintenance needs (e.g., armoring ditches, installing bridges and oversized culverts). Road running surfaces, bridge decks, ditches, and culverts were maintained to keep water flowing effectively, and to provide for the disposal of materials collected during road maintenance (soil, rock, debris) in a manner that minimizes sediment entering streams and lakes. During monitoring, reviewers noted that road surface maintenance to limit surface runoff, such as catch basin cleaning and ditch maintenance was completed.

The roads monitored showed that they have been maintained in accordance with the maintenance level designations. Kuiu roads 6415 and 46096, Big Thorne roads 3018, 3018122, 3018100, 3016600 and 3015635, and Sitkoh-False Island were maintained to ML-2 standard with rock blading and compaction, culverts cleaned and functioning. Sandy Beach road 3000 was maintained to ML-4 standards with widened curves and a straightened alignment, and asphalt paving.

**Road 6208 on Mitkof Island**

#### *Future*

Subsistence and recreation needs are important considerations in the management of the transportation system. Periodic public meetings are recommended, either as part of larger projects or simply as outreaches, to generate input from the public regarding their needs and desires. The unauthorized use of motorized trails (maintenance level 1 roads) could be eliminated by adding vehicle width restrictions at the beginning of a trail or road. Off-highway vehicle use did not generate any noteworthy damage on the shot-rock roads monitored, and OHV use seems to disappear as vegetation establishes itself on the road surface. This recommendation does not apply to all roads, however. Prior monitoring reviews have shown that rock can weather quickly, and gravel soils can be sensitive to significant OHV traffic and may erode.

## 33.Mining and Minerals Exploration

### Are Federal regulations (36 CFR 228) to ensure surface resource protection implemented and is the administration of this regulation through the forest plan effective in limiting soil and water resource impacts?

The Forest Service administers two large locatable mine plans (Greens Creek and Kensington Gold Mine) and processed several dozen exploration-drilling programs and mineral material operations (Herbert Glacier Project, Bokan Project, Wowoedski Island Project, Zarembo Island Project, among others). Inspections of mineral sites indicate that the effects of mining activities on surface resources are consistent with forest plan expectations. The necessity of the operator to obtain approval for their Plan of Operations provides the Forest Service the opportunity and authority to control the effects of the development on the Forest surface resources.

The Forest Service is engaged in an on-going effort to mitigate the dangers posed by abandoned mine land features on the national forests. These features include tunnels, adits, shafts, tailings ponds, rock dumps, mill sites and other associated mining features. Fiscal year 2015 inspections of mineral sites indicate that the effects of mining activities on surface resources are consistent with forest plan expectations.

**Green's Creek Mine**

## 34.Subsistence Management

### Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the forest plan?

Eleven fisheries assessment projects were conducted in Southeast Alaska in 2015. Ten projects assessed sockeye salmon harvests and escapements for stocks that sustain subsistence fisheries. One project surveyed Unuk River eulachon.

Aerial moose surveys were conducted near Yakutat in 2015.

A review of project level ANILCA 810 analyses will occur in 2017 to determine the effects of the forest plan on subsistence uses.

Monitoring trends in fish and wildlife populations and subsistence uses generally requires long-term data sets and will be analyzed in 2017.

Issues identified in the Southeast Regional Advisory Council annual report will be reviewed in 2017 to identify long-term unresolved issues and determine the effect of the forest plan on those issues.

**Salmon in fish trap. Photo by Justin Koller**

### Future

Continue to conduct ANILCA 810 analysis at the project level. Every five years a survey of project level 810 analyses will be conducted to determine what projects had a significant effect on subsistence recourses and if the project was consistent with the forest plan, and what effects it had on subsistence uses.

Continue to collect data on fish and wildlife populations that are important for subsistence uses. Every five years the subsistence fish and wildlife data collected through the monitoring program and other sources such as the Alaska Department of Fish and Game will be analyzed for trends and evaluated to determine whether the forest plan had any effect on those trends.

Continue to work with the Council and review the annual reports. Every five years, annual reports from the Council will be reviewed for unresolved issues and whether the forest plan was responsible for those unresolved issues.

