United States Department of Agriculture

Biennial Monitoring Evaluation Report

Mt. Hood National Forest

Forest Service – September 2020

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Summary of Findings and Results

The information presented in this monitoring report is summarized in Table 1 below. Monitoring suggests that forest management activities overall are being conducted in a manner that meets the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) desired conditions, goals, objectives, and standards and guidelines for most areas. Monitoring also suggests recommendations for changes to some forest management activities and some Forest Plan components.

Recommendations for changes to management activities include:

- Increasing pace and scale of timber harvest and associated NEPA procedures to ensure beneficial growth and mortality patterns across the forest, including increasing the quantity of projects where timber harvest is the driving objective;
- Enhancing coordination between soil specialists and contract administrators, as well as the inclusion of soil restoration opportunities into inventory and planning; and,
- Additional monitoring of the Oregon spotted frog, along with a possible site management plan.

Recommendations for changes to the Forest Plan include:

- Updating areas designated for timber harvest to more accurately reflect the land base available for production of timber, and concurrently updating the Probable Sale Quantity (PSQ) considering Forest outputs are trending to be about half of what the Forest Plan indicates; and,
- Updating standard FW-420 for defining criteria that would allow the Forest to focus its maintenance activities on passenger car-suitable roads and reduce operational maintenance levels on other, less passenger-car-utilized road systems.

Table 1. Summary of monitoring findings.

Monitoring Item	Do monitoring results demonstrate intended progress or trend toward Forest Plan targets?[1]	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?
Have Best Management Practices (BMPs) been implemented and are they effective at managing water quality consistent with the Clean Water Act?	Yes	No	N/A
Are Standards and Guidelines effective in maintaining or enhancing fish habitat capability?	Yes	No	N/A
Are habitat improvement projects contributing to the persistence of Survey and Manage species?	Yes: Aquatic Species Yes: Wildlife Species	No: Aquatic Species No: Wildlife Species	N/A: Aquatic Species N/A: Wildlife Species
Are known populations of invasive species continuing to spread? Are new infestations occurring?	Yes	No	N/A
Are projects designed to prevent reactivation or acceleration of landslides, debris slides, debris flows, and earthflow areas?	Yes	No	N/A

Monitoring Item	Do monitoring results demonstrate intended progress or trend toward Forest Plan targets?[1]	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?
What is the trend for mature and late-successional habitat needed for pileated woodpecker persistence?	Yes	No	N/A
What is the trend for mature and late-successional habitat above 3500 feet needed for American marten persistence?	Yes	No	N/A
What is the trend for oak pine habitat needed for gray squirrel persistence?	Yes	No	N/A
What is the trend for early-seral habitat needed for deer and elk persistence?	No	Yes	Additional forest management activities may be needed to progress towards Forest Plan objectives for early-seral habitat needed for deer and elk persistence.
Are Standards and Guidelines effective in maintaining or enhancing aquatic habitat complexity?	Yes	No	N/A
What is the trend for mature and late-successional habitat needed for northern spotted owl recovery?	Yes	No	N/A
What is the trend for Oregon spotted frog populations at Camas Prairie?	Uncertain	No	Additional monitoring is needed to determine if developing a site management plan for the Oregon spotted frog at Camas Prairie is needed.
Are significant (National Register eligible) historic properties being maintained, stabilized, and repaired according to historic preservation standards?	Yes	No	N/A
Are the physical/biological, managerial, and social settings of each Wilderness Resource Spectrum (WRS) maintained consistent with the standards for wilderness management?	Yes	No	N/A
Has the Off-Highway Vehicle Record of Decision (2010) been implemented?	Yes	No	N/A

Monitoring Item	Do monitoring results demonstrate intended progress or trend toward Forest Plan targets?[1]	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?
Are people having a high level of satisfaction during their visit to Mt. Hood National Forest?	Yes	No	N/A
Is the production of pure, clear, raw, potable water being sustained for municipal use?	Yes	No	N/A
What are the current tree mortality rates and patterns across the forest?	Yes	Yes	A change is recommended to forest management activities regarding the pace and scale of stand-level treatments.
Is total growth and productivity exceeding mortality over all forest disturbances? Every five to ten years?	Yes	Yes	A change is recommended to forest planning processes implementing NEPA.
What is the rate of harvest of stands available for timber management?	Yes	Yes	A change to forest management activities is recommended to increase the quantity of projects specific to timber harvesting.
How much timber is being awarded?	Yes	Yes	A change may be warranted to the Forest Plan's PSQ based on annual awarded volume accounting for about half of what is defined in the Forest Plan.
Are there any changes in the land base available for producing timber?	Yes	Yes	A change to the Forest Plan may be warranted in regards to the designation of acres classified as suitable for timber harvest.
Are we meeting the 5-year regeneration period required by the National Forest Management Act?	Yes	No	N/A
How many miles are suitable for passenger cars and high clearance vehicles?	No	Yes	A change to the Forest Plan may be warranted for FW-420 as it may make more sense to maintain roads for passenger cars based on different criteria. This may allow us to focus maintenance for passenger cars on certain roads and reduce operational maintenance levels on other roads.

Monitoring Item	Do monitoring results demonstrate intended progress or trend toward Forest Plan targets?[1]	Based on the evaluation of monitoring results, may changes be warranted?	If a change may be warranted, where may the change be needed?
Are road management activities being implemented in accordance with the latest access and travel management direction?	Yes	No	N/A
Are management activities being implemented so that they do not substantially and permanently impair the productive capacity of the land?	Yes	No	Forest management activities could benefit from enhanced coordination between soil specialists and contract administrators, as well as the inclusion of soil restoration opportunities into inventory and planning.

[1] Interval of data collection is beyond this reporting cycle (A); or more time/data are needed to understand status or progress the plan component (B); or methods/results are inadequate to answer monitoring question (C).

Introduction

Purpose

The purpose of the biennial monitoring evaluation report is to help the responsible official determine whether a change is needed in Forest Plan direction, such as components or other content that guide management of resources in the Forest Plan area. The biennial monitoring evaluation report represents one part of the Forest Service's overall monitoring program for the Mt. Hood National Forest (the Forest). The biennial monitoring evaluation report is not a decision document. It evaluates monitoring questions and indicators presented in the Forest's monitoring program. The monitoring program was recently updated in response to the 2012 National Forest System Land Management Planning Rule (Planning Rule). The Planning Rule stated, "Where a [forest] plan's monitoring program has been developed under the provisions of a prior planning regulation and the unit has not initiated plan revision under this part, the responsible official shall modify the monitoring program within 4 years of the effective date of this part (May 9, 2012), or as soon as practicable, to meet the requirement of this section." The Forest completed the updates to the monitoring program in May of 2016. This new approach encourages the use of existing and relevant monitoring questions and indicators that are consistent with the new rule requirements. It also encourages that any required changes to unit monitoring plans will tie to on-going broad-scale monitoring to the extent practical.

Monitoring and evaluation are continuous learning tools that form the backbone of adaptive management. For this reason, the Forest will produce an evaluation report every two years. The Forest's previous monitoring reports are available on the Forest website.[2]

How to Use this Report

This report is a tool and a resource for the Forest Service to assess the condition of forest resources in relation to Forest Plan direction and management actions. It is also a tool and a resource for the public to learn more about how the Forest Service is managing forest resources.

A part of implementing the Forest Plan involves a commitment to monitor and evaluate how well the Forest is doing. Based on review of information collected, adjustments in management actions or anticipated results can be identified. This adaptive management process allows the Forest Plan to remain an active, relevant, usable document. Monitoring provides the decision-makers and the public information on the progress and results of implementing the Forest Plan. As the Forest continued into the third decade under the Forest Plan, the Forest began to switch the focus from short-term implementation monitoring to monitoring long-term outcomes of management with respect to key social, economic, and ecological systems.

The biennial monitoring evaluation report is designed to help the public, as well as Federal, State, local government, and Tribal entities anticipate key steps in the program. These steps include opportunities for public participation and how the public will be informed of those opportunities, and how public input will be used as the monitoring program progresses. The biennial monitoring evaluation report is also intended to help people better understand reported results in relation to past monitoring reports, future monitoring reports, and the broader-scale monitoring strategy that is issued at the Forest Service regional level.

Roles and Responsibilities

The monitoring program requires a coordinated effort of many people, from the people who collect the data, to the people outside the Forest Service who provide feedback and assistance, to the decision maker.

Richard Periman, Forest Supervisor, is the responsible official to whom the recommendations from the report are provided.

This biennial monitoring report was respectfully prepared by an interdisciplinary team of the following

[2] fs.usda.gov/main/mthood/landmanagement/planning

Forest Program Managers and resource specialists: Chad Atwood, Forest Silviculturist & Terrestrial Program Manager; Chuti Fiedler, Fish Consultation Biologist; Bruce Zoellick, Fisheries Program Manager; Tiffany Cummins, Wildlife Program Manager; Josh Marxen, Forest Transportation Planner; James Roden, Forester; Todd Reinwald, Forest Watershed Program Manager; Amber Sprinkle, Forest Planner; Michelle Lombardo, Environmental Coordinator; Trent Skinner, Cultural Resources; and Jeremy Evans, Forest Recreation & Lands Program Manager.

The Importance of Public Participation

A draft monitoring program was shared with the public in July 2015 for a 30-day comment period. In response, we received two letters, which prompted changes to be made to the draft monitoring program. The final monitoring program and responses to the comments received on the draft are available on the Forest website[2]. The Forest informed the public that the first monitoring report under the new program would begin in 2016. That report was posted to the Forest's planning website in 2018, and a notification email was sent to a list of interested parties. This monitoring report is available to the public through the Forest website[2]. The Forest welcomes feedback regarding this monitoring report. Feedback will help ensure the effectiveness of the new monitoring program and the resulting information. The same notification method is applied for this report; posting to the Forest website, and emailing notification of its availability to interested parties.

