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Forest Service

Pacific Northwest Region

Fiscal Year 2009 Monitoring Report

Mt. Baker-Snoqualmie National Forest

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Cover: Forest Interdisciplinary Team members on monitoring field review at Forgotten Thin, August 2010.

Executive Summary

Annual Forest Plan monitoring provides an opportunity for leadership on the Mount Baker-Snoqualmie National Forest to adaptively manage natural resources by continually identifying accomplishments and challenges.

For the 2009 MBS Forest Plan Monitoring Report, an Interdisciplinary Team (ID Team) of specialists in the Forest Supervisor's Office convened and conducted a broad management review of each of the Forest's resource areas, and then conducted a field monitoring review of two timber management projects. The findings in this report are based upon individual observations relative to the monitoring elements outlined in Chapter Five of the MBS Forest Plan. Also included are observations of specialists from field monitoring visits to the Forgotten Thin timber sale and the I-90 Thin timber sale.

Based on this monitoring, the ID Team offers the following findings and recommendations.

Findings

1. Implementation of two projects showed successful results meeting project purpose and need statements, complying with project mitigation measures, and meeting Forest Plan standards and guidelines.

2. Most mitigation measures were followed, except for a few that either did not apply or may need further monitoring to determine applicability.

3. All projects were successful at mitigating for the spread of noxious weeds.

4. Monitoring field trips identified only minor exceptions.

Recommendations

1. Monitoring should begin the date that the NEPA decision is signed in order to complete the most comprehensive evaluation possible.

2. There should be an evaluation of prior monitoring results already available.

3. If mitigation measures are not followed through on the ground, a written rationale should be added to the Project Record to explain departure from the specific measures.

4. Within the Project Record, mitigation measures should be site-specific. General recommendations prove to be less useful.

5. A few items require further monitoring to determine their need, such as treatments for the possible spread of weeds.

Introduction

The Land and Resource Management Plan (Forest Plan) for the Mt. Baker-Snoqualmie (MBS) National Forest was approved by the Regional Forester on June 8, 1990. Four years later, on April 23, 1994, the Secretaries of the Departments of Agriculture and Interior signed the Record of Decision for the Management of Habitat for Late-Successional and Old-Growth Forest Related Species, commonly referred to as the Northwest Forest Plan (NWFP). The NWFP amended the Forest Plan by establishing new land allocations and standards and guidelines.

This monitoring report provides an update to the Regional Forester, MBS Forest managers, and the public on Fiscal Year 2009 Forest Plan implementation activities. Monitoring is conducted on an annual basis, and is intended to identify:

- Whether Forest Plan objectives are being met, and
- How well Forest Plan objectives correspond with the management situation on the ground.

Monitoring is essential to adaptive management of the MBS's ecosystems and facilities, because it allows resource managers to identify and respond to changing circumstances on the ground.

Monitoring Strategy

For the 2009 Monitoring Report, the MBS used an interdisciplinary approach. The Forest Leadership Team (FLT) established a Monitoring Interdisciplinary Team (ID Team) to conduct monitoring and develop this report as required by the Forest Plan. The team consisted of specialists from each resource area in the Forest Supervisor's Office. Additional input was provided by personnel on the Ranger Districts.

Chapter V of the MBS Forest Plan outlines specific monitoring activities to be performed for each resource area. The ID Team divided these activities among themselves, answered each question, and collaboratively evaluated the results. The Forest Plan's original monitoring activities were developed 20 years ago and in some cases became obsolete. Those activities that were identified in the FY 2007 monitoring report as obsolete were previously discontinued in the FY 2008 report.

To capture other monitoring activities that are now occurring but are not specifically listed in the Forest Plan, each responding specialist provided an analytical narrative answering a broad monitoring question on the status of their respective resource area.

In the tables below, for each resource area, the monitoring questions from the Forest Plan appear in the first column. The number in (parentheses) indicates the number of the corresponding monitoring question from Chapter V of the Forest Plan. The next column gives the monitoring method or activity. The third column gives a summary of the results of that activity. The fourth column titled "Supplemental Information" gives citations and summaries of additional information supporting the monitoring findings.

In the third column, specialists were asked to answer their resource-related monitoring questions. For brevity, answers are placed in one of four categories: A) Results acceptable; B) No new results; C) No

monitoring done; or D) Other. Supplemental information may also appear under category D to provide references, or context and recommendations for future monitoring.

One of the Forest Plan monitoring requirements calls for field review of a number of projects each year. Accordingly, because a number of timber management projects were underway or nearly completed on the ground in FY 2009, the ID Team selected the timber management program for monitoring. The ID Team conducted field visits to the Forgotten Thin and I-90 Thin timber sales to review project-level monitoring results. Findings from these two field trips are included at the end of this report.

This report is divided into ten sections, by resource area. The resource areas are under four categories: biological resources, physical resources, social and economic services, and Tribal consultation.

Biological Resources

Botany

Monitoring Question1	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Botany. Research Natural Areas: Are RNA management objectives being met? (42)	Field Visits	C) No monitoring done	Refer to narrative for Question 1 below
2. Botany. What effects are proposed management actions having which have the potential to affect habitats of T, E, or S species? Are BEs being completed for all activities when Sensitive species are present? Is habitat managed to ensure that these species do not become Threatened or Endangered? (52*)	Completion of surveys and Biological Evaluations	A) Results acceptable	Documentation: TES_MtBakerSno_Accomp_FY09.ppt
3. Botany. What is the status of occupied habitats of T, E, and S species? (53*)	Field visits	A) Results acceptable	Documentation: TES_MtBakerSno_Accomp_FY09.ppt UWRareCare monitoring report for 2009
4. Botany. Are noxious weeds being controlled to	Contract administration, field visits,	A) Results acceptable	Documentation: INV_MtBakerSno_Accomp_FY09.ppt NRIS database records

[1] *Note: The MBS Botany Program was started in June 1990, the same month the MBS Forest Plan was published. There were no monitoring questions for the Botany Program per se in Chapter 5 in the MBS Forest Plan. These four monitoring questions come from the Standards and Guidelines for the Threatened and Endangered Species section, pages 4-127 through 4-128; and the Vegetation Management section, page 4-135.*

the extent practical? Are small infestations of new noxious weeds being eradicated as quickly as possible? (54*)	documentation of new sites, completion of annual noxious weed NEPA (National Environmental Policy Act), membership in several CWMAs		FACTS database records

Monitoring Questions

Botany Monitoring Question 1: Are Research Natural Area (RNA) management objectives being met?

Although management and monitoring of RNAs is warranted, potential stewardship and monitoring projects proposed over the past several years for RNAs have ranked low in priority in the Forest's program of work. Thus, this activity has remained "on hold," pending higher priority.

Botany Monitoring Question 2: What effects from proposed management actions have the potential to affect habitats of Threatened, Endangered, or Sensitive (TES) species? Are Biological Evaluations (BEs) being completed for all activities when Sensitive species are present? Is habitat managed to ensure that these species do not become threatened or endangered?

The MBS has no Threatened or Endangered plant species; only sensitive species. Biological evaluations continue to be completed for every project in which there is ground or habitat disturbing activity. Over 30 BEs are done yearly Forest-wide. In 2009 the Forest's botany contractor for the proposed Beckler Timber sales documented multiple new sites for a variety of species. Mitigation in the project Environmental Assessment (EA) will be adopted and used for contract specifications. Using this mitigation will avoid impacts to the species and the surrounding habitat and prevent a trend toward listing these species. The monitoring activity should be continued to ensure the MBS is adhering to its responsibilities towards Sensitive species and other rare and uncommon species.

Botany Monitoring Question 3: What is the status of occupied habitats of Threatened, Endangered, or Sensitive species?

Once again this year, the MBS utilized skilled volunteers to complete monitoring of Sensitive plants on NFS lands through a partnership with the University of Washington's Rare Care Program. The volunteers visit between 4 and 10 of the Forest's TES sites per year. Monitoring results are documented in the national Natural Resources Information System (NRIS) – Threatened, Endangered, and Sensitive Plants (TESP) database. The Forest continues to enter data from new surveys and sightings into the NRIS database.

Monitoring activities should continue, in order to ensure that the MBS is meeting the agency's responsibilities towards Sensitive and other rare and uncommon species.

Botany Monitoring Question 4: Are noxious weeds being controlled to the extent practical? Are small infestations of new noxious weeds being eradicated as quickly as possible?

In 2009, the Forest exceeded its Management Attainment Report (MAR) target of 74 acres and actually treated 187 acres. The additional accomplishment was partly due to a new definition of how to account for infested acres. The Forest exceeded the R-6 goal of monitoring over 50% of sites. In 2009, 86% of the treated sites were monitored to determine effectiveness. Of these, 83% of the infestations were successfully controlled. (Some knotweed sites cannot be accurately assessed until the following field season.)

In addition to sites treated by contractors, the Forest partners have treated many sites at no cost to the Forest. Forest partners include The Nature Conservancy, Mountains to Sound Greenway Trust, WA State Department of Transportation, and especially the county weed boards. Whatcom County Weed Board hand pulled tansy ragwort again along Hwy 542, documenting 60 pounds of plants needing removal, compared to 4400 pounds in 1997. International District Housing Alliance and Seattle Parks Department worked with 22 youth and 5 crew leaders to remove oxeye daisy and bend knotweed at Gold Creek Pond. The Mountains to Sound Greenway Trust and King County Weed Board staff and volunteers contributed 889 hours, treating 80 acres, and surveying 192 acres of riverbank, roads, and trails.

The Forest should continue monitoring to determine when populations have been eradicated, when new populations occur, and if the Forest is meeting the goals and objectives of the 2005 Record of Decision (ROD) on invasive plants in Region 6.

Other Botany Program Accomplishments

The Forest's Botany Program has a third component: the Native Plant Materials Program. In 2009 the major accomplishments pertain to collection of native seed for future restoration projects.

In 2009, the Forest awarded a new seed collection contract to supplement 2008 grass seed collections in the Upper White and Lower Sauk watersheds. This "foundation seed" was then planted at J. Herbert Stone Nursery for the Forest's first "seed increase" effort.

2009 funds were also used to grow out the following sedges, rushes, and forbs in small lots for seed increase in the USFS Coeur d'Alene Nursery, using foundation seed from the Upper White and Lower Sauk watersheds stored from 2008.

- *Elymus glaucus* (blue wildrye)
- *Festuca rubra* (red fescue)
- *Bromos vulgaris* (common brome)
- *Trisetum canescens* (tall trisetum)

Also in 2009, 1½ pounds of foundation seed was collected for each of the following forb species in the Baker River and the Tye-Beckler watersheds. On the MBS, these species are much more common than grasses:

- Tye-Beckler: *Aruncus dioicus* (goatsbeard)
- Tye-Beckler: *Geum macrophyllum* (large-leaved avens)
- Baker River: *Geum macrophyllum* (large-leaved avens)
- Baker River: *Tolmiea menziesii* (piggyback)

2009 General Botany Accomplishments

The Botany program supported a total of 41 projects this year... with a wide range of needs, including sensitive species surveys, botanical assessments, invasive plant management, EIS's, EA's and categorical exclusions. Support spanned across many programs such as recreation, roads, timber sales, aquatics, wildlife, and lands, including Title II and legacy road projects. In addition we:

- Documented 43 new sensitive plant locations.
- Completed over 1534 acres of inventory.
- Monitored 11 sensitive plant populations (two in-house and 9 through our partnership with U of Washington)
- Trained 22 WA Native Plant Stewards, who in turn donate 2200 hours of native plant restoration.
- Coached 10 inner-city teens on careers in Botany.
- Facilitated technical working group to implement an MOU between the MBS and Tulalip Tribes for management of huckleberries and cedar.
- Signed Decision Memo (10/3/08) for Management & Monitoring Plan for the Enhancement of Big Huckleberry at Government Meadows, WA

Figure 1. Big huckleberry (*Vaccinium membranaceum*) is a sacred "first food' for tribes in Washington.

Figure 2. Forest Botanist engages teachers in defining what is a "native" plant or animal.