## 35.Wilderness

### Is the wilderness character being maintained?

#### Misty Fiords National Monument Wilderness

The factors affecting the untrammeled, natural and undeveloped qualities in Misty Fiords National Monument Wilderness are very small in scale or unchanging, and pose little threat to the change in quality of wilderness character. There are outstanding opportunities for solitude or primitive and unconfined recreation in most areas of Misty Fiords National Monument Wilderness. The greatest threat to wilderness character in Misty Fiords National Monument Wilderness is the high level of motorized use occurring in the Rudyerd Bay, Walker Cove, and the Misty Core Lakes Recreation Use Areas. However, the limited period of high use (June through August, or approximately 25 percent of the year), and the relatively localized nature of the effects of this use, reduce the overall impacts to wilderness character, which is being maintained throughout most of Misty Fiords National Monument Wilderness.

#### Other Wilderness Areas

Some results for components of the wilderness character are being reported separately by resource (for example, air quality and invasive plants). There has not been enough information collected to determine whether or not the wilderness character of each wilderness is being maintained.

**Future**

The action plan for maintaining wilderness character is highlighted in specific resource monitoring strategies attached to the Tongass Wilderness Character Monitoring Plan; Attachments A-G. Protocols have been developed, or are being formulated to address invasive plants, lichen biomonitoring, wilderness development indexing, preserving outstanding opportunities for solitude, measuring encounters, and campsite inventories.

Resource inventories may establish other monitoring components over time. These may include protection needs for historic properties and additional protections for sensitive plants. Future accomplishments will depend on the available funding and participation by stewardship partners willing to assist in the collection of the required information.

**Admiralty National Monument stewardship project – invasive plant removal**

## 36.Heritage Resources

### Are (1) project clearance/inventory, (2) project implementation, (3) mitigation, and (4) enhancement completed in accordance with the requirements and regulations for heritage resources?

Tongass archeologists monitored the condition of 82 sites in FY 2015, which represents a decrease from the preceding year. In general, condition assessments completed as part of monitoring activities have revealed relatively stable sites (good condition). Some however, were eroding due to environmental factors such as slope instability. In spite of this, there were no recommendations made for site stabilization or other overt activity to protect these sites.

A review of Tongass records indicates we are in compliance with the intent of the provisions of Section 106 requiring federal agencies to consider the effects of undertakings on cultural resources that meet eligibility requirements for the National Register of Historic Places. Field inventory procedures and site assessments are stringent enough to identify cultural resources within project areas of potential effect for the purposes of Section 106. This is supported by the fact that no inadvertent discoveries have occurred

once a project site has been evaluated. Current results suggest the forest plan's heritage resource standards and guidelines are adequate to protect the forest's cultural resources in the planning and implementation of management activities.

Forest plan standards and guidelines are complying with the requirements to identify and protect the forest's significant cultural resources. Monitored sites are stable and in good condition, with only a few being actively eroded through natural means, or experiencing adverse effects from visitors. Decreasing funding challenges the monitoring program to look for alternative methods to carry out the work. In this case, the staff introduce efficiencies by working cooperatively with other program areas to visit sites.

**Student volunteer, Sara Gross, excavates a test pit.**
**Photo by Jeff DeFreest**

**Volunteer Tom Metke excavates a stake.**
**Photo by Martin Stanford**

## 37.Recreation

### Are areas of the Forest being managed in accordance with the prescribed recreation opportunity spectrum class in Forest-wide standards and guidelines? Is the recreation opportunity spectrum classification consistent with public demand?

Non-wilderness and most wilderness areas monitored this season were being managed in accordance with the prescribed recreation opportunity spectrum class. Social encounters were found to be well below the limits set by the established recreation opportunity spectrum class in the forest plan.

Recreation settings on the Yakutat Ranger District are being managed in accordance with the recreation opportunity spectrum standards and guidelines for each land use designation. However, public demand in areas along the boundary and shoreline of the Russell Fiord Wilderness is often inconsistent with the primitive recreation opportunity spectrum setting.

**Naha Trail**

## 38.Wild, Scenic and Recreational Rivers

**Are wild, scenic, and recreational river standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values of the classification level for which the river was found suitable for designation as part of the national wild and scenic river system?**

There were no projects proposed that included effects to proposed wild, scenic or recreational river characteristics and no analysis documents completed that evaluated impacts to wild, scenic or recreational river characteristics.