How the Forest Plan Monitoring Program Works

Providing timely, accurate monitoring information to the responsible official and the public is a key requirement of the monitoring program. The Forest's biennial monitoring evaluation report is the vehicle for disseminating this information.

In the context of forest planning there are three main monitoring goals:

- Implementation monitoring: Are we implementing the Forest Plan properly? Are we meeting our management targets and project guidelines?
- Effectiveness monitoring: Are we achieving our Forest Plan management goals and desired outcomes?
- Validation monitoring: Does our hypothesis testing indicate we may need to change the Forest Plan?

Implementation monitoring is important for tracking progress and accomplishments. However, it is effectiveness and validation monitoring that drive and support the adaptive management process. Effectiveness monitoring evaluates condition and trend relative to desired conditions. Validation monitoring tests hypotheses and provides information that might necessitate changes to desired conditions in the Forest Plan.

Monitoring Activities

Monitoring questions focus on providing necessary information to evaluate effectiveness of plan components and management activities in maintaining or achieving progress towards desired conditions and objectives of the Forest Plan area. Indicators are like performance measures used in answering the respective monitoring question. Indicators should be practical, measureable, and relevant to answering monitoring questions for the Forest Plan area. They should also help to test relevant assumptions or track relevant changes. The Forest's monitoring program contains monitoring questions and identifies associated indicators that address each of the following:

1) The status of select watershed conditions.
2) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
3) The status of focal species to assess the ecological conditions required under 36 CFR §219.9.
4) The status of a select set of ecological conditions required under 36 CFR §219.9 to contribute to the recovery of federally-listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
5) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

6) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
7) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
8) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. §1604(g)(3)(C)).

See Appendix A: Monitoring Program Matrix to review the monitoring program questions and indicators based on the 2012 Planning Rule.

This biennial monitoring report will address the same monitoring program questions as the 2018 report. It will consider the 2018 report findings, which were based on data collected in 2015 and 2016, and provide additional information where necessary if changes have occurred. Subsequent biennial monitoring reports would focus only on just those monitoring items for which data has changed, or conditions have changed from this reporting period.

The following sections present the most current information (data and evaluations) for all monitoring questions contained within the Forest Plan. All monitoring questions were addressed during the current evaluation period (2017, 2018, and 2019). Each section describes the details that would support the recommendation(s). This report displays the results compiled for each monitoring item. Each monitoring item includes 1) the monitoring question and its indicator(s); 2) an evaluation of the monitoring results; and, 3) a finding on whether the recommendation(s) could be considered for future changes or not. The monitoring program is meant to "enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed" (36 CFR §219.12).

Status of Select Watershed Conditions

Best Management Practices

Have best management practices (BMPs) been implemented and are they effective at managing water quality consistent with the Clean Water Act?

- This monitoring question refers to Forest Plan Standards and Guidelines: FW-054, FW-056, FW-060, FW-068 to FW-070, and FW-072.
- Monitoring Indicators: United States Forest Service National BMP annual monitoring protocols.
- Background Information: 2019 marked the seventh year the Forest has performed monitoring using protocols set forth by the National BMP Monitoring Program. The Forest uses BMP monitoring to serve as a principle means for applying adaptive management measures aimed at protecting water quality from ground disturbing activities.

Monitoring Results

The Forest monitored BMPs at 23 activity sites from 2017 to 2019 to evaluate their implementation and effectiveness. Eight different activity categories were monitored across all four ranger districts on the Forest. At 16 of the 23 monitoring sites (70 percent) BMPs were either "mostly" or "fully" implemented as prescribed. At 21 of those sites (91 percent) BMPs were either "mostly" or "fully" effective at protecting water quality. As was the case at three of the sites, there was no post-activity risk despite a lack of prescribed BMPs. Table 2 summarizes the results of the monitoring.

Data

Monitoring is aimed at evaluating the level of effectiveness of implementing BMPs at the project scale. Implementation is rated as either fully implemented, mostly implemented, marginally implemented, or not implemented. Effectiveness ratings are either effective, mostly effective, marginally effective, or not effective.

Evaluations are typically conducted by select members of an interdisciplinary team, or specialists connected with the activity being monitored. Together they collect specifically defined information and observations (i.e., protocols) at the project site. Data are recorded in the field, and entered into a national database for tracking.

Table 2. BMP monitoring results.

Monitoring Item	Year Monitored	Implementation Rating	Effectiveness Rating[3]
Aquatic Restoration: Lost Creek	2019	Mostly	Effective
Aquatic Restoration: West Fork Hood River	2018	Fully	Effective
Aquatic Restoration: Bob's Pond side channel	2017	Mostly	Effective
Chemical Herbicide: Pinhead Creek blue-eyed grass	2019	Marginal	Effective
Facilities: South Lodge Addition Mt Hood Meadows	2019	Mostly	Effective
Facilities: Rhododendron Water Association	2018	Fully	Effective
Facilities: Big Eddy-Ostrander BPA[4] lines	2017	Fully	Marginal

[3] The target range is described as the level of effectiveness of the implementation of BMPs at the project site. Level of implementation is rated either as fully implemented, mostly implemented, marginally implemented, or not implemented; and the effectiveness rating is either effective, not effective, or marginal.

[4] Bonneville Power Administration

Monitoring Item	Year Monitored	Implementation Rating	Effectiveness Rating[3]
Fire: Jazz Fire	2018	Fully	Not Effective
Recreation: Knebal Spring Campground	2019	No BMPs	Effective
Recreation: Ladee OHV area	2018	Mostly	Mostly
Recreation: Buttercup ski lift Mt Hood Meadows	2018	Marginal	Effective
Recreation: Pebble Ford Campground	2017	Not	Effective
Recreation: Timothy Lake trail #528	2017	Mostly	Effective
Roads: Road #45 S. Fork Clackamas Crossing AOP[5]	2019	Mostly	Mostly
Roads: Road #1610 Hardened Stream Crossings	2018	Fully	Effective
Roads: Decommissioned Road #5710-015	2018	Fully	Effective
Roads: Road #3555 Mt Hood Meadows	2017	Mostly	Mostly
Veg. Management: Basalt timber sale unit #48	2019	Marginal	Effective
Veg. Management: Voodoo mastication unit #123	2017	Fully	Effective
Water Use: Cloud Cap/Tilly Jane Campground	2019	No BMPs	Effective
Water Use: Eightmile Creek pump chance	2018	No BMPs	Effective
Water Use: Camp Creek Campground well hand-pump	2017	Fully	Effective
Water Use: Canyon Creek hydro plant	2017	Mostly	Mostly

Monitoring Discussion, Findings, and Adaptive Management Considerations

Results of the BMP monitoring conducted from 2017 to 2019 reveal that there were seven cases in which BMPs were not implemented as intended. Contrary to what would be expected however, it was discovered that at all but two sites water quality was not compromised. Further review indicated that there were instances when prescribed BMPs were either not needed for water quality protection, or that current standard practices were adequate.

Monitoring at two sites indicated that despite measures to implement BMPs, protection of water quality was not achieved, so correction measures should be taken. One instance entails measures for minimizing erosion that could deliver sediment to water courses from access roads servicing high-tension powerlines. As a result of the monitoring, a restoration opportunity was ultimately identified, which included further collaboration with BPA to re-engage unified efforts for achieving resource protection objectives. In 2019, a project was executed to treat degraded segments of access roads to improve drainage and erosion control BMPs so that the observed effects were mitigated.

In another instance, a control hand-line had been constructed by initial attack crews directly adjacent to a steeply incised perennial stream during the emerging Jazz wildfire. Though the location selected to construct the control line was not ideal, it is understood that this was an extenuating circumstances during an emergency situation leaving little time for rumination about water resource protection.

Post-fire measures to repair suppression impacts offered a chance to reconcile unintended and unwanted lingering effects to water resources. In this case, the control line was in such a precarious and connected position in the steeply sided stream banks that repair measures were not effective at preventing

[5] Aquatic organism passage

sedimentation. Regrettably, corrective actions are not considered to be instantaneously practicable at this site, so it has been left to passively restore and revegetate naturally on its own.

Review of monitoring results at this site have been shared with suppression repair personnel (i.e., resource advisor) and lead fire fighters as a learning opportunity. For repair practitioners, it was acknowledged that there can be circumstances when the repair BMPs would not be expected to be very effective. Fire leaders continue to work with and train firefighters about control line location and to consider their options for protecting water sources even when they are secondary to quickly progressing suppression needs.

Status of Select Ecological Conditions

Fish Habitat Capability

Are Forest Plan Standards and Guidelines effective in maintaining or enhancing fish habitat capability?

- This monitoring question refers to Forest Plan Standard and Guideline FW-137, and the Northwest Forest Plan (NWFP) Standards and Guidelines for Riparian Reserves and the Aquatic Conservation Strategy (ACS).
- Monitoring Indicators:
    1. Stream habitat conditions from Forest Plan effectiveness monitoring;
    2. Abundance estimates of representative fish species (i.e., winter steelhead, coho salmon, and bull trout); and,
    3. The number of stream miles currently occupied by representative fish species (i.e., Pacific lamprey and bull trout).

Monitoring Results

The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) is a multi-federal agency program developed to assess the effectiveness of the ACS of the NWFP. The objective of the ACS is to maintain or restore the condition of watersheds in the NWFP area. Watershed condition is assessed by AREMP every five years for every sixth-field watershed based on upslope and riparian data derived from geographic information system (GIS) layers and satellite imagery. In-channel attributes are measured each year in a subset of watersheds to supplement the watershed condition assessments and validate the models used to assess stream condition. AREMP tracks changes in watershed condition over time; and reports on the NWFP's effectiveness across the region. Between 2017 and 2019 the AREMP program sampled 88 (25 in 2017, 31 in 2018, and 32 in 2019) random sixth-field watersheds across Washington, Oregon, California, with five of the watersheds (Pot Creek, Middle Bull Run River, Still Creek, Linney Creek, and Headwaters of Fifteenmile Creek) on the Forest.