2009 Accomplishments

Acres	Funding	Activity
1534	NFTM	TES plant inventory
2	NFVW	TES plant monitoring
15	NFWF	TES plant monitoring

1551 TOTAL ACRES
1536 Integrated Acres

Partners/Cooperators

Key partners in 2009 included University of Washington RareCare, Tulalip Confederated Tribes, Washington Native Plant Society, University of Washington Dept of Anthropology, Youth Environmental Leadership Institute, Muckleshoot Indian Tribe.

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2009 Invasive Plant Accomplishments

➢A record total number of high priority sites treated under contract, up from 51 in 2008 to 66 in 2009.

➢Our MAR target was 74 acres and we managed to accomplish 187 acres. This was in part due to a new explanation of how infested acres are reported, and in part due to new species and sites being treated this year.

➢Exceeded R6 goal of monitoring ≥ 50% of sites. In 2009, 86% of our treated sites were monitored to determine effectiveness. Of these, 83% of the infestations were successfully controlled (some knotweed sites can not be accurately assessed until the following field season).

➢Classified new position for Invasive Plant Specialist in AVUE. Filling forest-wide position to increase capacity on the MBS

➢Timely upward reporting – in FY2009 our FACTS database was brought up-to-date and results submitted ahead of schedule.

➢ Partnerships flourish!! For more info see our Quick Link for the Botany Program at www.fs.fed.us/r6/mbs

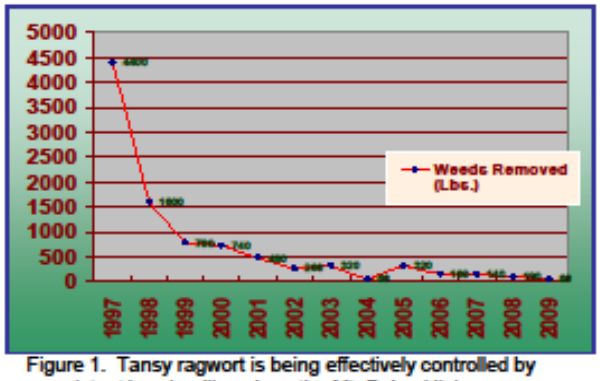

Figure 1. Tansy ragwort is being effectively controlled by consistent hand-pulling along the Mt. Baker Highway

Contacts: Laura Potash Martin 425-783-6043
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Figure 2. Invasive knotweed is often easier to treat if the stems are bent first, and kids love attacking it! (Photo by Seattle Parks and Recreation)

2009 Accomplishments

Acres	Fund Code
8	CWKV (timber sale)
26	CMRD (rockpits and stockpiles)
2	NFXN59 (fisheries enhancement site)
153	NFVW
188	Total

Partner/Cooperator Highlights include:

Whatcom County Weed Board hand pulled tansy ragwort again, documenting awesome progress in reducing this infestation (Fig 1).

International District Housing Alliance & Seattle Parks Dept worked with 22 youth + 5 crew leaders to remove oxeye daisy and bend knotweed (Fig 2).

Mountains to Sound Greenway Trust & King County Weed Board staff and volunteers contributed 889 hours , treated 80 acres, and surveyed 192 acres of riverbank, roads, and trails!

A study of huckleberry was planned for 2010 (see Appendix B). The goal of the USFS and the Tulalip tribe is to increase VAME fruit production in huckleberry fields of Segelsen Ridge. These fields have been producing substantial huckleberry fruit since the mature forest was harvested in the area in the 1980's. Fruit production is now declining at the same time conifer species have become established in the fields and have begun to overgrow the huckleberry plants. Based on the hypothesis that huckleberry fruit production will increase if conifer species competing for light and soil resources are removed, the USFS and Tulalip Tribe set a goal to reduce forest overstory cover by approximately 70% in one-half of the huckleberry release area. Monitoring will be done to determine if forest removal had the desired effect. A study plan will be developed to contrast huckleberry fruit production in areas where forest overstory is removed, versus areas where forest overstory is not removed.

Ecology

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Soil Productivity: Is soil productivity being maintained? (1)	End product review	C) No monitoring done D) Other: see soil discussion, Question 1, below	No monitoring to address potential site productivity was accomplished in 2009. Monitoring of actual site productivity could be accomplished on Ecology Benchmark plots, but no plot measurements or monitoring were accomplished in 2009.
2. Old-growth: What is the status of old-growth ecosystems? (14)	Identify acres and distribution	A) Results acceptable	Continue monitoring. Status of old-growth ecosystems is complex and dynamic, and is not represented by a single type or age. Monitoring of old-growth and replacement old-growth stands will document old-growth status and changes over time.
3. What is the status of Mountain Hemlock suitability? (55)	Mountain Hemlock study plan	D) Other. Results and conclusions from the study resulted in action in the Forest Plan that removed the Mountain Hemlock Zone from the suitable land base due to failure to meet regeneration standards.	Mountain Hemlock study plan was suspended indefinitely when the MBS Forest Plan was approved and implemented. Further study and monitoring on stand development in the Mountain Hemlock Zone was shifted to the MBS Ecology Benchmark plots.

Ecology Benchmark Plots Program

The Western Washington Area Ecology program serves the three National Forests of Western Washington, including the MBS. The Ecology Program monitors conditions on National Forest lands with a network of permanent benchmark plots.

The objectives of these plots are to establish benchmarks of species composition and stand conditions for the different plant associations and age classes on the landscape. There are about 600 of these permanent plots installed on the MBS, which date back to 1983. Many of these plots have been periodically re-measured to document conditions, trends, and changes over time, including species composition, stand conditions, successional patterns and development, stand volume, growth and mortality. This network of plots with repeated measurements provides data to address problems, land management issues, and questions such as thinning response, red alder growth and stand development, growth of young stands relative to culmination of mean annual increment and biomass accumulation ("Henderson wedge"), an old-growth restoration plan for the Finney Adaptive Management Area (AMA), and effects of climate change on vegetation such as species composition and abundance, growth, and mortality. Ongoing maintenance and re-measurements will continue to add value to the Forest and enable better land management decisions. No plot measurements or monitoring were accomplished in 2009, and this activity was postponed until future years.

As part of this permanent plot network, monitoring plots in thinning treatments have been established to document stand responses to different treatments. Most plots were established prior to treatment to document pre-thinning stand conditions, and will be re-measured periodically to document post-treatment response. Ongoing measurements of these plots have revealed problems with the application of thinning treatments on certain types of sites. These include unplanned regeneration, primarily of western hemlock, but also Douglas-fir and western redcedar, in the understory of some thinned stands. No plot monitoring was accomplished in 2009, and this activity was postponed until future years.

Ecologists continued the Silver Fir Spacing Trial, a long-term cooperative study with the PNW Olympia lab, to document stand response to different stocking levels in the Silver Fir Zone. This study was initiated in 1987, and the fourth measurement of 24 plots at four installations (Rat Trap Pass, Tonga Ridge, Haller Pass, and Evans Creek) was postponed until future years.

Ecology Monitoring Question 1: Is soil productivity being maintained?

This question can be interpreted to address the productivity potential of a site, as well as the actual production of a site. The National Forest Management Act of 1976 requires the Forest Service to ensure that management systems "will not produce substantial and permanent impairment of the productivity of the land." Land productivity can be defined as the "capacity of a given site to sustain plant growth." Aspects of land productivity can be addressed by monitoring factors such as soil porosity and compaction, soil organic matter, soil nutrients, and other soil properties that affect potential site productivity. Monitoring and quantifying effects of soil disturbance associated with timber harvest and other management activities can provide information on activities that affect soil processes that control forest health, productivity, and sustainability. No monitoring to address this question was accomplished in 2009. However, the actual productivity of the land is being monitored by re-measurement of the permanent ecology benchmark plots, which includes measurements of tree and stand growth, species composition and abundance, and changes in litter depth, standing dead trees, and down wood. No monitoring of permanent ecology benchmark plots occurred in 2009, and this activity was postponed until future years.

Ecology Monitoring Question 2: What is the status of old-growth ecosystems?

The acreage and distribution of old-growth ecosystems on the MBS did not measurably change in 2009. In 2009, there were no significant fires, blowdown, insect outbreaks, timber harvest, or stand disturbance events that would reduce the amount of old-growth on the Forest. Based on the fire history and stand year of origin data, 67% of the forested lands on the MBS are in old-growth forests, defined as stands at least 200 years of age. Of the total land area of the Forest, 54% is old-growth forest. The amount of old-growth forest by 5th-field watershed averaged 57% (using unweighted average), and ranged from 32 to 81%. The amount of old-growth forests on the MBS is within the historic range of variability, and is consistent with the long term average of about two-thirds of the forested land area.

Ecology Monitoring Question 3: What is the status of mountain hemlock suitability?

In the 1980s, data from ecology plots showed that stands in the mountain hemlock zone had very slow regeneration and growth and very low productivity. The 1990 MBS Forest Plan removed most of the mountain hemlock zone from the commercial timber base, pending a study on regeneration and growth following harvest in these high elevation forest types. A network of plots for this study was established in the mountain hemlock zone, but these stands were never harvested, and the study was suspended indefinitely. However, the Ecology Program continues to monitor benchmark plots in the mountain hemlock zone, and data continue to show that these stands are very slow-growing, and regenerate very slowly. No monitoring of benchmark plots in the mountain hemlock zone occurred in 2009.

Fisheries

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Fish Standards & Guidelines (S&G) and Prescriptions: Are area prescriptions effective toward protecting habitat capability? (19)	Use FSH 2609.23, Hankin-Reeves stream survey methodology, stream channel stability evaluation	A) Results acceptable using AREMP methodology (see answer below)	Annual use of Hankin-Reeves is not appropriate for S&G effectiveness monitoring. The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) conducts monitoring on large scale each year.
2. Water Quality/Fish Habitat Capability: Are BMPs effective? (21)	Measure temperature, sediment, bedload, turbidity, and pH	D) Other	Project level Best Manage-ment Practices (BMP) monitoring should be accom-plished as funding allows.
3. Fish Habitat Restoration/Improvement: Are habitat restoration and enhancement projects producing predicted fish outputs? (22)	Calculate smolt production, estimate Wildlife & Fish User Days (WFUDs derived from anadromous and resident fish)	C) No monitoring done	Discontinue metrics of smolt production and WFUDs. Smolt production is highly variable and models do not accurately predict change in smolt production due to habitat management. WFUDs are not a useful measure.
4. Cumulative Effects and Fish Habitat Capability: What are the cumulative cause/effect relationships between land disturbance and habitat capability? (23)	Collect and evaluate fish habitat trend data	A) Results acceptable	The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) is designed to evaluate changes in condition over time within the Northwest Forest Plan area.

Summary of Findings

The anadromous fish that utilize the Forest for spawning and rearing are under considerable stress from variable ocean conditions, intensive development around estuaries and along rivers, and rural land management activities. Management activities on the Forest have complied with Forest Plan standards and guidelines, and considerable effort has been made to reduce impacts to aquatic habitat across the Forest. However, fish populations continue to be stressed at various stages of their life cycle. Floods continue to damage or destroy redds and adversely affect over-wintering juveniles. Stream temperatures are slow to recover and climate change works against cooling temperatures. Off-Forest influences such as predation, harvest, and marine water quality conditions affect the populations.

The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) for the Pacific Northwest Region continues to sample subwatersheds on the Mt. Baker-Snoqualmie National Forest and evaluate the condition of aquatic habitats within the area of the Northwest Forest Plan over larger special and temporal scales. To evaluate the effectiveness of the plan, the monitoring program determines whether key processes that maintain aquatic and riparian habitats are intact.

Annual use of Hankin-Reeves is no longer appropriate for S&G effectiveness monitoring. Research has shown that the Hankin and Reeves method as applied often suffers from high variability among observers, inconsistent application of protocols, and lack of repeatability. This causes difficulty in using observed stream attributes to detect change caused by management activity (Roper and Scarnecchia 1995; Poole G., C. Frissell and S. Ralph 1997; and Roper, Kershner, Archer, Henderson, and N. Bouwes 2002).