Of the 27 candidate river systems on the Forest, five were visited by wilderness field crews this season. Because of the limited amount of time spent on the systems and the incidental nature of the monitoring, a meaningful evaluation of each candidate's designation cannot be readily attained. Overall, there appeared to be little threat to the remarkable values for each candidate river system.

**Petersburg Lake morning**

## 39.Scenery

### Are the adopted scenic integrity objectives established in the Plan met?

#### Sarkar recreation area

The district finds the new concrete toilet to be much easier to maintain; the shelter site with fire ring overlooking the lake has attracted a greater number of users; the fine-crushed aggregate surface is working well to increase accessibility.

However, the wood parking barriers are separating from their concrete anchors; concrete wheelstops may have been a better choice. The district is concerned about future replacement of the shelter posts, which are sunk nearly 4 feet into concrete footings. This “pole building” construction type is being reconsidered in a current project for this reason. The bench wood was coated with a polyurethane product, which is peeling. The rock edging plus metal rim of fire ring should be 10-inch maximum width.

Generally the users and district are pleased. The district is hearing requests from people who want to hold weddings there.

#### Blind River Rapids shelter

The structure fits well with the natural environment. Sizing of shelter posts and other members is appropriate to the setting. The use of soil anchors and concealed joists under the deck successfully downplays the new foundation. Wood-wrapped shelter posts allow for replacement of the façades if they attract abuse over time. The open span roof style gives birds no place to roost over the table. With future projects, the roof deck coating should not be a sealant, but rather should allow the wood to breathe and moisture to escape.

#### Raven’s Roost Trail, Phase 1A and 1B

During construction, the number and locations of drainage structures were adjusted slightly as conditions were observed; to date no drainage issues have been noticed. Every drainage structure appears to be functioning as envisioned. The trail receives more use than ever by a wider variety of age groups and ability levels. The presence of invasive plants in imported topsoil in Phase 1a is the only issue; topsoil was eliminated from the subsequent construction of Phase 1b.

#### Anan Trail

Overall, this trail reconstruction is a successful improvement. Eliminating steps and increasing trail width has increased hiker enjoyment and safety. Hikers can walk side-by-side, enjoy the scenery, and can be more aware of potential bear encounters without fear of a trip or fall. As is common with most trail projects, post-construction fine-tuning of trail drainage is needed. Bear traffic tends to wear an aggregate trail differently than human traffic; repeated trail crossings and occasional digging can create drainage issues in ways that would not happen in the absence of bears.

With our trails and site design in general, it has become apparent in recent years that heavy rain events are more intense and damaging than they have been in the past. Designers and site managers must be prepared to correct ditching and drainage issues that arise after construction if there is no heavy rain event to flag the need during construction. It is possible that climate change is triggering these larger weather events; assuming this is a continuing trend, we will likely need to design more robust drainage systems with larger, heavier rock to withstand more frequent high-energy water flows.

**Vegetation plugs near Raven's Roost Trail rest area. Photo by Carol Jensen**

***Future***

- Investigate methods of better-assuring the materials and equipment we import to a site are weed-free.
- Ensure that the correct wood preservative is applied for use in a continually wet environment.
- Investigate shelter design improvements that would eliminate the issues of post collar cracking and wood post replacements where the post is anchored deep into a concrete footing.
- Double-check during design and construction that we meet access requirements to the greatest extent practicable. A site visit should be made to Sarkar to evaluate and improve fire ring access, by either removing the rocks or replacing them with smaller ones.

# Economic and Social Environment

## 40.Economics

### Are the effects on employment and income similar to those estimated in the forest plan?

The Tongass National Forest comprises approximately 90 percent of Southeast Alaska's total land base. Over 74,000 people live in 32 communities within Southeast Alaska. These communities use and depend on Tongass resources for economic opportunities (such as commercial fishing and processing, recreation, tourism, wood products, and mining), quality of life (having a sense of place), traditional and cultural uses (subsistence activities), and recreation activities. Forest management decisions can have significant impacts, positive and negative, on these communities.