The AREMP data, which is gathered every five years, is added and analyzed in the previous report, with the latest available report covering the years 1993-2013. The 25-year report (1993-2018) was not available at the time of this report. Key results for stream conditions across the NWFP area include:

- Improvements in streambed sediment, macro-invertebrates, and water temperature suggest that improvements in roads and vegetation are having the desired effects in the streams. Improving trends were detected for both macroinvertebrate diversity (+0.03/1.0) and water temperature (-1.3° C).
- Individual components of the physical habitat index varied; substrate showed a positive trend, while in wood and pool tail fines had no significant change.

In addition, in 2018 AREMP visited 21 diversion sites on the Forest, 13 had some type of diversion structure while no diversion was found at eight other sites. No diversions were flagged as requiring more attention (i.e., there were no concerns) on the Forest. Results of all AREMP monitoring can be found on the Regional Ecosystems Office (REO) website[6].

[6] fs.fed.us/r6/reo/monitoring

The fish abundance and distribution information is used to better understand habitat use and capability for individual fish species as well as to focus recovery efforts for Endangered Species Act (ESA) listed or sensitive fish species habitat. Forest Service personnel, in collaboration with government, non-government, and Tribal partners, monitor fish production in each basin. A subset of that monitoring is briefly summarized here: 1) Hood River bull trout spawning surveys, 2) the Clackamas River bull trout re-introduction: spawning surveys and monitoring distribution in the upper Clackamas River basin, 3) smolt production monitoring in the Sandy River Basin for long-term population estimates, and 4) Pacific lamprey recolonization post Powerdale Dam removal in the Hood River Basin.

Hood River bull trout:

The Forest's Hood River Ranger District in collaboration with the Oregon Department of Fish and Wildlife, Middle Fork Irrigation District, and the Confederated Tribes of the Warm Springs Reservation of Oregon, conducts annual spawning surveys for bull trout in the Upper Middle Fork Hood River sixth-field watershed[7]. Although bull trout use areas downstream of the Forest, the only known spawning habitat is located on the Forest, within the Middle Fork of the Hood River, primarily in Clear Branch Creek and Pinnacle Creeks. The size of the Hood River bull trout spawning population remains small but relatively stable (Figure 1). The low numbers are a concern due to the potential for inbreeding and loss of genetic fitness.

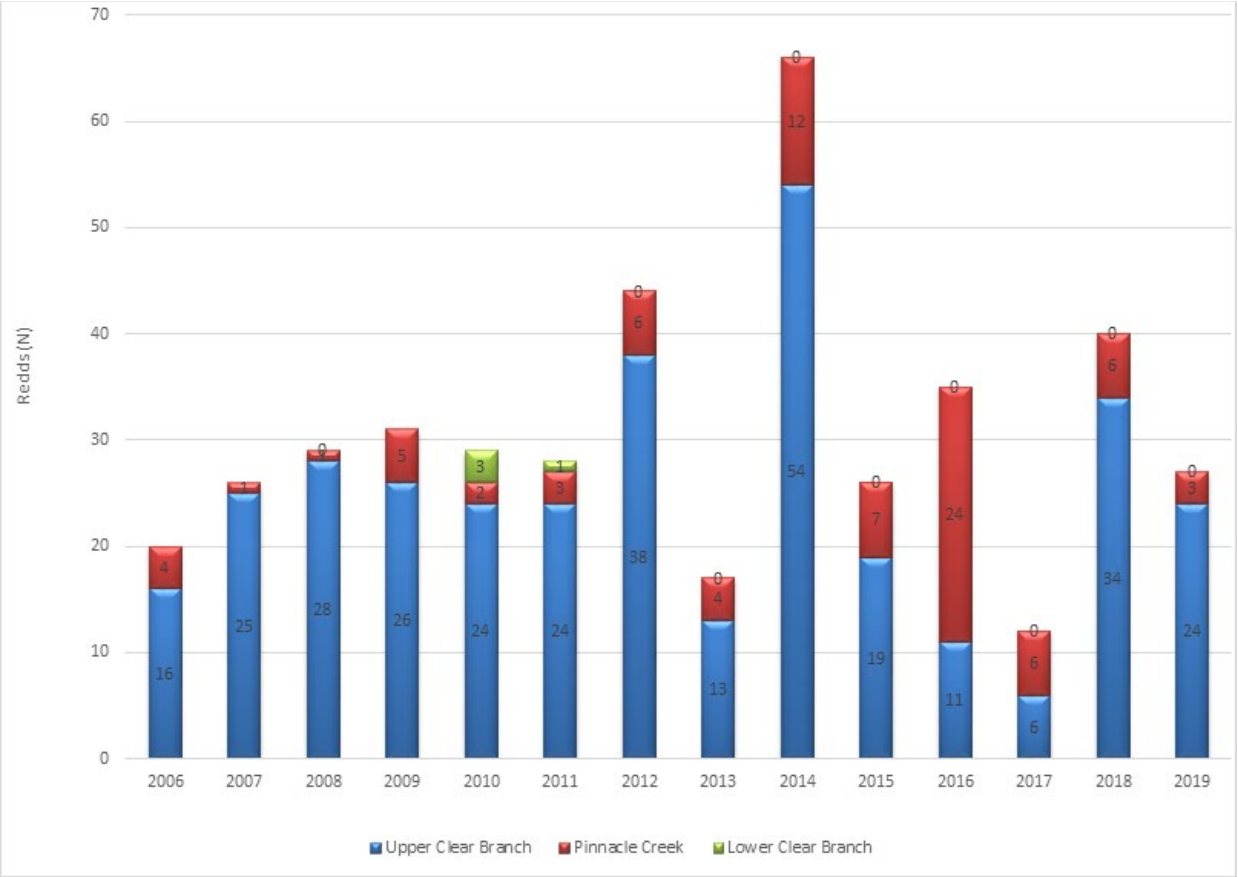

Figure 1. Total number of bull trout redds counted in Clear Branch above and below the dam and in Pinnacle Creek each year from 2006 – 2019. Lower Clear Branch was never surveyed over the entire spawning season and was not surveyed at all in 2006, 2007, and 2009.

Clackamas River bull trout:

Bull trout were once abundant in the Clackamas River basin but were extirpated around the 1970's due to

[7] Saiget, Darcy. Hood River bull trout spawning survey report 2006-2017, USDA Forest Service, Mt. Hood National Forest, Hood River Ranger District. Parkdale, Oregon. June 2018.

human actions. With the goal to expand the distribution of this federally-listed threatened fish species, an interagency working group, including the Forest, U.S. Fish and Wildlife Service, Portland General Electric, and Oregon Fish and Wildlife Department, developed a feasibility assessment (2007) and implementation plan (2011) to reintroduce bull trout to a portion of its historic habitat. From 2011-2016, 2,836 bull trout were translocated from the Metolius River basin to the Clackamas River basin[8]. Since then, monitoring including redd surveys, use of passive integrated transponder (PIT) tag technology, and eDNA (environmental DNA) surveys, have documented bull trout are successfully spawning and rearing in the upper Clackamas River, with key spawning and rearing areas all located on the Forest.

From initial release in 2011 to 2018, the number of bull trout redds have steadily increased from 5 to 80 in the primary spawning stream, Pinhead Creek, which has been surveyed annually. Additional monitoring, including eDNA surveys, has shown that bull trout are currently distributed in upper Clackamas River, Last Creek, Oak Grove Fork, Roaring River (eDNA detection in 2017 and 2019, although spawning not yet confirmed), and Berry Creek (spawning confirmed for the first time in 2019). This successful re-introduction plan is unique in being the only known range-wide attempt to return bull trout to a historically occupied watershed.

Sandy River basin smolt monitoring program:

In 1989, employees with the Zigzag Ranger District Fisheries Program of the Forest began a multi-year steelhead trout and coho salmon smolt monitoring study on Still Creek in the Upper Sandy River Basin. In 2009, the study broadened to include collaboration with the Portland Water Bureau and the Oregon Department of Fish and Wildlife. The sampling design involves monitoring different sets of tributaries every year. Some tributaries are monitored every year; others are monitored on an irregularly rotating basis. The study is intended to provide basin-scale trends after 20 years to better understand fish use, abundance and distribution throughout the Sandy River basin, and, more recently, supporting efforts to evaluate the effects of the removal of Marmot Dam in 2007 and the Little Sandy Dam in 2008.

Smolt production was monitored in Lost Creek, Still Creek, Clear Creek, Salmon River, Cedar Creek, the Little Sandy River, the Bull Run River, Gordon Creek, and Beaver Creek in 2018. Most steelhead and coho smolt population estimates were relatively high compared to the previous eight years of the Sandy River Basin Smolt Monitoring Program. Still Creek and Gordon Creek produced a record number of coho smolts, and the Salmon River produced a record number of both steelhead and coho smolts. The relatively high numbers of coho smolts emigrating from several streams in 2018 stood in contrast to the relatively low estimated number of coho spawners observed in the parental generation (autumn of 2016). The record-high production of coho by Still Creek, the Salmon River, and Gordon Creek is likely related to extensive fish habitat restoration projects[9].

Recolonization of the Little Sandy River by steelhead after the removal of Little Sandy Dam in 2008 was immediate and continued through 2018, the latest year of available data. The 2011 steelhead smolt population for the Little Sandy River was comparable in terms of smolts per unit length and area of stream to other streams of similar size where access by steelhead was never blocked, like Gordon Creek and Still Creek. Chinook and coho have also recolonized the Little Sandy River but juvenile production was fairly low from 2008-2018.

More detailed information can be referenced in the Sandy River Basin Smolt Monitoring Report (Appendix F) of the Bull Run Habitat Conservation Plan report[10].