Vegetation Management

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Timber: What is the status of reforestation? (5)	Plantation survival examinations	B) No new results	Continue monitoring.
2. Timber: What is the status of timberland suitability? (6)	Management reviews, resource inventory	B) No new results	Continue monitoring.
3. Timber: What is the size of the harvest area? (7)	EAs and FACTS[2] database, field reviews	A) Results acceptable	Continue monitoring.
4. Timber: What are the impacts of insects and disease, animal damage and air pollution to growing stock levels? (8)	Aerial surveys, field observation, stand exams	A) Results acceptable	Continue monitoring.
5. Timber: How many acres per management	Number of acres harvested by	A) Results acceptable	Continue monitoring.

[2] Forest Service Activity Tracking System

area are using various silvicultural practices? (11)	silvicultural system or activity by management area		
6. Timber: What is the distribution of timber harvest acres and volume? (12)	FACTS, PAS[3] reports,	D) Other (see narrative on timber harvest)	Continue monitoring.

Timber Monitoring Question 1: What is the status of reforestation?

Reforestation survival and stocking exams are normally completed in the 1st, 3rd, and 5th years following planting or following timber harvest where natural regeneration has been prescribed. Since the implementation of the Northwest Forest Plan in 1994, the timber program on the Forest has consisted almost entirely of commercial thinning sales where reforestation is not needed after harvest.

No monitoring occurred for reforestation in FY 2009 because of the lack of reforestation activities.

The Forest should continue monitoring following planting to determine whether National Forest Management Act requirements are being met.

Timber Monitoring Question 2: What is the status of timberland suitability?

No changes to timberland suitability occurred in FY 2009.

The Forest should continue monitoring to provide accurate data for determining land base available for scheduled timber harvest.

Timber Monitoring Question 3: What is the size of the harvest area?

The maximum size of forest openings created by timber harvest allowed by the Forest Plan under normal conditions is 60 acres. Exceptions are permitted for natural catastrophic events such as fires, windstorms, or insect and disease attacks. The Forest Plan standards and guidelines for opening sizes were written in an era when clearcutting and other regeneration harvests were common. Since implementation of the Northwest Forest Plan in 1994, most of the timber harvest on the Forest has been commercial thinning.

No forest openings greater than 60 acres were created in FY 2009.

The Forest should continue monitoring to determine whether Forest Plan standards for size and dispersion of harvest units are met.

Timber Monitoring Question 4: What are the impacts of insects and disease, animal damage and air pollution to growing stock levels?

[3] Performance Accountability System

Aerial surveys to detect insect and disease activity are conducted each year. The surveys provide estimates of locations and amounts of damage caused by insects, disease, and other causes.

No major amounts of insect or disease-caused damage were identified in FY 2009.

The Forest should continue monitoring to assess whether impacts of insects, disease, animal damage, and air pollution are affecting achievement of Forest Plan objectives.

Timber Monitoring Question 5: How many acres per management area are using various silvicultural practices?

Approximately 307 acres of commercial thinning were accomplished in FY 2009. Of the total of 307 acres, 215 were in Matrix land allocations where timber harvest is permitted. The remaining 92 acres were within late successional reserve (LSR) land allocation. The LSR thinning was designed to improve late successional habitat conditions as permitted under the Northwest Forest Plan Record of Decision (NWFP ROD, 1994).

Approximately 496 acres of pre-commercial thinning were accomplished in FY 2009. All acres were within Matrix allocations where pre-commercial thinning is permitted.

The Forest should continue monitoring to determine whether silvicultural practices are consistent with management area direction and NWFP land allocations

Timber Monitoring Question 6: What is the distribution of timber harvest acres and volume?

The Forest sold approximately 8.5 million board feet of timber in FY 2009. Additional board feet were offered for sale but received no bids.

The Forest should continue monitoring to determine whether implementation of the Forest Plan is having the predicted results regarding timber harvest.

Wildlife

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Wildlife: What are population trends and habitat capability for T&E species? (15)	Review Washington Department of Fish & Wildlife, US Fish & Wildlife Service, and other T & E species census sources and habitat data	A) Results acceptable: owl C) No monitoring done: wolf, murrelet, grizzly	Continue. The Rainier Demographic Study Area (DSA) will document the expected continued decline of spotted owl occurrence on the Forest.
2. Wildlife: What are population trends for old growth and snag dependent species? (16)	Monitor population levels in Spotted Owl Habitat Areas (SOHAs), survey management-required (MR) old growth acres for suitability, Washington Department of Fish & Wildlife data	C) No monitoring done	Recommend discontinue SOHA monitoring and surveys of management-required old growth areas in favor of Regional monitoring protocols for spotted owls

3. Wildlife: What are population trends for deer, elk, and mountain goat? (17)	Survey assigned big game habitat for continued suitability	A) Results acceptable: mountain goat C) No monitoring done: deer and elk	Continue to determine if mountain goat populations on the Forest will continue to increase towards historic levels. Development of a new elk habitat model for OR and WA was initiated in 2009.
4. Wildlife: What is the status of habitat improvement efforts? (18)	Field observation of habitat utilization	C) No monitoring done	Continue to acquire information on species utilization of habitat to answer if enhancement is effective

Wildlife Monitoring Question 1: What are population trends and habitat capability for T&E species?

The bald eagle, peregrine falcon, gray wolf, and grizzly bear were wildlife species federally listed as threatened or endangered at the time the Forest Plan adoption. Federal listing of the northern spotted owl, marbled murrelet, and Canada lynx occurred after Plan adoption. In recent years, the bald eagle and peregrine falcon were de-listed, and the Forest is no longer considered within the range of the lynx. As of FY 2009, there are four wildlife species federally listed as threatened or endangered northern spotted owl, marbled murrelet, gray wolf, and grizzly bear.

No monitoring has occurred for the marbled murrelet, grizzly bear, or gray wolf on the Forest in FY 2009. Efforts are underway to secure funding for a hair snare study in the North Cascades Grizzly Bear Recovery Area. Hair collected will be tested for DNA to determine if any grizzly bears are present.

Northern Spotted Owl

The year 2009 was the 17th year of the monitoring and banding of spotted owls on the Rainier Northern Spotted Owl Demography Study Area (Rainier DSA). Based on the annual report, of 60 spotted owl sites monitored, 23 were active (contained at least one owl). Of the active sites, eleven were pairs, with no pairs attempting nesting. Recent years have noticed a pattern of site abandonment by spotted owls on the Rainier DSA. Evidence seems to implicate the expansion of the barred owl into the range of spotted owls as the primary factor in the general decline in occupancy at spotted owl territories in the DSA.

The Forest should continue to support the Rainier DSA to document the expected continued decline of spotted owl occurrence on the Forest.

Bald Eagle (De-listed)

Wintering bald eagles were monitored along the Skagit River between Sedro-Woolley and Rockport for the 14th consecutive year. Eagles were counted each week from December through February, except for two weeks in December and one week in January when driving conditions were unsafe. A report analyzing bald eagle survey data from 2007 - 2011 will be produced in the spring of 2012.

Wildlife Monitoring Question 2: What are population trends for old growth and snag dependent species?

Upon adoption of the NWFP, the pileated woodpecker and marten networks were maintained in order to provide connectivity between large Late Successional Reserves (LSRs). The LSRs were expected to provide adequate habitat for spotted owl, pileated woodpeckers, and marten.

As a result of the major change in how pileated woodpeckers and marten are managed under the NWFP, changes are appropriate to this monitoring section during Forest Plan revision. The Forest should discontinue monitoring of Spotted Owl Habitat Areas (SOHAs) and surveying of management-required old growth areas. Late-Successional Reserves (LSRs) established under the Northwest Forest Plan in 1994 protect habitat for old-growth and snag dependent species over a larger area than under the 1990 Forest Plan. Therefore, old growth and snag monitoring should focus on the LSRs at the regional scale.

Wildlife Monitoring Question 3: What are population trends for deer, elk, and mountain goat?

Deer and Elk

Regionally the consensus among elk biologists in Oregon and Washington is that Forest Service and Bureau of Land Management's elk management plans developed during the past couple decades, such as the MBS Forest Plan, are based on science that is outdated (Wisdom et al. 2007). Substantial research since 1990 has suggested that elk are limited by the nutritional adequacy of the habitat, including forage area, forage biomass and quality, and the effects of human disturbance on forage availability. Available forage quality and quantity is also thought to limit black-tailed deer populations in western Washington (Washington Department of Fish and Wildlife [WDFW] 2008). The development of an updated elk habitat model reflecting current science has been proposed by a group of elk researchers.

With the cessation of large-scale clearcutting brought by the Northwest Forest Plan, forage quality and populations have declined on the Forest for both deer and elk. Based on hunter statistics and annual census counts by WDFW, population trends of black-tailed deer appear to be declining. The availability of forage appears to be a contributing factor. As the forest matures, the availability of high quality forage often declines. In addition, overstocked managed timber stands have reduced understory forage.

The Forest should discontinue monitoring suitability of habitat until a habitat model reflecting current science is developed. Development of the new habitat model for Washington and Oregon was started in 2009.

Mountain Goat

Mountain goat populations in western Washington have declined for many decades despite reductions, or cessation, of hunting (WDFW, 1998). The Washington Department of Fish and Wildlife suggests that habitat changes resulting from fire suppression and disturbance of goats by recreationists may be important factors limiting population growth because the decline has been long and gradual (WDFW, 1998). However, unsustainable hunting could also cause long-term gradual decline in the mountain goat population. As it is a Management Indicator Species for the MBS, it is important to identify the cause of the decline and, if possible, implement management actions that will reverse the population decline.

In 2008, Adam Wells, Phd candidate at the University of Idaho, began the first year of his evaluation on fine-scale habitat use patterns of mountain goats, the effects of trail-based recreation on mountain goat

habitat use, and possible sites for mountain goat population augmentation or reintroduction based on habitat quality. Final results are expected in 2011.

Mountain goat population surveys on Mount Baker occurred in 2009; see results, below. The population appears to have stabilized after many years of increase while the area was closed to hunting (1996 - 2006). The population figures presented have not been corrected using sightability factors developed by WDFW. However, because sightability of the Mount Baker population is high, the uncorrected data can be used to evaluate population trends. Based on historic information, it appears that the Mount Baker mountain goat population has recovered to population levels present in the early 1960s when the population was not hunted.

Table 1. Mountain Goat Counts, Mt. Baker Population

	Year					
	2009	**2008**	**2007**	**2006**	**2005**	**2004**
Mountain Goats Sighted	326	308	328	324	331	222

Because there are no known historic estimates of mountain goats on the Skykomish and Snoqualmie Ranger Districts, the relative population size of mountain goat populations was estimated using past hunting records compiled for continuous areas of mountain goat habitat. A report was produced to assist in planning and implementing aerial surveys to determine current population size and to assist in the identification of sites for population augmentation or reintroduction efforts.

Surveys of these areas were conducted in partnership with the Muckleshoot Indian Tribe and WDFW in 2009. There had been no concerted effort to survey mountain goats in these areas prior to 2008. Although the surveys were not conducted to the same intensity as those at Mount Baker and Glacier Peak, they are believed to have accounted for most animals that were present.

In the Snoqualmie Game Management Unit (GMU) 460, 49 goats were estimated to occur north of I-90 and 22 were counted south of the interstate. These 71 animals are at the high end of the 24-75 animals guessed to occur there in the 2008 WDFW State-wide estimate. However, the 8 goats located in the Green and Cedar River watersheds (GMUs 485 and 490) were much lower than the 16-28 guessed in the State-wide estimate.

In addition to providing more accurate information for State-wide estimates, these population monitoring flights provided information on the north half of Skykomish Ranger District where so little information was available that even guesses were not attempted in the 2008 State-wide estimate.

The Forest should continue monitoring to determine if mountain goat populations on the Forest will continue to increase towards historic levels

The Forest Plan projected a population of 1,440 mountain goats in the second decade (2000 – 2010) and 1,430 in the third decade (2011 – 2020) (Table 4-1, p. 4 – 16). Using the 2008 WDFW State-wide estimates and updating this data with more recent survey information, there are an estimated 1,098 mountain goats on the Mt. Baker-Snoqualmie National Forest (see Appendix A for Unit descriptions).