### Lumber and wood products

Estimated annual employment in the Forest Plan was based on the maximum allowable sale quantity (ASQ) so a comparison is difficult when looking just at the numbers in the forest plan analysis. The timber sale adaptive management strategy allows for additional areas (phases) to be accessed when harvest reaches a certain level for two consecutive years. Harvest is far below the maximum ASQ and all harvest in recent years has been in Phase I areas; associated employment is far below the estimated maximums shown in the forest plan. The average number of employees in logging and sawmills has remained fairly constant for the past few years, averaging 249. This is down from a high of 265 in 2008 and 262 in 2011, and up from a low of 216 in 2009; all other years since 2008 have been stable between 240 and 250 annually.

### Recreation and tourism

Alaska DOL employment statistics are compiled by industry sector and there is no single recreation and tourism industry sector. Employment within this sector is distributed across various related industries such as leisure and hospitality, trade/transportation/utilities and other. No Alaska DOL labor statistic exists to accurately evaluate the criteria of employment presented in the 2008 Forest Plan related to recreation and tourism.

The total employment for related industry sectors, which may include recreation and tourism jobs, can be examined for trends in overall employment. This may serve as a general indicator of employment trends in recreation and tourism; the specific reasons for growth or decline are complex and are depend on many factors outside the effects of the Forest Plan, including local, state and national economies. The reported annual average employment for industry sectors, which may include recreation and tourism employment, show a slight increase over the past five years.

Forest Service National Visitor Use Monitoring (NVUM) is a program with a goal of assessing levels of Forest recreation use, demographics of users and economic contributions of Forest visitors. The first five-year sampling cycle was 2004-2009; an Alaska-specific supplemental NVUM survey began in 2008. Preliminary analysis of the visitation data revealed non-resident visitors to the Tongass arrive by cruise ship (49 percent of the sample), ferry (24 percent) and air (24 percent) (Alexander 2010). Data for the second five-year period (2010-2014) was not yet available for this 2015 report. The NVUM data provides estimates for economic contributions of the Tongass on the recreation and tourism industry, though employment estimates should not be compared with employment projections provided in the 2008 Forest Plan FEIS.

### Mining

The possible effects of Forest Service policy on mining employment cannot be easily ascertained, and mining employment and income partially depend on whether locatable deposits are economically viable. Southeast Alaska growth in mining in recent years was mostly from the Kensington mine near Juneau, where employment has leveled off yet exploration continues. Annual Southeast Alaska employment statistics in for the mining sector are not available from the Alaska DOL.

### Salmon harvesting and processing

A review of labor statistics related to salmon harvesting and processing can show trends; however, current trends in the salmon harvesting and processing employment are more likely a reflection of global market conditions and the related price per pound of fish, rather than a reflection of Tongass management activities. Table 2 shows an increase during 2015 associated with processing; labor statistics for harvesting is unavailable. Year to year fluctuations exist but overall the industry appears fairly stable.

Although difficult to draw a direct correlation between processing employment and forest management, the Forest Plan assumes that 80 percent of Southeast Alaska salmon originate on the Tongass and thus 80 percent of the salmon fishing industry is dependent on the National Forest. Similarly, salmon represent 60 percent (volume) of the total processed catch. If these assumptions hold true, forest management activities on the Tongass may have had a positive effect on the industry, but numerous other factors affect the fishing industry as well.

### Federal government

The government sector is the main source of year round employment in Southeast Alaska communities. In addition, annual government employment can serve as an indication of regional economic health, as local government and private sector activities in Southeast Alaska are dependent on government funding to support community industries and the services they provide.

Although holding steady for the past two years, overall federal government employment has declined since 2008 (Table 2), when there was an estimated 1,800 federal employees. This may be due to a number of factors including consolidation of positions, lower budgets from Congress, and a decreased number of projects (timber, recreation and road building). Due to the lower federal government employment, some smaller communities may experience difficulty attracting other services and industries (USDA Forest Service 2008a, p. 3-498).

### Summary

Table 2 shows the employment figures for the four industry sectors examined in this report from 2011 through 2015. Data sources and additional information are listed in the table footnotes.