Pacific lamprey distribution expansion in the Hood River:

The three primary tributaries to the Hood River, West Fork, Middle Fork and East Fork, all originate on the Forest before joining and entering the Columbia River in the Bonneville pool between Bonneville Dam and The Dalles Dam. Pacific lamprey have been blocked from the upper Hood River on the Forest since 1923

[8] Clackamas River bull trout reintroduction project fws.gov/oregonfwo/Species/Data/BullTrout/ReintroductionProject.asp
[9] A report on a decade of restoration work and results for the Sandy River (2007-2017): sandyriver.org/wp-content/uploads/2017/10/State-of-the-Sandy-.pdf.
[10] portlandoregon.gov/water/article/746838

when Powerdale Dam was completed at approximately river-mile 4 on the Hood River. In October 2010, Powerdale Dam was decommissioned, and all in-channel structures removed.

Within a few years of the removal of this barrier dam, the Confederated Tribes of Warm Springs staff documented Pacific lamprey moving past the old dam site and recolonizing the upper river. By 2014, ammocoete distribution was nearly 4.4 miles above the detected location in 2012. As of 2017, Pacific lamprey are now in the East Fork Hood River almost up to the Forest boundary, with no barriers to prevent their use of high quality habitat on-forest. Although ammocoete distribution continues to expand in the East Fork Hood River, there is no evidence of distribution into the Middle or West Forks of the Hood River, although suitable habitat is available[11].

The Forest is currently planning, and applying for funding and continuing partnerships, to monitor Pacific lamprey distribution on the Forest using a non-invasive technique of sampling for eDNA (environmental DNA) to detect Pacific lamprey occurrence. Our goal is to identify recolonization rate, as well as to prioritize habitat restoration projects to benefit lamprey in concert with salmonid populations.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Reviewers of results of the AREMP, and the fish abundance and distribution monitoring by Forest and local area agencies, show that aquatic habitat conditions are being maintained across the Forest since NWFP implementation. In addition, federally threatened and sensitive fish species are increasing in distribution to occupy available habitat on National Forest System lands.

Continued aquatic restoration projects, implemented in collaboration with partners and stakeholders, will further improve conditions and ensure an abundance of high quality habitat on the Forest for conservation and recovery of many fish species in the local region.

Survey and Manage Species

Are habitat improvement projects contributing to the persistence of survey and manage species?

- This monitoring question refers to NWFP standards and guidelines for survey and manage species.
- Monitoring Indicator: Acres of habitat enhanced for survey and manage species.

Monitoring Results and Data

The NWFP outlined additional protection for rare species closely associated with late-successional old-growth habitat. The NWFP survey and manage guidelines are intended to mitigate potential effects from agency actions to approximately 300 flora and fauna species including mosses, liverworts, fungi, lichens, vascular plants, slugs, snails, salamanders, great gray owl, and red tree voles.

Since the NWFP, projects on the Forest have generally been planned to avoid potential habitat (stands >80 years old and spring-fed systems), if possible. In cases where treatment was desired in mature stands, required surveys were completed and known sites protected from ground disturbing activities.

From 2017-2019, a total of 12,142 project acres were surveyed to locate and buffer all potential survey and manage sites.

The Forest provides potential habitat for 11 species of NWFP fauna survey and manage species, including:

1. Larch Mountain salamander (*Plethodon larselli*)
2. Great gray owl (*Strix nebulosa*)
3. Red tree vole (*Arborimus longicaudis*)
4. Columbia Oregonian (*Cryptomastix hendersoni*)

[11] Lamprey recolonization in the Hood River:
https://www.fws.gov/pacificlamprey/Documents/Lamprey%20Info%20Exchange_2018/Restoration_Recolonization_Speed%20Session/3_Johnsen.pdf
https://www.fwspubs.org/doi/suppl/10.3996/042016-JWFM-033/suppl_file/fwma-08-01-14_s5+reference+s1.pdf

5. Crater Lake tightcoil (*Pristiloma arcticum crateris*)
6. Dalles sideband (*Monadenia fidelis minor*)
7. Evening fieldslug (*Deroceras hesperium*)
8. Panther jumping slug (*Hemphillia pantherina*)
9. Puget Oregonian (*Cryptomastix devia*)
10. Basalt Juga (*Juga O. sp. 2*)
11. Columbia Duskysnail (*Colligyrus greggi*)

Monitoring Discussion, Findings, and Adaptive Management Considerations

Obligate aquatic species (Basalt Juga and Columbia duskysnail) were surveyed and known sites evaluated for potential project impacts. In almost all cases stream/spring habitat are already delineated and protected by NWFP riparian protection buffers. With these conservation measures in place, the Forest is contributing to the persistence of survey and manage species as described in the NWFP.

Terrestrial survey and manage species include the larch salamander, the great grey owl, the red tree vole, and seven terrestrial mollusks identified above. These species were surveyed and known sites evaluated for potential impacts for all projects occurring in potential habitat. Successful conservation measures developed during project analysis, and put in place during implementation, indicate that there are no recommended changes. The Forest continues to contribute in a positive way to the persistence of survey and manage species.

Invasive Species

Are known populations of invasive species continuing to spread? Are new infestations occurring?

- This monitoring question refers to Forest Plan Standards and Guidelines: FW-375 to FW-377, FW-384, and Forest Plan amendments 13 and 15.
- Monitoring Indicators: Acres of surveyed lands with new and active invasive species infestations, and acres treated.

Monitoring Results

The monitoring results indicate that populations of invasive species are continuing to spread and new infestations are being recorded on the Forest. This is reflected as an increase in acres infested with weeds over the past several years. However, the existing database inventory does not accurately represent all invasive plant infestations on the Forest. Annual treatments are recorded, but it is difficult to prove that sites have been eradicated. Many weeds have seeds which will persist in the soil and remain viable for several years or more. Treatment of an infestation does not necessarily result in the immediate elimination of the infestation, particularly when multiple treatments are required to affect a change in the target infestation. Treatments can include actions within any of the four general categories of integrated pest management techniques: biological treatments, cultural treatments, physical/mechanical treatments, or chemical treatments. Awareness, treatment capacity, and funding have increased which contributes to a rise in the number of acres identified.

Botanists continue to map infestations that have not been previously mapped. These sites are not necessarily "new" sites, rather they simply may not have been mapped before. For this reason, there is no true baseline in which to analyze from. A recent increase in staffing, as well as seasonal crews, and partnerships, has allowed the Forest to conduct additional mapping efforts within the last three years. Systematic annual surveys and data entry have been prioritized to develop an accurate baseline. Revisiting older infestations allows us to accurately re-measure infestations to document any increase or decrease in size.

In 2011, the Forest moved all the inventory data into a spatial natural resource management database called the Threatened, Endangered and Sensitive Plant – Invasive Plant database (TESP-IS). The data in Table 3 are query results for new and edited inventory records by calendar year beginning in 2012.

Table 3. Invasive species acres inventoried over time.

Calendar Year	New Inventory Acres	Edited Inventory Acres
2012	1148	453
2013	311	942
2014	369	332
2015	68	1060
2016	72	47
2017	89	290
2018	697	336
2019	656	2,950

Monitoring Discussion, Findings, and Adaptive Management Considerations

The desired future condition (amended to Forest Plan in 2005) states, "In National Forest lands across Region Six, healthy native plant communities remain diverse and resilient, and damaged ecosystems are being restored. High quality habitat is provided for native organisms throughout the region. Invasive plants do not jeopardize the ability of the National Forests to provide goods and services communities expect. The need for invasive plant treatment is reduced due to the effectiveness and habitual nature of preventative actions, and the success of restoration efforts."

The Forest Plan monitoring results indicate that the Forest is making progress reducing invasive species. The Forest is also realizing an increasing trend in our ability to prevent and document new infestations. Management continues for invasive species and there is no need to reduce treatments.

Forest management activities as modified by the Region 6 FEIS[12] have positively influenced invasive plant management, and monitoring results. There is support from other resource and business areas to adhere to the invasive species management and prevention standards and to assist with treatment efforts. Several management activities have influenced the monitoring results:

- Treatments of populations with herbicides and hand removal have reduced the density and spread of high priority infestations on the Forest;
- All ground-disturbing projects utilize a risk assessment to determine the risk of weed introduction and spread. Projects also identify mitigations to reduce this risk;
- All projects follow Region 6 standards and guidelines to prevent invasive species;
- We have increased our partnerships and volunteer groups to survey and/or treat more acres of weeds each year; and,
- Education events and phone-based apps for early detection and rapid response to weeds of concern has increased the number of reports for new populations on the Forest.

Monitoring results suggest that changes in management activities within the Forest Plan area may be warranted. To reduce invasive weed populations to manageable or declining levels, the treatments and follow-up restoration actions need to be increased. All programs must adhere to BMPs and regional direction to reduce the risk of new infestations. Education and outreach must also be prioritized to increase awareness, early detection and rapid response among our forest visitors. No changes to the monitoring program are recommended

Landslides, Debris Slides, Debris Flows and Earthflow

Are projects designed to prevent reactivation or acceleration of landslides, debris slides, debris flows, and earthflows?

- This monitoring question refers to Forest Plan Standards and Guidelines: FW-001 to FW-021, and B8-001 to B8-055.

[12] USDA Forest Service, Record of Decision, Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants, 2005, fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5302164.pdf

- Monitoring Indicator: Description of projects that are near landslides, debris slides, debris flows, and earthflow areas, and how the projects affect stability.