This total includes animals that are known to spend most of their time on the Wenatchee National Forest, and animals from Mount Rainier and North Cascades National Parks that spend at least some of the winter on the Mt. Baker-Snoqualmie National Forest.

Because most mountain goat populations that have declined have not recovered in the absence of recreational hunting, the Forest is unlikely to meet projected Forest Plan outputs for mountain goats without translocating mountain goats from other areas. (See Appendix A, *Management Indicator Species Monitoring: Mountain Goats*.)

Wildlife Monitoring Question 4: What is the status of habitat improvement efforts?

Field observation of habitat use before and after implementation of habitat improvement projects can provide insight as to whether wildlife use has changed. Projects involving vegetative treatment often create forage for species such as deer and elk. Many projects contributing to habitat improvement for wildlife often do not involve manipulation of habitat. Decommissioning and closure of roads are common occurrences on the Forest that benefit wildlife through decreased human use.

The Forest should continue monitoring habitat improvement efforts involving vegetative treatment for predicted increased wildlife use.

Program Accomplishments

The Forest improved habitat on 3,667 acres, by reducing roads open to motorized traffic and enhancing the forage growth and improvement on those closed roadways, commercial and non-commercial thinning of overstocked stands, and huckleberry enhancement.

Physical Resources

Roads

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Mass Wasting: Are management activities affecting the frequency and amount of mass wasting? (2)	Visual observation	A) Results acceptable	Monitoring conducted on Legacy Roads projects. Additional monitoring needed in future.
2. Roads: How many miles of new road construction occurred? How many miles of roads are being decommissioned? (48)	Engineering reports, database TIS	D) Other. Variables in 1990 Forest Plan are not relevant in today's environment. TIS database replaced by the I-Web database. See narrative answer below.	Recommend discontinuing monitoring of new road construction. Begin monitoring of road reconstruction or improvements and decommissioning.

Summary of Findings

Roads Monitoring Question 1: Are management activities affecting the frequency and amount of mass wasting?

Policy changes during the past 20 years have had profound effects on how roads have been managed compared to 1990 when the thresholds of concern were formulated in the Forest Plan. In the past, the primary purpose for road construction, reconstruction, and maintenance on the Forest was to enable timber harvest. Reduced harvest levels have resulted in the need for substantially fewer miles of new road construction and reconstruction than anticipated in the 1990 Forest Plan. In fact, during FY 2009, there was no new road construction or road reconstruction or improvements from timber sales occurring on the Forest. This falls far below the projected miles in the Forest Plan for Decade 2, of 11.1 miles of timber purchaser construction and 46.0 miles of timber purchaser road reconstruction. However, a total of 280.3 miles of other road improvements were accomplished during FY 2009 with funding from road maintenance, Legacy Roads, ERFO, Title II (Resource Advisory Council, RAC) and other non-Forest Service sources. These road improvements in some cases were intended to prevent mass failures and wasting of the roads.

Roads Monitoring Question 2: How many miles of new road construction occurred? How many miles of roads are being decommissioned?

Timber revenue and road maintenance budgets have fallen substantially during the last 20 years. As result, the Forest Service and the Forest have not had the means or ability to maintain its entire road system. The agency must find an appropriate balance between the benefits of access to the National Forests and the costs of road-associated effects to ecosystem values. Providing road systems that are safe to the public, responsive to public needs, environmentally sound, affordable, and efficient to manage is among the agency's top priorities. In 2007, an assessment of the road system--Roads Analysis--was started on the Forest to determine the optimum road system based upon recent funding levels to support current land management objectives on the Forest. Depending on funding availability, this effort is expected to continue in the future.

"Right-sizing" the transportation system, or reducing the road mileage, is a goal that the Forest is trying to achieve to reduce system impacts to the environment. Right-sizing the transportation infrastructure means to achieve a sustainable system that provides for safe access for management of the National Forest, based upon current and projected funding levels. Implementation involves a number of road management actions. The main ones are: reduction of road maintenance levels, storm-proofing roads, upgrading drainage structures and river or stream crossings, road reconstruction and upgrades, road storage, road decommissioning, alternative transportation, and access and travel management planning.

During FY 2009, there was a total of 7.5 miles of road decommissioned. The miles of road suitable for passenger cars have been reduced to 1073.1 miles so far, versus the 1204 miles projected for Decade 2 in the 1990 Forest Plan. The miles of road suitable for high clearance vehicles have been reduced so far to 846.9 miles, versus the 1719 miles projected for Decade 2. Additional reductions in the future will need to continue after the Roads Analysis is completed and as watershed analyses and Access Travel Management (ATM) plans are completed and management decisions are made.

In the future, adequate funding for the necessary planning and implementation for road closures, decommissioning, and conversion to trails will be a challenge. But programs such as Legacy Roads and continuing to seek new partnerships and grant opportunities will help accomplish those objectives.

Program Accomplishments

The table shows the Forest's current road system and road related accomplishments for the year.

Table 2. Status of the Forest's Transportation System – FY 2009

Road Construction, Reconstruction, Improvements, and Decommissioning

Miles of Road Constructed	0.0
Miles of Road Reconstructed or Improved	280.3
Miles of Road Decommissioned	7.5

Bridge Replacements

Bridges Replaced	1
Culverts Replaced with Bridges	2

Existing Road System

Miles of Road Suitable for Passenger Cars	1073.1
Miles of Road Suitable for High Clearance Vehicles	846.9
Miles of Closed Road or Roads in "Storage"	643.2
Total Miles of Road	2563.2

Roads Maintained

Miles of Road Suitable for Passenger Cars	604.8
Miles of Road Suitable for High Clearance Vehicles	89.5
Total Miles of Road Maintained	694.3

Note that the miles listed above are taken from internal accomplishment reports and may not reflect actual mileages on the ground. For example, roads decommissioned with outside funding sources may not show up in the accomplishment reports. Also, roads converted to trails may not show up as miles of road decommissioned in the reports. Beginning in FY 2009, the Region is implementing accomplishment reporting to be tracked in the I-Web Infrastructure (INFRA) database, which will more accurately reflect actual mileages.

Trails

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Recommendation for Future Monitoring
38. How many miles of trail are in trail inventory? What is their condition?	INFRA Trails	A) Results acceptable	More familiarity with INFRA needed.

The condition of trails on the MBS varies widely from excellent to needing total reconstruction. Currently there are 1512 miles in the trail inventory. Of that, about 660 miles received maintenance in 2009. Major repair work is still needed for the trails damaged or obliterated during the flood events of 2003 and 2006. An estimated $3.5 million dollars maintenance backlog resulted from these two events.

The Recreation Information Management (RIM) database is no longer the system of record for trails, as Infra Trails is now the agency-wide database system for all trail reporting. In 2009, the Forest had a target to accomplish condition surveys on four trails and report the results in Infra Trails. This target was accomplished. It is the Forest's intent to continue with trail condition surveys.

In 2009, the Forest's trails benefited from an infusion of nearly $800,000 in Emergency Supplemental funding for "shovel ready" projects. This allowed for repair work to be obligated or completed on the following trails:

- Grouse Creek Bridge Replacement
- Skookum Flats NRT Relocation and Bridge
- Ice Caves NRT Bridge and Puncheon Repair
- Baker Lake Trail, Hidden Creek and Blum Creek Bridge Repair
- West Fork Foss Trail Bridge Design & Trail Repair
- Suiattle River Trail Repair
- Iron Goat Trail & Bridge Repair
- Pacific Crest National Scenic Trail Repair – White Chuck Section
- West Cady Ridge/Pass Creek Trails
- White Chuck Bench Trail Repair
- North Fork Sauk Trail Repair
- Weden Creek Trail
- Middle Fork Snoqualmie Trail
- Snoqualmie Lake Trail

The Forest maintains an active partnership program with volunteer groups. It resulted in over 50,000 hours of volunteer trail maintenance service in 2009. Forest trail coordinators were successful in competing for $302,500 of Recreation Trail Program (RTP) grant funds from the State of Washington. In addition, through coordination with our partners including the Washington Trails Association, Pacific Northwest Trails Association, Mountains to Sound Greenway, and Backcountry Bicycle Trails Club; these groups received an additional $455,745 in RTP grants, much of which benefited trails on the MBS Forest. Routine maintenance of MBS trails was paid for largely through funding received from the Recreation Fee program.

Emergency Relief For Federally-Owned Roads (ERFO) funding the Pacific Crest National Scenic Trail resulted in contracts over $500,000 awarded for repairs in the Suiattle River area. Planning prior to this work included an environmental analysis, release of a pre-decisional EA (Environmental Assessment), public review and comment, issuance of a decision, and the decision being upheld on an appeal.

The Ice Caves National Recreation Trail benefitted from a unique aluminum truss bridge purchased and installed through ERFO funds totaling more than $400,000.

Wilderness

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Recommendation for Future Monitoring
39. Wilderness: What is the condition of wilderness resources?	Measure visitor registration, ranger surveys, and photoelectric counts. INFRA Wild	B) No new results	Discontinue monitoring activity. Plan methods have become obsolete, and new methods are still in testing phase

The nine designated wilderness areas on the Forest comprise a total of 824,111 acres, or approximately 48% of the Forest:

- Mount Baker
- Boulder River
- Alpine Lakes
- Wild Sky
- Glacier Peak
- Pasayten
- Henry M. Jackson
- Goat Rocks
- Norse Peak
- William O. Douglas

The tenth, William O. Douglas Wilderness, is administered by the Okanogan-Wenatchee National Forest. The flood events of 2003 and 2006 cut off access to hundreds of thousands of acres of this wilderness across the Forest. National monitoring efforts confirm local anecdotal data and observations that suggest the average length of overnight wilderness trips is shorter and the number of day users has increased.

Wild Sky Wilderness

In April, 2008 Congress passed a bill designating the new Wild Sky Wilderness on the Skykomish Ranger District of the Forest. The bill was signed on May 8, 2008. The legislation creating this wilderness directed the Forest Service to pursue a land exchange with Chelan County for its Miners Ridge parcels in the Glacier Peak Wilderness and to develop a "Trail Plan." Progress is being made on the acquisition of the Chelan County Parcels. The trail plan process began in 2010.

Proposed Wild Pratt Wilderness Legislation

Congressman Dave Reichert has introduced legislation that would expand the Alpine Lakes Wilderness by about 22,100 acres, primarily in the Pratt River area on the Snoqualmie Ranger District. The proposal would also extend the boundaries of the Alpine Lakes Wilderness down the valley slopes in both the Middle and South Forks of the Snoqualmie River. The Forest will work with appropriate partners and congressional staff as appropriate as the process proceeds. As maps are not yet fully developed, it is expected that the Forest will play a role in refining the proposed boundaries.

Pacific Northwest National Scenic Trail

The Omnibus Lands Bill of March 2009 created the Pacific Northwest National Scenic Trail. A portion of the trail includes existing trails and roads on the Mt. Baker Ranger District. It passes through much of that District including the Mt. Baker Wilderness and Mt. Baker National Recreation Area. Management direction for the trail is to be developed subject to funding as part of a Comprehensive Management Plan.

Chief's 10 Year Wilderness Stewardship Challenge

The 10-Year Wilderness Stewardship Challenge (Challenge) was developed by the Chief's Wilderness Advisory Group (WAG) as a quantifiable measurement of the Forest Service's success in Wilderness stewardship. The goal identified by the Wilderness Advisory Group, and endorsed by the Chief, is to bring each and every wilderness under Forest Service management to a minimum stewardship level by the 50th Anniversary of the Wilderness Act in 2014. The first year of the Challenge was Fiscal Year 2005 (10-Year Wilderness Stewardship Challenge Guidebook, p 1).