**Table 2. Southeast Alaska Region reported annual average employment statistics**

| Industry Sector | 2011 | 2012 | 2013 | 2014 | 2015 | Average* |
|---|---|---|---|---|---|---|
| Logging and sawmills | 262 | 244 | 243 | 249 | --- | 249 |
| Recreation and tourism | 13,700 | 13,900 | 12,280 | 14,150 | 14,450 | 13,696 |
| Salmon harvesting and processing | 1,600 | 1,600 | 1,274 | 1,276 | 1,800 | 1,510 |
| Mining | 647 | --- | --- | --- | --- | 647 |
| Federal Government | 1,700 | 1,650 | 1,500 | 1,500 | 1,450 | 1,560 |

1 Logging and Sawmills: Data source – USDA 2016. Tongass National Forest. Includes only direct employment with the logging and sawmill industries.

2 Recreation and Tourism: Data source - Alaska DOL Current Employee Statistics, Southeast Economic Region: 2015 Workers by Industry (State of Alaska 2016). Note these data entries include all employment from recreation and tourism related industry sectors; data includes the following industry sectors: trade/transportation/utilities, information services, professional and business services, leisure and hospitality, and other services.

3 Salmon Harvesting and Processing: Data source – Alaska DOL, Fishery Employee Statistics (State of Alaska 2016). Note most commercial fishers are self- employed so their earnings are not counted by the Alaska DOL. The figures in Economics Table 2 represent employment in the salmon processing only.

4 Mining: Data source –Starting in 2012, the State of Alaska combined Mining and Logging so no individual mining employment is available.

5 Federal government: Data Source – Alaska Department of Labor and Workforce Development, Current Employee Statistics (State of Alaska 2016).

*Since not all data is available for all years, the average is based on the number of years of available data. For example, mining data is only available for 2011 so the average is based on 1 year.

Beginning in 2009, the Forest Service and other USDA agencies and the U.S. Department of Commerce's Economic Development Administration formalized the USDA Investment Strategy working with Southeast Alaska business industry leaders, tribal government, and non-governmental organizations, and

local government agencies, contracted through the Juneau Economic Development Council (JEDC). The partnership analyzed economic opportunities and identified initiatives to improve economic opportunities in Southeast Alaska. This integrated plan is integral to the Tongass' programs, which include multi-year collaborative stewardship, ecological restoration and enhancement, and the updated forest management strategy emphasizing old- and young-growth timber sales (a key component to a transition framework to transition toward young-growth timber sales in the future). To date, these initiatives have included increased watershed restoration for increasing wild salmon production, collaborative emphasis supporting renewable energy development projects and conversion of government agency administrative facilities in Southeast Alaska from oil to renewable energy sources (JEDC 2011).

Better ways to monitor the economic impact associated with the Forest Plan should be evaluated. Most employment and economic data are influenced by numerous factors, only one of which is forest management activities.

## 41.Costs and Outputs

### What is the trend in outputs and costs associated with those outputs?

In general, funds for planning, inventory, and monitoring are decreasing. At this time, the Tongass is able to achieve at least the minimum number of monitoring requirements and acres of inventory data collection, which also includes updates to existing data within our corporate systems. If funding continues to decrease in future years, decisions on what inventory and monitoring are the most important to forest management will need to be made.

**Table 3. Allocated and expended funds for planning, inventory and monitoring (NFPN and NFIM funds)**

| Fiscal Year | Allocated | Expended |
|---|---|---|
| FY 2015 | $ 3,678,548 | $ 3,473,266 |
| FY 2014 | $ 3,849,465 | $ 3,813,588 |

**Table 4. Outputs for planning, inventory and monitoring**

| Accomplishment | FY 2015 | FY 2014 |
|---|---|---|
| Annual Monitoring Requirements Completed | 37 requirements | 31 requirements |
| Acres of Inventoried Data Collected and Acquired | 3,795,651 acres | 4,389,240 |
| Land Management Plan (LMP) Amendments Underway | 1 amendment | 0 amendment[1] |

1 Notice of Intent to prepare an EIS for a Forest Plan amendment was issued during FY14 but was not recorded as an official accomplishment for this category.

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