Monitoring Results

Whenever activities are proposed in terrain where slope stability may be an issue, specialists in geology, soils, or engineering are consulted. Four projects were monitored between 2017 and 2019 where slope stability is an issue or concern. Two were vegetation management projects and two were road-related reconstruction projects. New and ongoing vegetation management projects that encompass terrain where slope-stability has been a known consideration are the Zigzag Integrated Resource and Whale planning projects. The latter is in its first year of planning, while the former is in its second year. The road reconstruction projects included segments of Forest Road 46 above Rainbow Campground and Forest Road 45 known locally as the Memaloose Road. Repairs to Forest Road 46 began in 2017 while the Memaloose Road reconstruction project was in the design phase.

Monitoring Discussion, Findings, and Adaptive Management Considerations

The Whale project is in its initial phase of planning; identifying previously managed forest stands where opportunities for thinning are being considered. The planning area is located on both sides of the Fish Creek divide, an area prone to various types of landslides. Initial planning efforts have included the compilation of landslide information and geologic mapping. Empirical spatial data and observational inventories have been acquired to-date. The data will aid and support ongoing field reconnaissance and validation of landslide risk in relation to potential thinning opportunities. Sampling in units considered for thinning will take place during the 2020 field season to identify and determine if any unstable or potentially unstable terrain is present and needs to be safe-guarded from proposed activities. The proposed action, treatment units, and final project area boundaries will be dependent (in part) upon these initial findings prior to the preparation of an environmental assessment (EA).

The Zigzag Integrated Resource project is in its final phases of planning. It encompasses two distinct and disparate areas. The Horseshoe area has landslide prone terrain. Design criteria for the project has incorporated potential landslide risk into its configuration. Thinning treatments would be excluded from terrain where the potential for landslides is a notable risk. Riparian Reserve buffers have been customized to incorporate unstable and potentially unstable zones. BMPs and project design criteria (PDC) have been developed to avoid further effects of proposed activities to landslide prone terrain. Existing roads that are planned for use during project implementation would be improved so that their effect on potentially unstable slopes would be minimized.

Repair of two segments of primary arterial roads that are located on hillslopes prone to landslides has been ongoing. One project has been completed. It entailed segment of NFS Road 46 where it crosses above Rainbow Campground. Repair at this location entailed reconstruction using design features to stabilize the slope. Potentially unstable material of the entire toe slope was excavated, removed, and then backfilled with engineered lifts of interlocking geotextiles and rockwork.

The Memaloose Road site is still in the planning phase. This segment of road crosses both NFS and Bureau of Land Management (BLM) lands. Design of this repair is underway by engineers and geotechnicians. Field surveys have mostly been completed and work is scheduled to occur in 2020 or 2021 depending upon when funding becomes available. Design features would include BMPs and PDC to minimize effects to water resources during construction activities. All four of the projects selected to monitor between 2017 and 2019 have been, or will be completed so that slope stability is maintained, and to prevent activation or reactivation of unstable slopes or landslide features.

Status of Focal Species[13]

Pileated Woodpecker[14]

What is the trend of mature and late-successional habitat needed for pileated woodpecker persistence?

- This monitoring question refers to the Forest Plan desired condition that habitat is managed for the pileated woodpecker.
- Monitoring Indicator: Acres of late-successional and old growth habitat on the Forest tracked over time. These are acres that contain 10 or more trees per acre that are greater than 20 inches in diameter at breast height (DBH).

Monitoring Results

The pileated woodpecker is one of the Forest's Management Indicator Species (MIS) and is associated with mature and old growth forests (coniferous and mixed deciduous-coniferous forest types) that typically contain large snags and down wood. They also utilize younger forests if there are scattered large trees and down wood present. Overall, this metric has been steadily increasing since the Forest Plan was written in 1990. Evidence of the 2017 Eagle Creek Fire exists in the dip between 2017 and 2018.

Data

As technology advances, data analysis tools also evolve. The data for the graph below are based on a new annual time series of maps that supersedes previous versions used to compile graphs in previous reports. Data for the 2018 and 2019 forest analysis are currently being developed by the Oregon State University's Landscape Ecology, Modeling, Mapping, and Analysis (LEMMA) team using the vegetation structure; Gradient Nearest Neighbor (GNN).

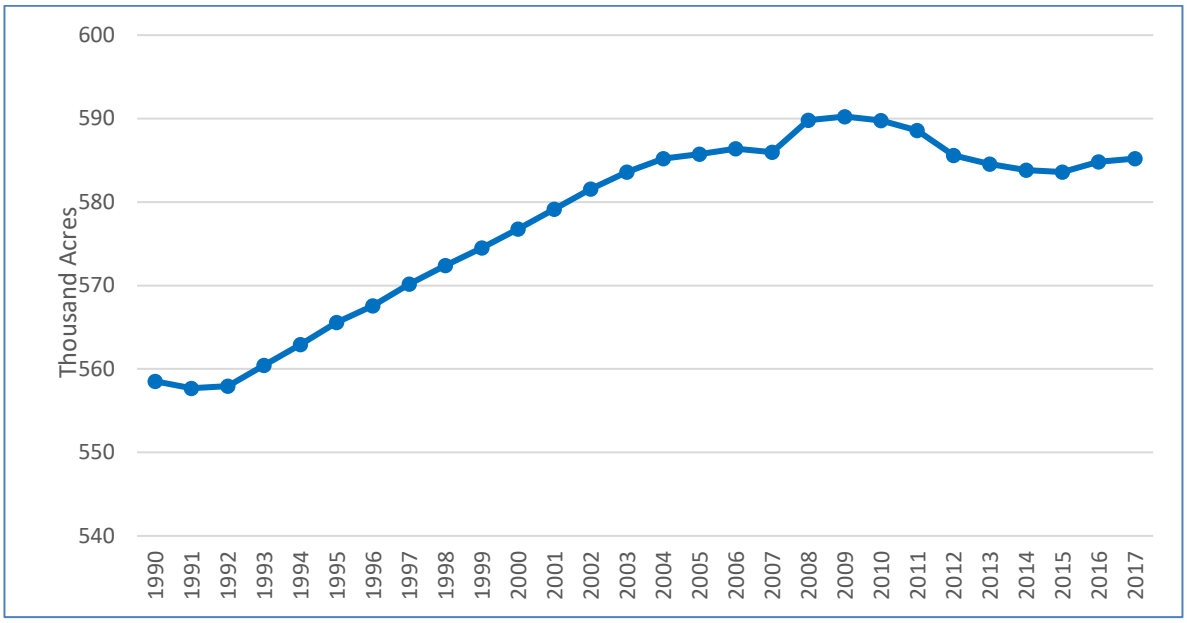

Figure 2. Acres of pileated woodpecker habitat over time.

[13] The 2018 and 2019 areal analysis that supports this the wildlife findings in this report is currently being developed by the LEMMA group in conjunction with the Northwest Forest Plan 25 year Report.

[14] Data for the pileated woodpecker, American marten, Western gray squirrel, Deer and Elk, and the Northern Spotted Owl was provided by Oregon State University's LEMMA vegetation structure GNN dataset https://lemma.forestry.oregonstate.edu/about.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Range-wide within Canada and the United States, the pileated woodpecker population has steadily increased from 1966 to 2015, according to the North American Breeding Bird Survey (Sauer et al., 2017). As shown in Figure 2, the trend for the pileated woodpecker is increasing at the Forest and range-wide scale. The increasing trend does not compel a recommendation for changes in the Forest's management strategy for this focal species.

American Marten Error! Bookmark not defined.

What is the trend for mature and late-successional habitat above 3,500 feet needed for American marten persistence?

- The monitoring question is tracking the Forest Plan desired condition that habitat is managed for the American pine marten.
- Monitoring Indicator: Acres of late-successional and old growth habitat above 3,500 feet elevation on the Forest tracked over time that is currently in mature or late-successional stage, with greater than 50 percent canopy cover were used in this evaluation.
- Background: The American marten is one of the Forest's MIS and is associated with mature and old growth coniferous Forests, generally above 3,500 feet in elevation. Optimal habitat would contain greater than 50 percent canopy cover, with complex cover components (i.e., down trees, rock piles, shrubs/brush).

Monitoring Results

Overall, American marten habitat has been increasing since the development of the Forest Plan, but as shown in Figure 3, these acres plateaued between 2002 and 2005. From 2006 to 2011, mature and late-successional forests (above 3,500 feet elevation) acreage declined largely due to multiple large fires in or adjacent to the Mt. Hood Wilderness and Bull of the Woods Wilderness. Since 2011, marten habitat acreage leveled out as almost all fires were at lower elevations, coupled with several years of low fire activity on-Forest. From 2012 to 2017, the trend for forest stands that meet this metric stayed relatively constant with a slight decline (152,975 to 152,312 acres).

Data

As technology advances, data analysis tools also evolve. The data for the graph below are based on a new annual time series of maps that supersedes previous versions used to compile graphs in previous reports. Data for the 2018 and 2019 forest analysis are currently being developed by the Oregon State University's LEMMA team using the vegetation structure GNN.