Each wilderness is measured against accomplishment levels for 10 primary output elements. There are a variety of scores for each element (e.g., 2 to 10 points), depending on the level of achievement for that element. A minimum cumulative score of "60" must be achieved in order for a wilderness to be considered as meeting the "minimum stewardship level." (Supplemental Information for Determining Accomplishment, May 18, 2011)

Forest Service wide data from the 2005 reporting indicate only a slight improvement from the original assessment, with approximately 12% of wildernesses meeting the minimum level of stewardship. Since then, accomplishment has been in a positive direction, most recently 30.0% of wildernesses reported being managed to this standard as of the FY 2009 reporting cycle. Perhaps more encouragingly, the average score for all wildernesses has risen steadily from 34.7 in FY 2005 to 50.7 in FY 2009 (10-Year Wilderness Stewardship Challenge Guidebook, p 2).

The Forest has not been able to make meaningful progress on the Challenge, with average scores in the 30's. The reasons relate to an entirely different social and ecological setting compared to most NFS Wildernesses as well as staffing limitations. Progress has been further stymied by the substantial attention and energy spent on the Wild Sky Wilderness legislation. Also, the major storm events that have cut off access to wilderness have focused managers' energy on restoring access.

Quantitative Observations

Quantitative wilderness monitoring and research activities have declined since the mid-1990s. Wilderness trailhead register information is collected and stored, but it is rarely analyzed or interpreted. There is increasing question over the specific causal relationships between wilderness user numbers and adverse wilderness impacts.

Qualitative Observations

Qualitative observations indicate that wilderness use on the MBS is increasing in day-hike areas. Overnight use peaked in the early 1980s and has been in slow decline for many years. Population growth in the Puget Sound basin has caused this trend to reverse in recent years, with backpacking use leveling off or increasing slowly. Certain remote "hot spots" have seen large increases in use. A marked increase

in dogs accompanying hikers is in contrast to a marked decrease in horse use. Part of the reason for declining overnight uses is the substantial damage to wilderness access roads and trailheads caused by the 2003 and 2006 storms blocking stock trailer access. The Forest Service law enforcement and wilderness ranger presence in wilderness has dwindled to minimal levels. As a result, complaints received about wilderness overcrowding and other issues have actually decreased substantially.

Visitor registration data, ranger surveys, and photoelectric counts are no longer practical methods given minimal budgets and a smaller workforce. The Forest Plan monitoring protocol for wilderness is therefore not being implemented and is not currently relevant. A new monitoring system for wilderness called "Wilderness Character Monitoring" is being tested nationally. The lack of wilderness rangers on staff, associated with continuing budget constraints in wilderness and recreation, is hampering any monitoring efforts. However, the Forest is continuing its efforts to seek non-profit and volunteer organizations to assist in wilderness monitoring.

Other Research

The diversity of vegetation, fauna, geology, human use, and climate found within the wildernesses on the Forest has attracted many different researchers to the area. The Forest Service conducts limited survey and monitoring within wilderness as well as outside, including:

- Clearwater Wilderness air and water quality, Lake Dorothy, Summit, and Foehn Lakes, Alpine Lakes Wilderness - Forest Service R-6 Regional Office
- MBS Ecology Program Eco-Plots – MBS Forest
- Forest Inventory and Analysis, the Forest Service's national permanent vegetation plot system – Forest Service

Other agencies and organizations continue to conduct more extensive research in MBS wildernesses. Examples include:

- Fish population surveys - Washington Department of Fish and Wildlife
- Mountain Goat surveys, Boulder River, Glacier Peak, and Mt. Baker Wildernesses - Washington Department of Fish and Wildlife
- Long-term mass balance monitoring of South Cascade Glacier, Glacier Peak Wilderness - U.S. Geological Survey
- North Cascades Glacier Climate Project, Nichols College, Mt. Baker, Glacier Peak, Henry Jackson, and Alpine Lakes Wildernesses
- Cascade Volcano Observatory seismograph network, Glacier Peak and Mt. Baker Wildernesses - USGS
- Twin Sisters Dunite, Mt. Baker Wilderness - University of Wisconsin

Social and Economic Resources

Socio-Economic Conditions

Table 3. Socio-Economic Monitoring

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. What are the changes in local income? (28)	Average annual household income, Washington State Office of Financial Management	D) Other. Median income in four of the five counties decreased; the five counties experienced minor wage decreases.	Continue monitoring activity. Provides insight into community lifestyles which may affect use of National Forests. Improve methodology for determining linkage between Forest activities and impacts on communities.
2. What are changes in local populations? (29)	County population growth, Washington State Office of Financial Management, US Census Bureau	D) Other. Average of 0.86 percent population growth among five counties.	Continue monitoring activity. An increase in local population may provide insight into future demand for recreation and other Forest uses. Improve methodology for determining linkage between Forest activities and impacts on communities.
3. What are changes in local employment patterns? (30)	Total employment and unemployment rates per County. Washington State Employment Security Department, Bureau of Labor Statistics	D) Other. Although local county unemployment rates have risen in the 2008-2009 period, County rates are in line with the national figure.	Continue monitoring activity. Changes in employment patterns may affect Forest outputs. Improve methodology for determining linkage between Forest activities and impacts on communities.
4. What are the changes in Forest contribution to area forest products industries? (32)	Track raw materials flow to mills; industry mix	D) Other. The MBS contributed a negligible volume of sawtimber to local mills.	Continue monitoring activity, but also show 5-year average of NF timber in western WA to monitor long-term regional trend

In an effort to assess the relationship between the Mount Baker-Snoqualmie National Forest and its surrounding social and economic environment, the Forest Plan requires regular monitoring of specific socioeconomic indicators. These indicators are measured within King, Pierce, Skagit, Snohomish, and Whatcom counties, which each contain MBS National Forest System lands.

Annual Income

The median annual household income in 2009 declined in four of the five counties to an average of $58,212, slightly down from $58,847 in 2008 (Skagit County increased 1.4%). A breakdown of annual

household income per county, compared to the 1987 Forest Plan baseline, and the 1999 census, shows the relative changes:

Table 4. Median Household Income by County, 2008-2009

	King	Pierce	Skagit	Snohomish	Whatcom
1987 Forest Plan	19,511	14,008	14.301	15,511	13,595
1999 Census	53,157	45,204	42,381	53,060	40,005
2008	67,027	57,674	54,803	64,289	50,443
2009	65,877	56,555	55,572	63,297	49,761

Source: 1990 MBS Forest Plan; Washington State Office of Financial Management, http://www.ofm.wa.gov/economy/hhinc;

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A related measure, worker wages, decreased faster in the five counties than in the State. The Washington State Employment Security Department reports that between 2008 and 2009, average annual wages in the five counties decreased 2.66 percent, compared to a decrease in Washington State of 2.02 percent. Declining wages and incomes can increase the demand on the National Forests for employment opportunities.

Population

While incomes declined, populations continued to increase. The 1990 Forest Plan (FEIS Appendix B) estimated the five-county population at over 2.6 million people, and projected growth to 3.1 million by 2000, and over 5.4 million in the State. The actual U.S. Census data indicate in 2009, a total of 3,728,348 people lived in the five counties, and approximately 6.7 million people in Washington State. Although the five county populations vary widely, their growth rates--except for Pierce County--are similar:

Table 5. Washington State Population by County

	King	Pierce	Skagit	Snohomish	Whatcom	Total
1980						2,600,000
2008	1,891,124	794,331	115,422	699,329	197,675	3,697,881
2009	1,909,205	796,900	116,612	705,895	199,736	3,728,348
% Change	+ 0.95	+ 0.32	+ 1.03	+ 0.94	+ 1.04	+ 0.82

Source: 1990 MBS Forest Plan; Washington State Office of Financial Management, http://www.ofm.wa.gov/pop/intercensal/default.asp

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Increasing local populations can be expected to increase the demands for recreation on National Forests such as the MBS in close proximity to populated areas.

Employment

The unemployment rate in Washington State rose sharply from 5.5 percent in 2008 to 9.3 percent in 2009, similar to the national average which increased from 5.8 percent to 9.3 percent. Unemployment rates also rose and people employed in the five counties decreased similar to State-wide rates.

Table 6. Washington State Unemployment Rate by County

	King	Pierce	Skagit	Snohomish	Whatcom
2008	4.7	5.7	5.7	5.5	5.0
2009	8.5	9.7	10.1	9.9	8.0

Source: Washington State Employment Security Department,
http://www.workforceexplorer.com/admin/uploadedPublications/1886_laus_historical.xls

Table 7. Number of Individuals Employed by County

	King	Pierce	Skagit	Snohomish	Whatcom
2008	1,042,790	371,300	55,320	354,160	103,140
2009	1,021,540	358,570	52,560	344,960	98,690

Source: Washington State Employment Security Department,
http://www.workforceexplorer.com/admin/uploadedPublications/1886_laus_historical.xls

The sharp increase in unemployment along with other factors serves to depress demand for housing and wood products from public Forests. It can also lead to increased interest in and pressure on the National Forest for local economic production opportunities, such as mining, outfitting and guiding, special uses, and forest products such as boughs and Christmas trees.

Socio-Economic Indicators

The decades-old income and population statistics and projections used in the 1990 Forest Plan have been eclipsed by rapid growth in Puget Sound populations and income. The Forest supports a substantially larger regional population base than the Forest Plan's environmental impact statement (EIS) assumed. Current demographic, employment, and economic statistics will be needed in the upcoming Forest Plan Revision process.

A second shortcoming is the scale of available data. Due to data or reporting limitations, socio-economic impact analysis is typically focused at the county or State level – "a level of aggregation that may obscure important community-level relationship between people and landscapes" (Mekbeb et al 2011).[4]

In the past three decades, as exemplified by the Northwest Forest Plan of 1990, the National Forests of the Pacific Northwest experienced a transition from commodity-based to amenity-based contribution of public benefits. Tangible National Forest products such as timber, energy, and minerals are still important to small communities adjacent to National Forest lands. However, in these five large counties with large economies, National Forest outputs do not represent substantial percentages of total county economic activity. The National Forests' amenity value contribution to the quality of life in the local communities is now as important to the counties as their commodity contributions.

[4] Mekbeb, E. T., Lilieholm, R. J,, Blanha, D. J., and Kruger, L. E. 2011. Resource use, dependence and vulnerability: community-resource linkage on Alaska's Tongass National Forest. Ecosystems and Sustainable Development VII, pp. 263 – 272. WIT Transactions on Ecology and the Environment, Vol. 122, www.witpress.com, ISSN 1743-3541 (on-line).

Nevertheless, research is finding that "it is difficult to distinguish how changes in land management could differentially affect specific communities or groups" (Endter-Wada 2011).[5] A new methodology is needed to draw better "approaches and protocols for monitoring human linkages to public land or common property over time" (ibid).

Benefits of this new methodology would come mainly from "evaluating the usefulness of information sources on linkages for providing monitoring information, modifying or revising some of the information gathered and contained in these information sources, and deciding how to more effectively utilize these information sources for monitoring purposes" (ibid).

Forest Products

Table 6. Mt. Baker-Snoqualmie Forest: Timber Production

MBS Timber Volume Produced (Million board feet)	2007	2008	2009	MBS Average (2003-2008)
Offered	12.71	13.09	10.74	--
Sold	12.7	2.17	8.47	6.9
Harvested	2.5	8.83	7.80	2.7

Source: Forest Service Performance Accountability System (PAS)

The 1990 MBS Forest Plan called for an allowable sale quantity (ASQ) of about 137 million board feet. That figure is now over 21 years old, predates the Northwest Forest Plan (1994) which substantially overhauled the Forests' land allocations for suitable timber land, and is thus outdated. The Forest Plan Revision process will need to account for this change and determine a new Forest ASQ.

Timber volume offered is within the control of the Forest Service, while volume sold and volume harvested are contingent on purchaser interest and commitment. Timber volumes harvested from a National Forest fluctuate substantially from year to year because of multiple variables including the timber market, housing demand, and regional and national economies. Future monitoring would be better focused not on annual production but on the average timber produced over a 5-year average from the three national Forests in western Washington combined—Gifford-Pinchot, Olympic, and Mt. Bajer-Snoqualmie Forests.

Heritage

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Cultural: What is the level of documentation? (34)	Review data components in Cultural Resource Reconnaissance Reports, site inventory records, evaluation reports, Cultural	D) Other. See below.	The USFS accounting system (INFRA) is used for reporting; data are also summarized in a report to the State Historic Preservation Officer regarding

[5] Endter-Wada, J. and Blahna, D. J. 2011. Linkages to Public Land Framework: Toward Embedding Humans in Ecosystem Analyses by Using "Inside-Out Social Assessment." [Unpublished manuscript.]

	Resource Management Plans, cost figures from field units		actions taken under the terms of the Programmatic Agreement. Data on associated costs are incomplete.
2. Cultural: What is the status of protection of historical resources? (35)	Inspection visits	D) Other. See below.	This is a required measure of accomplishment for the Heritage Program (FSH 6509.11k).

Summary of Findings

Forty-six proposed projects were reviewed under the terms of the Programmatic Agreement Regarding Cultural Resources Management on National Forests in the State of Washington, or the *Programmatic Agreement for Management of Recreation Residences*. This includes four projects for Emergency Repair of Federally Owned Roads (ERFO), and 21 projects that were initiated by other agencies or individuals for uses of National Forest System Lands (for example, special use permits, and road easements). Others included Forest vegetation management, facilities maintenance, and recreation maintenance and enhancement. Projects encompassed an estimated 3,058 acres, of which approximately 691 acres were surveyed for cultural resources.

The Forest completed three evaluations to determine the eligibility for the National Register of Historic Places. All three were determined "ineligible" for the National Register. Forty-two projects were found to have "no historic properties present" or "no historic properties affected" by the project. Four projects were documented as having "no adverse effect" on significant resources. None was determined to have an adverse effect on significant historic resources.

The Forest implemented some projects for which documentation of cultural resource compliance was lacking, and some were implemented without adherence to mitigation measures or management requirements. For example, monitoring of the I-90 Corridor Thin project (October 21, 2009) found that the project had ground-disturbing impacts outside of the area identified for potential impacts to cultural resources (the "area of potential effect", or "APE" as defined in 36 CFR 800.16. However, there were no reported direct or indirect effects to cultural resources as a result in 2009.

The Forest Service has an agency standard for completing condition assessments (site inspection visits) of certain cultural resources at least every five years: "Priority Heritage Assets (PHAs) are managed to standard if there is no deferred maintenance, and if the asset is monitored every 5 years." PHAs are those heritage resources that meet certain criteria regarding their significance and management priority (as provided in FSH 6509). The Forest's Heritage Inventory database listed 28 PHAs at the end of 2009. Three are reported as managed to standard in 2009. (The Stevens Pass Historic District, a District composed of several historical features, was previously reported as several PHAs, but is now reported as one PHA managed to standard.)

In addition to PHAs, heritage resources also may include historical buildings that serve another function (for example, Ranger Station buildings which are historic resources, but are also administrative facilities), artifact and history collections, and other cultural resources that do not meet the definition of PHAs. The Forest has responsibilities for managing and preserving these resources as well, and while

some are accounted for by other functions such as Engineering (facilities), the condition of others is currently not documented, and site monitoring visits are limited by scarce staff and resource funding.

The Forest Service is among the partners working with Puget Sound Energy to complete a historic properties management plan for the Baker River Hydroelectric Project. The plan was scheduled to be completed in October of 2009; however, PSE filed an extension request with the Federal Energy Regulatory Commission until March 31, 2010.

Program Accomplishments

A restoration and stabilization project was substantially completed for the Green Mountain Lookout (Darrington Ranger District), originally built by the Civilian Conservation Corps in 1933.

Two Ranger Districts (Darrington and Skykomish) have strong heritage site stewardship programs to monitor historical sites that receive a large number of recreation visitors. These inspection visits contribute to the protection of significant historical resources, and the management to standard of priority heritage assets.

Lands

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. Lands: What are the effects of N.F. management on lands, resources, and communities adjacent to NFS lands? (44)	Meet with cost share cooperators, city and county officials. Conduct staff management review.	A) Results acceptable: 1. Sale of Skykomish compound & residences 2. Annual meetings with DNR and Counties on road cost share and repair projects.	
2. Lands: What is the status of adjacent land management by other government agencies? (45)	Meetings with federal, State, and local land management agencies	D) Other: 1. Project-specific coordination ongoing with State and County government highway departments	
3. Lands: What are the effects of NFS management of utility corridors on transmission needs and other resource values? (46)	Review existing capacity and plans for upgrade with utility officials. Management review of effects.	C) No monitoring done: 1. New utility corridor identified in Federal Programmatic EIS, but no decision made to implement. 2. Vegetation management plans are implemented for Bonneville Power Administration (BPA) and Puget Sound Energy (PSE) corridors.	

Lands Monitoring Question 1: What are the effects of NF management on lands, resources, and communities adjacent to NFS lands?

Selling the Skykomish work center compound and residences to the Town of Skykomish resulted in direct benefits to the local community by providing housing and office space to the town, while reducing the agency's building maintenance burden, and without affecting the District's management capabilities. (The District retained ownership of the co-ed crew bunkhouse.)

Lands Monitoring Question 2: What is the status of adjacent land management by other government agencies?

No monitoring of other entities' adjacent land management activities is done formally, other than when Forest staff are notified of their projects. Typically the Forest is notified when the State Department of Natural Resources (DNR) or a private timber company plans a timber sale and requires access to their land, either for hauling timber or aggregate via the existing Forest road system, or when they have a need to construct or reconstruct access road(s) across NF land.

On-the-ground monitoring of the Forest boundary has not been conducted in recent years, due to lack of staff, so the agency does not have a good indication of any trespass occurring, other than when an incident is brought to its attention. A backlog remains of minor encroachments on NFS lands by residential lot owners. However, three encroachments recently have been resolved in Silverton along the Mountain Loop Highway.

A cooperative boundary survey with the DNR is ongoing. A challenge cost share agreement between the Forest and DNR for a cooperative boundary survey is in place.

The Forest has developed good working relationships with the Washington State Department of Transportation (WSDOT) and County highway departments on several highway improvement projects that traverse NFS land, to ensure that National Forest resources are protected and environmental and Forest Plan standards are met. Forest staff continues to coordinate with WSDOT on highway projects and with Snohomish County on their maintenance and repair work on the Mountain Loop Highway and the Index-Galena Road, damaged by 2003 and 2006 washouts. A road maintenance agreement with Snohomish County is in place for the County to maintain the Beckler River Road 65 for providing safe access to private recreational inholdings. A supplemental agreement is pending to authorize the County to maintain Forest Road 22, the Gold Mountain Road, near Darrington.

Lands Monitoring Question 3: What are the effects of NFS management of utility corridors on transmission needs and other resource values?

Vegetation management plans are established with Puget Sound Energy and the Bonneville Power Administration for managing native vegetation and controlling noxious weeds under their major transmission corridors that cross the Snoqualmie and Skykomish Ranger Districts. Vegetation management is compatible with the utilities' transmission needs and Forest Plan resource objectives. Forest Lands staff continues to coordinate with PSE and BPA on repair and maintenance projects.

The Forest coordinated with local landowners and mining claimants up the Middle Fork Snoqualmie Road on access to their property by issuing keys to easement holders and miners for the new Dingford gate lock after Facilities completed the gate repair, thus resolving this access issue.

Tribal Consultation

Monitoring Question	Monitoring Activity	Summary of Monitoring Results	Supplemental Information
1. American Indian Government-to-Government Coordination (33)	Review meeting notes, project files documenting consultation with Tribes	A) Results acceptable	Project files include NEPA Project Records and NHPA compliance documentation. Project meeting notes are filed with project files.

Summary of Monitoring Activities

This monitoring requirement addresses the consistency of Forest programs and activities with regulations and policies regarding American Indian Tribal Government relations. Regulations and policies have broadened and expanded since the 1990 Forest Plan, and are now integrated into a number of Forest programs (FSM 1563).

The Forest regularly consults with western Washington federally recognized Tribes. These are legal successors to the Tribes and bands that were signatory to the Treaties of Medicine Creek (10 Stat. 1132) and Point Elliott (12 Stat. 927), and Tribes recognized by Executive Order or by the Department of the Interior's acknowledgement process. In addition, the Forest involves and consults with Yakama Indian Tribe and the Colville Confederated Tribes when proposed project may result in effects to Tribes east of the Cascade Crest. For example, The Summit at Snoqualmie Ski Area is located partially in Kittitas County, but the Ski Area Special Use Permit is administered by the Mt. Baker-Snoqualmie National Forest. In addition, consultation occurs when projects may affect Tribal usual and accustomed fishing grounds adjudicated in the court decision U.S. v. Washington.

National Environmental Policy Act (NEPA) Project Records developed on a project-specific scale include documentation of Government-to-Government consultation for projects undergoing NEPA analysis. The files developed under Section 106 of the National Historic Preservation Act (NHPA) also include documentation that potentially affected Tribes have been consulted. In FY 2009, no project decisions were appealed by Tribal governments.

Program Accomplishments

Annual Government-to-Government meetings are held with many of the Tribes included in the Forest's area of influence to review the Forest's proposed actions, as well as to address and discuss other Tribal interests. Examples are: the exercise of Treaty Rights on National Forest System lands, road management and access, exchange of information regarding cultural resources managed by the Forest, and cultural and sacred sites and activities. Additionally, phone calls, meetings, and field visits with Forest Service and Tribal technical specialists (e.g. wildlife and fisheries biologists, foresters) were on-going to facilitate regular communication.

In October of 2008, the Forest Service and the Tulalip Tribes convened a technical committee with Forest and Tribal experts in botany, ecology, forestry and Tulalip cultural practices and resources. The committee met through 2009 to develop recommendations for cedar, huckleberry and other plant uses by the Tulalip Tribes in the Forest. The recommendations were adopted as an amendment to the Tulalip Tribes – Mt. Baker Snoqualmie National Forest Memorandum of Agreement (MOA, 2007) in December

of 2009. On August 27, 2009, the Darrington District Ranger signed a Decision Memo for a collaborative project between the Tulalip Tribes and the Forest Service to enhance production of big leaf huckleberry, important to the Tribes for ceremonial uses as well as for dietary health.

The Sauk-Suiattle Indian Tribe formally submitted a letter in protest in April of 2009 over two specific incidents regarding Tribal members exercising Treaty gathering rights on the Forest being questioned by a Forest Service Officer. A Government –to-Government meeting was held the following fall. The Darrington District Ranger and the Forest Supervisor meet regularly with members of the Sauk-Suiattle Tribe to improve communication and address issues as they arise.

The Snoqualmie Ranger District completed a site-specific analysis for enhancing the production of big huckleberries on October 3, 2008. Muckleshoot Tribal elders approached the Mt. Baker-Snoqualmie National Forest because they felt that berry yields were declining in the Government Meadows area. Historically, the meadows and forest edges have been used for both recreational and subsistence gathering of big huckleberries, and huckleberries continue to be culturally important to the Muckleshoot Tribe. In the fall of 2008, baseline monitoring was completed in the project area. Implementation of the enhancement measures will be ongoing over several years.

On December 2, 2009, the USDA Forest Service issued interim direction in the Forest Service Handbook for granting of forest products, without charge, to federally recognized Indian Tribes for non-commercial traditional and cultural purposes pursuant to Section 8105 of the Food, Conservation and Energy Act of 2008 (Public Law 110-246, § 8105, 122 Stat. 1651 (2009), known as the "Farm Bill"). The interim directive allows the Forest to use of the Farm Bill authority while implementing regulations are being promulgated.

FOREST SERVICE MISSION

The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The Agency manages 193 million acres of public land, provides assistance to State and private landowners, and maintains the largest forestry research organization in the world.

Field Review Findings: Forgotten Thin, and I-90 Thin

The Forest Interdisciplinary (ID) team conducted two field trips in FY 2010 - 2011 to monitor and evaluate implementation and effectiveness of projects implemented during FY 2009. On August 11, 2010, the ID Team conducted a monitoring field tour of the Forgotten Thin Timber Sale, Darrington Ranger District, to monitor the implementation and effectiveness of mitigation measures and how well projects met the purpose and need. On October 21, 2010, the ID Team toured the I-90 Timber Sale, Snoqualmie Ranger District, for the same purpose.