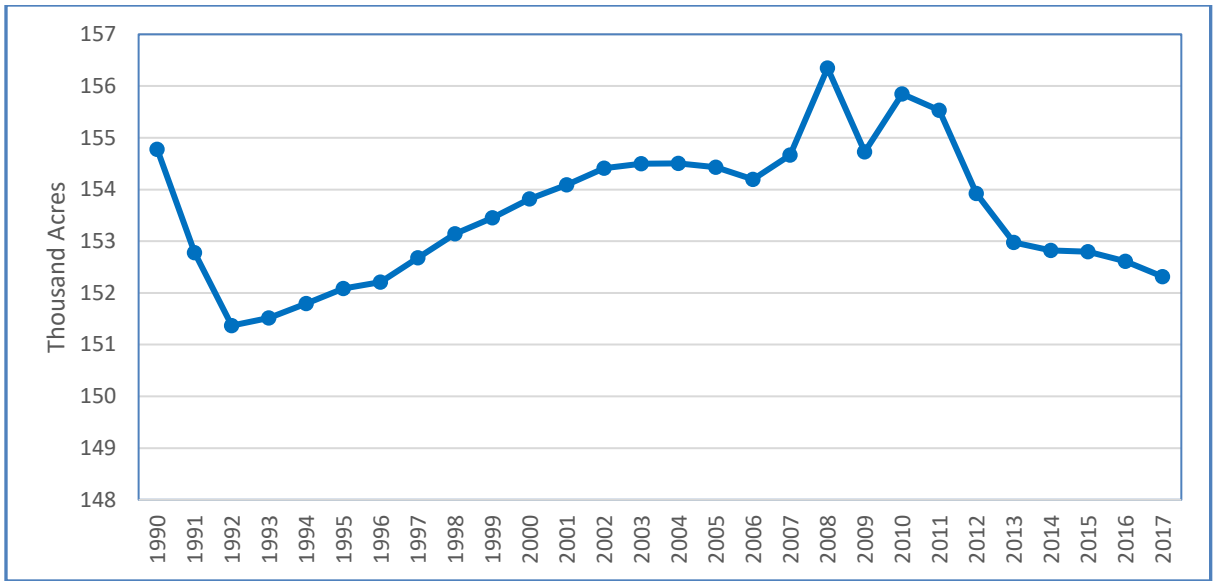

Figure 3. Acres of American marten habitat over time.

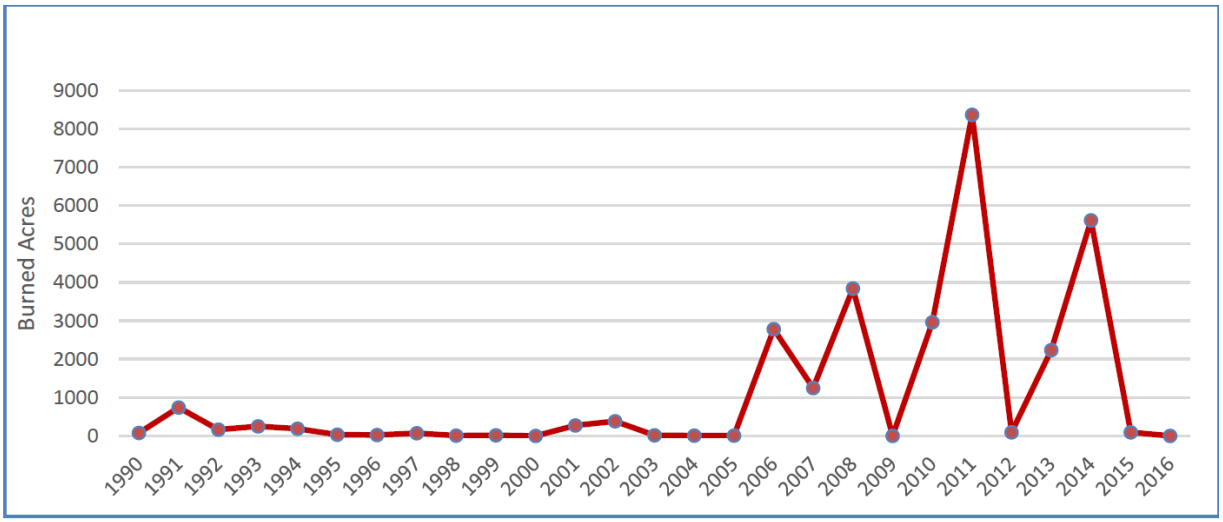

Figure 4. Burned acres on the Forest between 1990 and 2016.

Monitoring Discussion, Findings, and Adaptive Management Considerations

The fires that caused the decrease in habitat shown in Figure 3 resulted from naturally occurring lightning strikes. The habitat fluctuations between 2007 and 2012 mirror fire activity on-the-ground. The aerial imagery used for this analysis may be impacted by the ground conditions (i.e., large amounts of soot) potentially skewing some analysis.

There are no recommendations for changes because the Forest has been maintaining and continues to maintain habitat for this species. Acknowledging that there will be natural fluctuations in available habitat due to wildfire activity, the American marten's habitat on the Forest is on a trend that is consistent with the Forest Plan.

Western Gray Squirrel Error! Bookmark not defined.

What is the trend for oak pine habitat needed for the Western gray squirrel persistence?

- The monitoring question is tracking the Forest Plan desired condition that habitat is managed for other wildlife species represented by the named MIS.
- Monitoring Indicator: Acres of oak pine habitat tracked over time that contain greater than or equal to 80 percent ponderosa pine and/or Oregon White Oak basal area.
- Background: The Western gray squirrel is one of the Forest's MIS that is strongly associated with forested stands with high ponderosa pine and Oregon white oak components. Studies in south central Washington and north central Oregon, and in areas both within the Forest boundary or immediately adjacent, show that the nest and core areas are in coniferous stands that contain approximately 80 to 95 percent ponderosa pine and/or Oregon white oak, mixed with Douglas-fir (Foster, 1992; Linders and Stinson, 2007).

Monitoring Results

As technology advances, data analysis tools also evolve. The data for the graph below are based on a new annual time series of maps that supersedes previous versions used to compile graphs in previous reports. The data in Figure 5 shows a steady decline from 1990 (32,896 acres) to a low in 2004 (27,777 acres). Habitat has steadily increased since 2008 to approximately 29,431 in 2017. This timing is coincident with the Forest's priority to restore fire-adapted stands to a more natural range of vegetative conditions using fuel reductions projects.

Data

Data for the 2018 and 2019 forest analysis are currently being developed by the Oregon State University's LEMMA team using the vegetation structure GNN. All data below supersedes previous graphs in earlier reports.

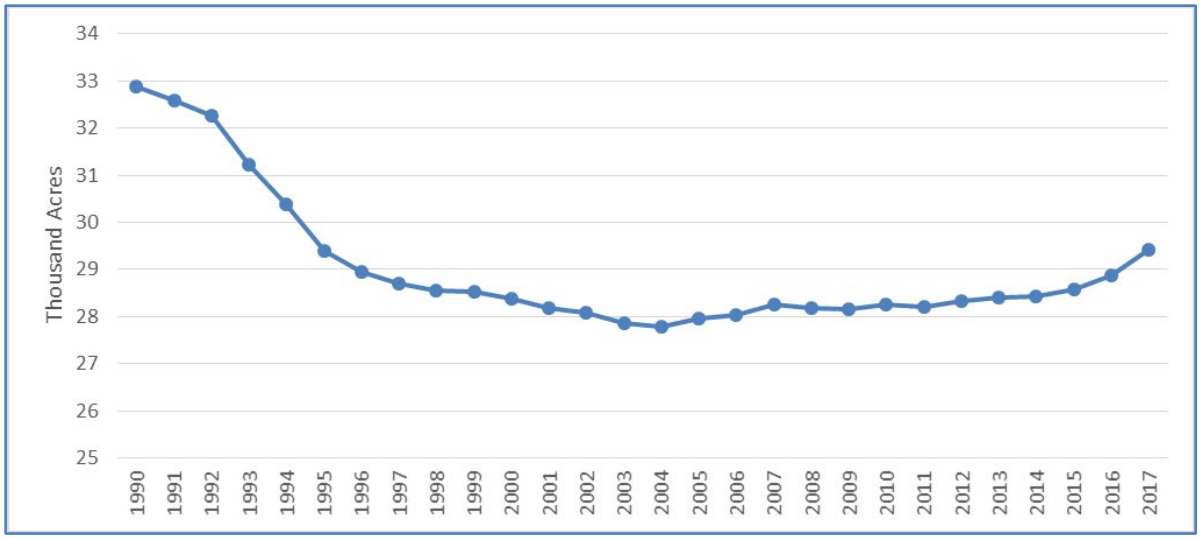

Figure 5. Acres of Western gray squirrel habitat over time.

Monitoring Discussion, Findings, and Adaptive Management Considerations

The goal of fuel reduction projects included silvicultural prescriptions to favor ponderosa pine, oak, and other fire-resistant species, which remove thick understory that resulted from decades of active wildfire suppression. These fuel reduction projects are currently being planned and implemented, and thus will continue to improve pine/oak habitat required by the Western gray squirrel. Therefore, changes to management strategies for the Western gray squirrel are not recommended at this time.

Deer and Elk

What is the trend for early seral habitat needed for deer and elk persistence?

- The monitoring question is tracking the Forest Plan desired condition that habitat is managed for

other wildlife species represented by the named MIS.

- Monitoring Indicator: Acres of early seral habitat tracked over time. The Forest used acres of habitat with less than 40 percent canopy cover to measure deer and elk habitat.

Monitoring Results

From 2012 to 2017, early seral habitat slightly decreased from 91,371 to 86,514 acres. Overall, this habitat has steadily decreased since 1990 (high of 155,880 acres) to present day as illustrated in Figure 6. This decreasing trend is consistent with the sharp decline in federal timber harvest starting in the early 1990's, and the reduction of clear cut (regeneration harvest) methods that would have maintained early seral forage preferred by deer and elk[15]. The slight increase in 2012 is likely due to high-severity large fires that created early seral habitat.

Data

The data in Figure 6 are based on a new annual time series of maps that supersedes previous versions used to compile graphs in previous reports. Data for the 2018 and 2019 forest analysis are currently being developed by the Oregon State University's LEMMA team using the vegetation structure GNN.

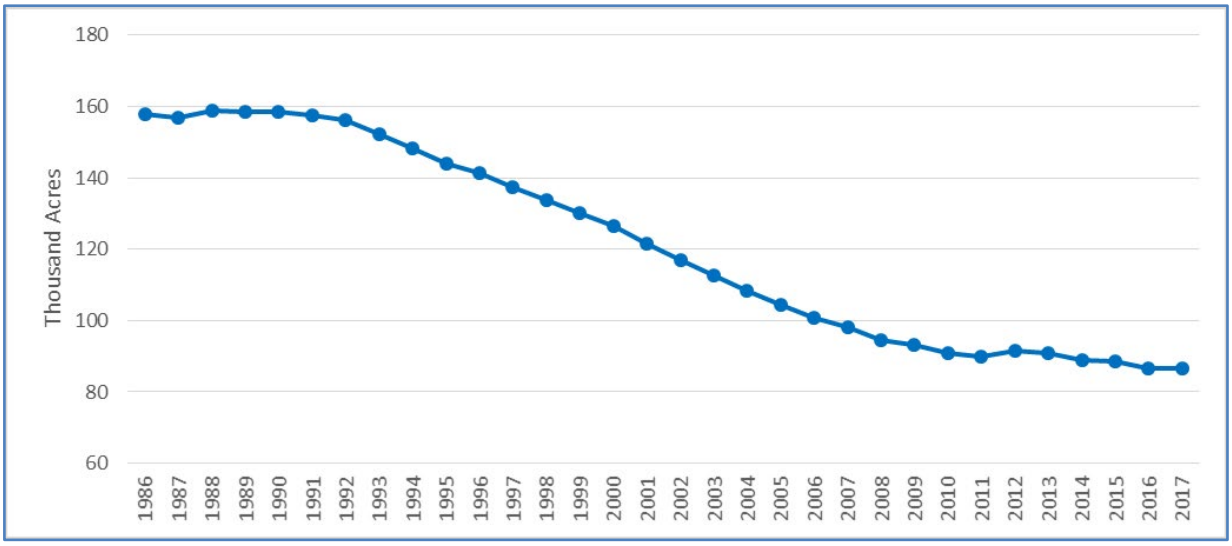

Figure 6. Acres of early seral habitat for deer and elk forage.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Overall, the Forest is in a declining trend for this habitat type even though most vegetation management projects include the creation and enhancement of forage at a small scale. A change in management strategy at the project and landscape level is recommended. In an effort to see a positive trend for deer and elk habitat, future projects should incorporate big game forage enhancement opportunities to a much greater extent.

Starting in 2010/2011, the habitat decline starts to flatten. This trend continues into 2017. Based on current management strategies we expect this trend to continue (with potential for a slight increase) into 2018 and 2019.

[15] Oregon Department of Fish and Wildlife (ODFW). 2008. *Oregon Black-Tailed Deer Management Plan*.

Status of Ecological Conditions for Threatened, Endangered, and Proposed Candidate Species

Aquatic Habitat Complexity

Are standards and guidelines effective in maintaining or enhancing aquatic habitat complexity?

- The monitoring question is tracking FW-139 to FW-147 and NWFP Standards and Guidelines for Riparian Reserves and the Aquatic Conservation Strategy
- Monitoring Indicator: Number of stream miles restored for ESA and sensitive listed fish species (i.e., steelhead, Chinook, coho, Pacific lamprey, bull trout, rainbow trout, and cutthroat trout).
- Background: The Forest Plan goals for the fisheries program are to maintain aquatic habitat quality, as well as diverse and sustainable fish populations. Aquatic resource monitoring is the starting point to track the status of populations of concern, such as ESA-listed fish; develop long-term data sets on population trends; and conduct effectiveness monitoring for restoration projects designed for habitat recovery and long term sustainability of fish populations. Federally-listed fish species on the Forest include steelhead, coho, Chinook, and bull trout.

Monitoring Results

In 2010, the Forest Service initiated a Watershed Condition Framework methodology nationwide as an approach for evaluating and strategically focusing resources and funds in implementing watershed restoration. The Forest has since used this methodology to rank, prioritize, and target watershed restoration projects at both channel and upland sites to best benefit local fish and watershed resources.

The Watershed Condition Framework initiative has now resulted in the completion of all restoration projects listed in Watershed Restoration Action Plans for two watersheds on the Forest: Still Creek and Upper West Fork Hood River.

Still Creek

Beginning in 2012, the Zigzag Ranger District and its partners performed extensive restoration work within the Still Creek watershed to provide for habitat to recover healthy populations of threatened fish species including spring Chinook salmon, coho salmon, and winter steelhead. Restoration was guided by the 2011 Still Creek Watershed Restoration Action Plan, which identified 19 essential projects to be completed in-stream, within the riparian zone, and at the watershed scale, including:

- Placement of 2,300 pieces of instream and floodplain large wood for habitat creation/cover;
- Reconnection of 6.5 miles of side channel habitat, replacement of 5 (culverts) passage barriers, restoration of riparian vegetation; and,
- Installation of 30 road-related sediment control structures.

These projects restored 8 miles of main channel habitat on Still Creek and 3.2 miles of tributary stream habitat for ESA-listed salmon and steelhead, with 4.9 miles restored during 2017-2019.

Total investments in the watershed amounted to nearly $2.2 million dollars that includes investments from partners such as The Freshwater Trust, Clackamas County, Columbia Land Trust, METRO, Multnomah County, National Marine Fisheries Service, The Nature Conservancy, Northwest Steelheaders, Oregon Department of Fish and Wildlife, Portland Water Bureau, Sandy River Basin Watershed Council, Bureau of Land Management, and Western Rivers Conservancy.

West Fork Hood River[16]

Similarly, since 2013, the Hood River Ranger District and its partners, has implemented 12 essential projects identified in the 2012 Upper West Fork Hood River Watershed Restoration Action Plan to recover habitat of threatened fish species including spring Chinook salmon, summer steelhead, and coho. Projects included instream/floodplain large wood placement, riparian thinning, invasive plant control/eradication, stream passage remediation, and road stormproofing/decommissioning. During 2017-2019, a total of 4.3 miles of ESA-listed salmon and steelhead was restored in the West Fork Hood River.

The total six-year funding investment is currently still being totaled, but the 2019 investment in the watershed alone amounted to nearly $256,500. Key partners include the Confederated Tribes of the Warm Springs Reservation of Oregon, Bonneville Power Administration, The Oregon Watershed Enhancement Board, Ecotrust Forest Management, and the Hood River Watershed Group.

Other restoration projects to restore aquatic habitat quality from 2017-2019 include:

- Restoring spawning gravel downstream of constructed dams/reservoirs. Dams, and their intended reservoirs, trap spawning-sized gravel from naturally moving downstream, resulting in reaches below dams unnaturally lacking in suitable sized substrate (typically around 0.75-3" diameter gravel). Spawning-sized gravel (430 cubic yards) was thus placed below reservoir dams on the Oak Grove Fork of the Clackamas River to benefit around 4 miles of stream for anadromous salmon and steelhead below Lake Harriet Dam, and resident native trout below Timothy Lake dam and Stone Creek Dam. Suitable-sized gravel were placed in the channel margins or on point bars as much as possible to allow for gradual transport downstream with periodic high water events over the following winter and spring. Key partners include Portland General Electric, Oregon Department of Fish and Wildlife, and City of Portland Water Bureau. The project timeline for this project was for annual placement from 2015-2020 in the Oak Grove Fork of the Clackamas River.
- High lakes garbage cleanup and closure of user-created dispersed sites (Shining Lake and Clear Lake east shore). Shining Lake clean-up was originally completed on the Clackamas River Ranger District over the weekend of 8/26/17, where over 100 pound of Styrofoam, plastic barrels and other assorted user-made raft material were packed out on mules owned by Backcountry Horsemen, with additional human staffing support by Oregon City chapter of Trout Unlimited volunteers. In 2018, more garbage material was discovered and packed out from this lake with much appreciated assistance from Trout Unlimited volunteers. On the east side of Clear Lake, user-created dispersed sites on the shoreline were closed, using on-site large boulder placement via heavy equipment to limit vehicle access on the lake shoreline. Dispersed sites were also decommissioning in cases where chronic excessive vegetation damage was noted. Thirty acres of lake and shoreline were improved by garbage removal, vehicle access limitation or closure of dispersed sites that were causing extensive resource damage.
- Failing culverts were replaced at Anvil, Bull and Kelly Creeks in 2017. In addition, 20.8 miles of road closed or decommissioned in the Bedford, Big, Fish, Last, Mag, Roaring, Sandstone, and Stone Creek watersheds and along the Collawash, Clackamas and Oak Grove Fork River, with decommissioned roads replanted with native seedlings and seed.
- In the first year (2018) of the multi-year Upper Sandy Watershed Restoration Action Plan, The Freshwater Trust, Bureau of Land Management, and Forest Service teamed up to restore all non-Wilderness instream reaches of Lost Creek and fully restored Cast Creek for a total of 3 miles of ESA-listed fish habitat restored. The partners placed 945 logs and whole trees to construct 70 wood jams and reconnected 1.1 miles of historic floodplain side channels.
- In 2019, the maintenance and restoration of salmonid spawning and rearing habitat was completed with 4 additional stream restoration projects in 5.3 miles of Clear Fork, Zigzag River, South Fork Salmon, and Lost Creek. Whole trees and logs totaling 791 pieces were placed, as well as 6 stream control berms were breached to allow the river to access its historic floodplain.
- The Forest Service partnered with Portland General Electric in 2018 to replace an undersized and failing culvert on the South Fork Clackamas River with an open-bottom arch, benefitting resident

[16] fs.fed.us/naturalresources/watershed/condition_framework.shtml
Mt Hood National Forest Annual accomplishment reports: fs.usda.gov/detail/mthood/about-forest/?cid=fseprd512232

native and aquatic organisms, and mitigating the potential for a major failure of a highly used primary road.
- In 2018, about 3.2 miles of the popular Riverside Trail #650 were relocated and constructed out of the East Fork Hood River and floodplain and up onto an obliterated road bed. This relocation is expected to reduce chronic sedimentation and other impacts to the river caused by heavy recreational trail use and chronic washouts from naturally occurring high winter/spring river flows.
- In 2019, Five culverts were replaced by culverts that could pass all aquatic organisms; 2 on Meadows Creek of the Hood River, and 3 in the Bull Run watershed. Enlargement of additional 4 culverts were also completed in the Bull Run watershed; the source for Portland's water. Key partners include Federal Highways and the City of Portland.