Background

Forgotten Thin Timber Sale

A commercial timber sale in this planning area was first proposed in 1996 (Forgotten Thin Timber Sale), but the analysis was never completed. In 2001, environmental analysis began on a revised proposal in the same area (Forgotten Thin Plus Commercial Thin). Acting Forest Supervisor Rob Iwamoto signed a Decision Notice to approve this thinning project on October 17, 2003. The decision was administratively appealed. After further review, the decision was withdrawn to allow additional analysis. A second Decision Notice was signed on August 11, 2006.

This timber sale is located within the Darrington Ranger District. The actions include approximately 9.2 million board feet (mmbf) of volume from approximately 394 acres; roughly 160 acres harvested with ground-based or cable logging systems and about 234 acres helicopter harvested. Small openings (2-6 acres each) were planned within units 4 and 5 to contribute to forage opportunities for black-tailed deer. These openings are created through heavy thinning, leaving a canopy closure as low as 20%. Total acreage of these areas does not exceed 20 acres/unit. Most western hemlock trees were planned to be removed. Douglas-fir and minor tree species including cherry and yew were planned to be retained.

The proposed action included connected actions associated with timber harvest: reconstruction of about 6.9 miles of existing road; construction of approximately 0.5 mile of temporary road to be closed following sale activities; landings necessary for ground-based, cable, and helicopter logging; scattering of landing slash, and some burning to reduce slash at landings or at designated burning sites.

I-90 Thin Timber Sale

The I-90 Corridor Thin Project is located within the Interstate 90 (I-90) corridor west of the Cascade crest between I-90 exits 42 and 47. The project encompasses approximately 338 acres in the South Fork Snoqualmie River watershed, and is located on the Snoqualmie Ranger District in King County.

This project revised the I-90 2 Timber Sale Contract cancelled by then-Regional Forester Linda Goodman in July 2006. The contract was cancelled because portions of the sale as offered requiring helicopter yarding could not be logged without incurring unacceptable crown damage to the residual stands and safety problems for the purchaser.

The project planned commercial thinning on approximately 338 acres, removing about 6.7 million board feet (mmbf) of timber from 14 units ranging in size from about 6 to 86 acres. Logging systems included ground-based, skyline and helicopter. Silvicultural treatment planned to “thin from below.” Trees

removed are generally smaller suppressed or intermediate less vigorous individuals lacking crown development.

The proposed action included the following connected actions: construction of about 1.4 miles of temporary road to or within Units 1, 2, 6, and 13. All temporary roads were planned to be decommissioned and obliterated after thinning.

Monitoring Strategy

At the Forgotten Thin Timber Sale, the ID Team selected sale Units 3, 4, and 5, in addition to a road in a riparian zone and some rock-drill work on a cut-slope. At the I-90 Timber Sale, the ID Team selected sale Units 3, 6, 8, and 9. These sites were chosen to allow for monitoring a variety of actions.

During each field trip, ID Team members considered and answered five monitoring questions:

1. *How well did the project meet its purpose and need?*
2. *Were the project design and mitigation measures implemented?*
3. *Were the design and mitigation measures effective in meeting their objectives?*
4. *Were the project environmental effects as disclosed in the NEPA document?*
5. *Were the project environmental effects in compliance with the Forest Plan as amended?*

Monitoring Findings

FORGOTTEN THIN TIMBER SALE PROJECT

Purpose and Need

Goals Met:

- The timber sale met the need to **provide commercial wood fiber products**. Forest Plan Timber Management goal, page 4-130, is to "provide for the production of timber on lands classified as suitable for timber production consistent with various resource objectives, environmental constraints, and considering cost efficiency." The land allocations and standards and guidelines in the 1994 ROD are to "provide for a steady supply of timber sales and non-timber resources that can be sustained over the long-term without degrading the health of the forest or other environmental resources" (USDA USDI 1994, pp. 3 and 4).
- Conditions of the **silvicultural prescription** were met to achieve the need to increase health and vigor and enhance growth that would foster long-term site productivity and horizontal and vertical diversity. The Forest Plan, as amended, includes a Forest wide goal to "maintain prime forest lands in timber production" (Forest Service USDA 1990, pp. 4-5).
- Implementation of **wildlife openings** was accomplished with 20% cover provided by leave trees.

Evaluation:

- Time will tell. Evaluation of effectiveness monitoring would be needed in the future. It is not yet known whether the project met the need to provide opportunity to enhance forage for

localized populations of black-tailed deer and other large game. Ecology plots in other parts of the sale will provide comparison of ground cover. Forest Plan Monitoring Plan, p. 5-12, calls for surveying big game habitat in and adjacent to project areas for continuing suitability.

Project Design Features and Mitigation Measures

Goals Met:

- Resource specialists did not identify any particular mitigation measures that were not being implemented.

Evaluation:

- The group identified the need for early input on fuels for NEPA analysis and contract preparation to pre-plan appropriate slash near landings to mitigate fire hazards.
- A question arose about snags and downed logs as part of a DecAid program requirement. Snag counts were recorded in the Wildlife Specialist Report and in the EA (p. 80). The DecAid program was also used in the wildlife assessment of snags and down wood (EA, pp. 82-85), and in the wildlife environmental consequences for snags and down wood (pileated woodpecker and other cavity nesters) in the EA on pages 163-170. Anecdotal evidence indicates that timber harvest projects on the MBS usually meet and exceed expected levels of residual downed wood in stands.

Effectiveness of Design Features and Mitigation Measures

Goals Met:

- Review of the innovative treatment of **chipping and covering temporary road** instead of creating slash and burn piles indicated this variation of a mitigation measure appears very effective and meets multiple objectives. The positive review included botany-related advantage: the wood chips are nitrogen-deficient, so invasive weeds are less likely to establish and grow on them. Also, water quality advantages exist: chips provide a filter for water, less sediment delivery to ditches. Using chips on-site is energy-efficient and more climate-friendly: it saves energy used for creating and hauling road gravel. It also avoids smoke caused by slash burning.

Evaluation:

- The temporary road surfaced with woodchips was reviewed and discussed. At least one large relief ditch has a pile of exposed soil that needs to be mulched before the winter season begins.

Environmental Effects

Goals Met:

- Botany: Design features and mitigation measures were included in the EA (pp. 39-40) and implemented on the ground, so no undisclosed effects were apparent.
- Fisheries: Effects appear as disclosed. Rock hammer was used instead of blasting on Road 2080 reconstruction (even though blasting was covered in the BA) so as to minimize impacts to fish in the side channel just below road.
- Wildlife: Effects were as disclosed. Seasonal closures were implemented.

Evaluation:

- Other resources: Implementation was as described in the environmental effects. Results are needed from long-term project monitoring to provide a definitive answer on effectiveness, but on-the-ground site visit showed no undisclosed effects. Reviews from other resource areas were predominantly positive.

Effects Compliance with Forest Plan

Goals Met:

- Complied for **scenery**. Project design met visual quality objectives of MA 2B and MA 6. MA 2B: management activities were visually subordinate to the natural landscape. MA 6: managing designated portion of the Sauk River under the 1990 Forest Plan and 1983 Final Wild and Scenic River Management Plan for outstandingly remarkable values (Wild & Scenic Rivers Act terminology) of scenery, wildlife, and fisheries. Forest Plan, p 4-174: Areas of ground disturbance should be rehabilitated to natural appearance.
- All project work was conducted outside of **Riparian Reserves.**

Evaluation:

- Areas that would have had effects making the project out of compliance with the Forest Plan were dropped from the proposed action near the start. For example, occurrences of round-leaf orchid were excluded.

I-90 THIN PROJECT MONITORING

Purpose and Need

Evaluation:

- Time will tell. Initial opinion is that treatments were effectively implemented and should lead to the results expected to achieve project's stand objectives.

Project Design Features and Mitigation Measures

Evaluation:

- Some known invasive weed sites were not identified on the timber sale map, so appropriate provisions did not come into effect to manage weeds. Such sites need to be fully delineated on future sale maps.
- Mitigation measure was not followed in Unit 9 in riparian reserve, as an edge of a landing was expanded slightly to make room for the landing size required for safety.
- Implementation differed from project design for temporary roads (Unit 8).
- Fire breaks along the temporary road in Unit 8 have not yet been set.
- Road closure was not publicized on time to notify public expediently of logging.
- Safety hazard of hiking public walking up road during logging operations needs to be prevented.

Effectiveness of Design Features and Mitigation Measures

Goals met

- Those mitigations included into the contract were followed.
- **Visual quality** mitigation measures were effective, and possibly exceeded visual quality objectives for the project area. MA 2B, Scenic Viewshed – Middleground has a VQO of

partial retention. MA 27, Scenic Forest calls for retaining or enhancing viewing and recreation experiences.

Evaluation

- More design features and mitigation measures should have been included. Future contracts should include adequate protection measures for fish and water resources.
- Mitigation measures that are not yet implemented, such as mulching, reseeding, etc., should be monitored post-implementation.

Environmental Effects

Goals met

- For **Silviculture** (vegetation management), all effects were as analyzed. The Forest Plan, as amended, includes a Forest-wide goal to "maintain prime forest lands in timber production" (Forest Service USDA 1990, p. 4-5). The reduction in canopy closure of thinned stands that occurred from thinning should increase growth of residual trees.

Evaluation

- Partial Riparian Reserve entry was not foreseen in NEPA analysis.
- Follow-up is needed on temporary roads for hydrology concerns.
- Spotted owl and marbled murrelet effects need follow-up for the old-growth remnant stand discovered after thinning young stand around it.
- Extent of invasive weed spread is too early to tell, but monitoring susceptible areas will be key (5 years for Knudsen-Vandenberg project funding).

Effects in Compliance with Forest Plan

Goals Met

- The parts of the project conducted on NFS lands were consistent with the Forest Plan, as amended.

Evaluation

- Unanticipated expansion of the landing into Riparian Reserve was not consistent.

Recommendations and Conclusion

Recommendations

1. Encourage creative prescriptions for future timber sales (for example, the wildlife biologist identifying openings for forage). Experimenting with different prescriptions and monitoring the results provides the Forest with much more information than repeating standard prescriptions.

2. Continue researching ways in which multiple resource benefits can result from one project. Forgotten Thin is a good example with aquatic habitat, road, and wildlife benefits in addition to meeting timber and stand objectives.

3. See how applicable the wood chip surfacing technique can be for temporary roads elsewhere. There are advantages to using wood chips; however, monitor is needed on the effectiveness of wood chips through the seasons and over time.

4. Be sure that relief ditches on temporary roads are mulched in preparation for the winter season to avoid impacts from winter runoff, erosion, sedimentation, and deposition.

5. Keep the public and fellow employees familiar with the "Designation by Description" method of tree marking so that the process, possible impacts, and on-the-ground product are well understood.

6. Do further monitoring in order to support conclusions about the effectiveness of mitigation measures, the absence of unforeseen effects, etc. Monitoring conclusions cannot be made in the short-term if a long-term perspective on effectiveness is the goal. Need to look into ways in which ongoing monitoring can be made feasible to continue.

7. If re-vegetation of wildlife openings is desired, take into account native vegetation that is utilized by black-tailed deer and other big game. Red huckleberry was identified as a target species for understory development within the openings. This is one of the most hedged (browsed) species ecologists see on survey plots.

8. Long-term results from Forgotten Thin Unit 3 monitoring plot will give more information about how extensively to thin for desired future conditions of stands. Results from other thinning operations indicate that under certain combinations of site conditions, stand conditions, and thinning prescription, unintended results can include thick regeneration of western hemlock seedlings, reduction in liverwort component, decrease in litter-fall depth, spread of noxious weeds, and increased windthrow and breakage that slow height growth.

9. Storage and storm-proofing of roads were identified as sound proactive measures to decrease future maintenance costs for roads, especially in light of reduced funding.

10. A climate change scorecard will be a mandatory reporting tool across the agency in the near future. The MBS needs to look for ways it can incorporate climate change in road design and planning, and match road infrastructure design to climate change projections. Ways that Forgotten Thin responded to climate change concerns included:

    a. Wood chip road utilized slash instead of burning, and also reduced fuel expenditure by not hauling gravel

    b. The thinning prescription provided for increased stand resilience by making the remaining trees more vigorous in the residual trees

    c. Retention of stand diversity with mix of hardwoods and conifers improves stand resilience in face of future shifts in climate

    d. Stormproofing of roads responds to potential increase in flows in wetter winters

    e. Upgrade of culverts on ML2 and ML3 roads prepared for future higher water flows.

    f. Helicopter thinning consumes more aviation fuel than road-based logging, so reducing helicopter units saves energy. The project slightly reduced fossil fuels used and carbon dioxide released into the atmosphere by favoring road-based logging over helicopter logging.

11. Include only the mitigation measures that are applicable to the project, and work to mitigate specific effects identified for this project. This will reduce complexity and assist implementation by avoiding confusion when too many mitigation measures are overlaid. Including only pertinent mitigation measures will make it easier to incorporate them into a contract for the purchaser to implement. It will also reduce costs and create an economically more viable timber sale, especially under current poor market conditions. The need exists to identify the project's objectives, goals, and desired condition and consider a variety of means of accomplishing the goals. A good example is the wood chip road surfacing, which was not listed as a mitigation measure.

12. Mobile Wi-Fi for sale administrators might be a tool that gets information about sale activities out faster: from Sale Administrator to front-liners, operators, and ID Team members.

13. Thorough field review is important prior to the writing of environmental consequences.

14. Opportunity exists to take interest groups into the I-90 Thin sale area for a tour of the sale next year. Parts of this project would be a good example of a model thin.

15. I-90 Thin project dispels the old school concept of what timber harvest looks like.

Conclusion

Overall, the implementation of the two projects showed successful results in meeting the purpose and need and complying with project mitigation measures. As a result, Forest Plan standards and guidelines were met. Most mitigation measures were followed. A few need further monitoring to determine their need, such as treatments for the possible spread of invasive weeds. Both projects were successful at mitigating for plants, snags, residual downed wood, and visual quality. The monitoring field trips identified only minor exceptions as described above.

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Appendix A

Management Indicator Species Monitoring: Mountain Goats

Monitoring Report

Management Indicator Species: Mountain Goats

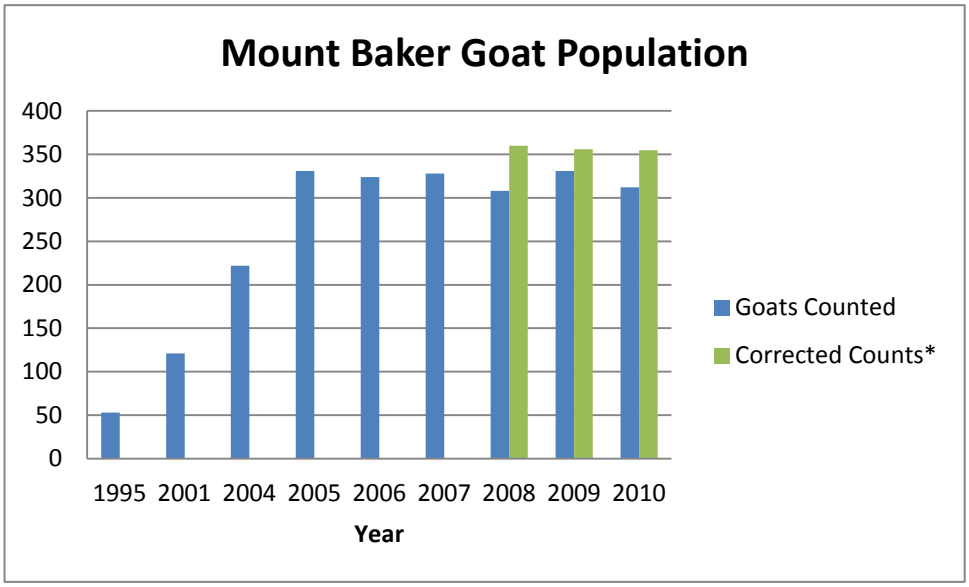
Mount Baker-Snoqualmie National Forest

Fiscal Years 2009 and 2010

Mount Baker

As the largest goat population in the State and the only population on the Forest that is hunted, the Mount Baker population has been surveyed annually since 2004 using a protocol that differs from earlier surveys. More recent surveys collect information on the factors that influenced surveyors to detect mountain goats. The counts from these surveys are comparable to earlier surveys that did not occur each year, but did survey the same areas. A correction factor for goats not observed during surveys was developed during a cooperative research effort that occurred from 2003 through 2007. Data from surveys beginning in 2008 include the correction factor. Population estimates using sightability corrections are not comparable to surveys that did not apply them.

The Mount Baker mountain goat population recovered after recreational hunting was discontinued following the 1995 season. Past recreational hunting levels were too high (Rice and Gay 2010) and resulted in the decline of mountain goat populations throughout northwest Washington State from the mid 1960s to the mid 1990s. Recreational hunting resumed in 2007, but at lower levels than occurred during the population decline. Two recreational hunting permits were allowed by Washington Department of Fish and Wildlife (WDFW) in 2007 and 2008. In 2009, WDFW increased recreational harvest permits to seven.



As the graph indicates, the use of correction factors to account for missed animals has yielded population estimates with less year-to-year variability than uncorrected counts. In years 2008 – 2010, the uncorrected goat population estimates were variable, ranging from 308 to 331 animals.

The counts using corrections were more consistent, varying between 355 and 360 animals. Population monitoring since 2005 suggests that the population has been stable. Additional large increases are unlikely within the areas surveyed. The estimated size of 350 animals within surveyed areas, plus the known presence of animals in unsurveyed areas such as Barometer Mountain, compare with pre-hunting (1961) estimates of 384 to 419 mountain goats. The presence of mountain goats in nearby areas such as Table Mountain, Dock Butte, Survey Point, and Park Butte also suggest that the population in the surveyed areas is nearly saturated, and animals are dispersing to smaller habitat patches that have not been occupied for a decade or more.

Glacier Peak

Survey flights in 2010 estimate between 18 and 19 goats on the west side of Glacier Peak. This is the first documentation in at least 15 years of remnant groups of resident animals at this location. All groups seen had fewer than five animals, and the kid:adults + yearling ratio was 0.14. This reproductive rate is less than half the rate found at Mount Baker and suggests that the resident Glacier Peak population is not increasing.

Snoqualmie and Skykomish Ranger Districts

Surveys of these areas were conducted in partnership with the Muckleshoot Indian Tribe and WDFW in 2009. There had been no concerted effort to survey mountain goats in these areas prior to 2008. Although the surveys were not conducted to the same intensity as those at Mount Baker and Glacier Peak, they are believed to have accounted for most animals that were present.

In the Snoqualmie Game Management Unit (GMU) 460, 49 goats were estimated to occur north of I-90, and 22 were counted south of the interstate. These 71 animals are at the high end of the 24-75 animals guessed to occur there in the 2008 WDFW State-wide estimate. However, the eight goats located in the Green and Cedar River watersheds (GMUs 485 and 490) were much lower than the 16-28 in the State-wide estimate.

In addition to providing more accurate information for State-wide estimates, these population monitoring flights provided information on the north half of Skykomish Ranger District where so little information was available that even guesses were not attempted in the 2008 State-wide estimate. This was a vital piece of information that allows a Forest-wide estimate that can be compared to expected Forest Plan outputs, which can help prioritizing areas across the Forest for translocation of mountain goats.

Forest-wide Estimate

The Forest Plan projected a population of 1,440 mountain goats in the second decade (2000 – 2010) and 1,430 in the third decade (2011 – 2020) (Table 4-1, p. 4 – 16). Using the 2008 WDFW State-wide estimates and updating this data with more recent survey information, there are an estimated 1,098 mountain goats on the Mt. Baker-Snoqualmie National Forest. This total includes animals that are known to spend most of their time on the Wenatchee National Forest, and animals from Mount Rainier and North Cascades National Parks that spend at least some of the winter on the Mt. Baker-Snoqualmie National Forest.

Because most mountain goat populations that have declined have not recovered in the absence of recreational hunting, the Forest is unlikely to meet projected Forest Plan outputs for mountain goats without translocating mountain goats from other areas.

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Rice, C. G. and D. Gay. 2010. Effects of mountain goat harvest on historic and contemporary populations. Northwestern Naturalist 91:40-5

Appendix B

Segelsen Ridge Huckleberry Enhancement

Date: Aug 24, 2010

1.0 PROJECT SCOPE

The goal of the USFS and the Tulalip tribe is to increase VAME fruit production in huckleberry fields of Segelsen ridge. These fields have been producing substantial huckleberry fruit since the mature forest was harvested in the area in the 1980's but fruit production is now declining at the same time conifer species have become established in the fields and have begun to overgrow the huckleberry plants. Based on the hypothesis that huckleberry fruit production will increase if conifer species competing for light and soil resources are removed, the USFS and Tulalip tribe set a goal to reduce forest overstory cover by approximately 70% in one-half of the huckleberry release area and to monitor the project in such a way as to determine if forest removal had the desired effect. This led to our development of a study plan to contrast huckleberry fruit production in areas where forest overstory is removed versus areas where forest overstory is not removed.

From the HUCKLEBERRY RELEASE MONITORING PROPOSAL, April 2010

> RES, LLC will perform work in support of the Huckleberry Enhancement CCS Decision Memo, the goal of which is to enhance the production of big-leaf huckleberry, *Vaccinium membranaceum* (VAME) in the Segelsen Ridge area of the Darrington Ranger District. The U.S. Forest Service (USFS) and the Tulalip Tribe will remove maturing conifer trees that are reducing understory huckleberry fruit production. Our work will be in support of this effort through comparing the response of VAME within the removal units to comparable areas where no trees will be removed.
>
> RES, LLC will establish geo-referenced, long-term monitoring transects inside and outside the treatment areas in areas of Segelsen Ridge as per the preference of the USFS and based upon field conditions. Given the preliminary study design of 100' by 200' treatment blocks, we suggest establishing three 50' transects per unit. Along these transects, we will conduct quadrat surveys to measure VAME crown cover, VAME height, VAME fruiting class and overstory canopy cover.

2.0 PROJECT IMPLEMENTATION AND MONITORING

The USFS and Tulalip Tribe chose an area to conduct huckleberry release work along Segelsen ridge. This area is comprised of early successional vegetation after forest harvesting in 1982.

3.0 DISCUSSION

Monitoring results indicate the overstory removal effort achieved the desired canopy removal of approximately 70%.

Current VAME size and fruiting appear to reflect pre-thinning conditions that limited VAME growth and fruiting, presumably due to competition between VAME and other plants for light and soil resources.

Unit 2, which had the least overstory canopy cover before thinning, had the tallest and broadest-canopied VAME plants as well as the highest fruiting class.

This data is also consistent with the hypothesis that VAME response to thinning will not be substantial for several years. VAME plants respond after sufficient time to allow a physiological response to increased resource availability. No response to the current thinning was apparent in the data collected one month after thinning.

The higher VAME canopy cover in most of the Huckleberry release area compared to the old growth area probably reflects a VAME response to the initial forest clearing in 1982 that persists despite increasing forest canopy cover. This bodes well for the success of this huckleberry release project. Anzinger (2002) found huckleberry fruit production in huckleberry patches cleared of mature forest cover five years before was similar to huckleberry production in comparable 100 year intact forests on the Warm Springs Indian Reservation (Anzinger 2002, Fig. 3.6). Significantly increased berry production was not apparent until 10 years after mature forest clearing in her study. On Segelsen Ridge however, huckleberry plants will be responding to young overstory removal with substantially higher initial biomass in most of the treatment units than huckleberry plants in nearby mature forest. This suggests the fruiting response to 28 year old overstory removal may be more rapid or at least more abundant than that found in Anzinger (2002).

4.0 FUTURE MONITORING

It took two people six hours on-site to census all the quadrats in the treatment area and the old growth. Contingent on travel time or changes in access to the site, possible future monitoring of these transects will be relatively straightforward.

5.0 CONTACT INFORMATION

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