Monitoring Discussion, Findings, and Adaptive Management Considerations

The Forest maintains habitat capable of supporting fish, and the Forest annually implements a robust aquatic restoration program that continues to improve habitat for ESA-listed and sensitive fish species of concern. In 2017-2019, 21.5 miles of ESA-listed fish habitat was improved on the Forest. Aquatic habitat complexity varies naturally across watersheds and individual streams, but all stream habitat complexity has been maintained or improved over the reporting period.

Northern Spotted Owl

What is the trend for mature and late-successional habitat needed for northern spotted owl recovery?

- The monitoring question is tracking NWFP Standards and Guidelines' Late-Successional Reserves (LSRs).
- Monitoring Indicator: Acres of late-successional and old growth habitat on the Forest tracked over time. The Forest used acres of nesting and roosting habitat that are rated as suitable or highly suitable (Davis et al., 2016) as the metric to measure mature and late-successional habitat for the northern spotted owl.
- Background: The northern spotted owl is a federally listed threatened species.

Monitoring Results

Habitat for the northern spotted owl has increased steadily over time from 1990 to present. There were several years where this increasing trend slowed somewhat due to large individual forest fires (i.e., 2011 and 2014) and high fire frequency/acreage years (i.e., 2014 and 2015).

The 2017 Eagle Creek Fire is evident in the dip between 2017 and 2018. This dip may also be impacted by the change in the habitat analysis methodology used for the pre-2018 data. Overall, it seems that processes of forest succession have compensated for most of the losses due to fires. It is likely this increasing trend will continue due to reduction of regeneration harvest methods and increased focus on thinning methods.

Data

As technology advances, data analysis tools also evolve. The data for the graph below are based on a new annual time series of maps that supersedes previous versions used to compile graphs in previous reports. The years 2018 and 2019 use a different analysis called "normalized burn ratio" which is related to living or dead vegetation.

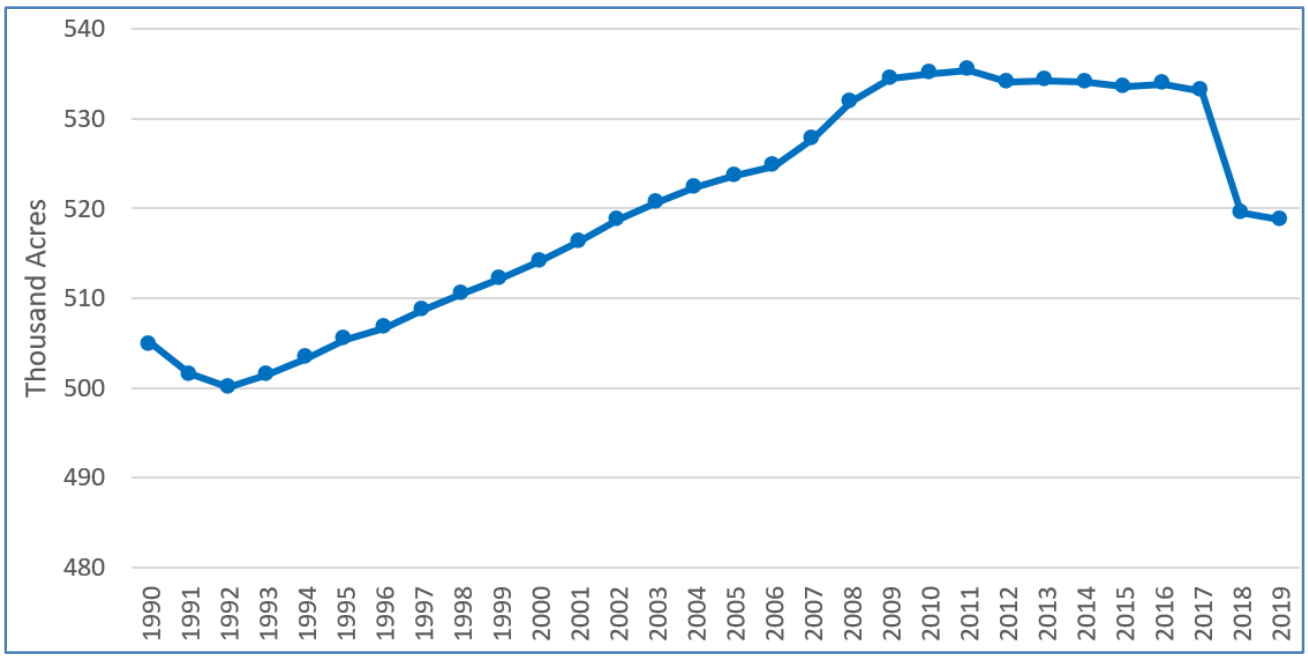

Figure 7. Acres of NSO suitable nesting and roosting habitat over time.

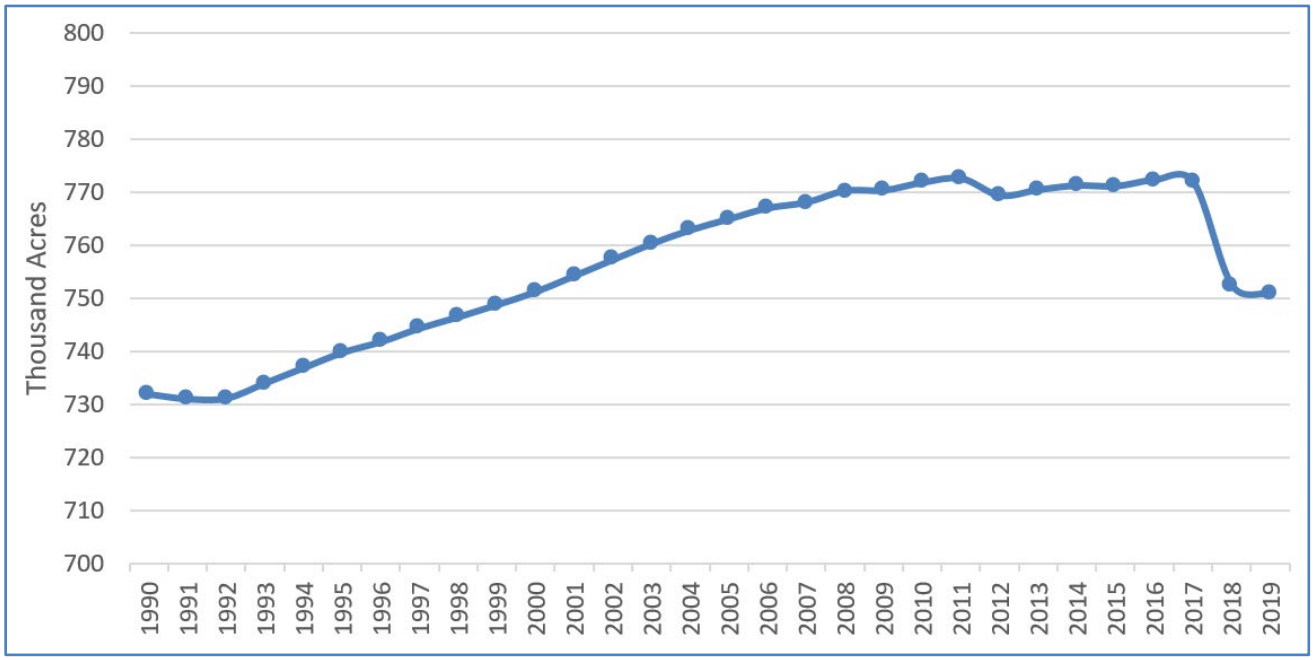

Figure 8. Acres of NSO dispersal habitat over time.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Northern spotted owl suitable habitat on the Forest has increased over the years (as shown in Figure 7) while populations of owls have continued to decline[17]. Threats to this species include climate change, wildfire, and

[17] Spies, T.A., J.W. Long, S. Charnley, P.F. Hessburg, B.G. Marcot, G.H. Reeves, D.B. Lesmeister, M.J. Reilly, LK. Cerveny, P.A. Stine, and M.G. Rapheal. 2019. Tewnty-five years of the Northwest Forest Plan: What Have We Learned? Frontiers in Ecology and Environment. Lesmeister, D.M., R.J. Davis, P.H. Singleton, and J.D. Wiens. 2018. Chapter 4: Northern Spotted Owl Habitat and Populations: Status and Trends. Synthesis of the Science to Inform Land Management Within the Northwest Forest Plan Area; Volume 1. Gen. Tech. Rep. PNW-GTR-966. Portland, OR: USDA, Forest Service, Pacific Northwest Research Station.

invasive species, particularly the barred owl (Strix varia) whose range is expanding rapidly.

A twenty-year report (1994-2013) describing the trend of federal late-successional habitat managed under the NWFP shows a small decrease (2.8-2.9% decrease) in older forests[18]. Wildfire-related losses, including the large areas of the NWFP lands burned annually, has increased in frequency compared to recent decades preceding the NWFP. This increase in fire frequency and size is also reflected on the Forest, but the increase in older, suitable habitat is still on an upward trend for the forest due to on-going forest succession.

It is apparent that the northern spotted habitat trend is the direct inverse of the early-seral habitat trend that provides for forage habitat for deer and elk. You can compare those trends by viewing Figure 7 and Figure 8 and comparing those with Figure 6.

Oregon Spotted Frog

What is the trend for Oregon Spotted Frog populations at Camas Prairie?

- The monitoring question is tracking Forest Plan Standard and Guideline FW-175.
- Monitoring Indicator: Tracking visual encounter surveys of egg masses over time.
- Background: Due to range-wide population declines, the Oregon spotted frog was listed as a threatened species under the ESA in 2014. This is the only extant population on the Forest, and it is completely isolated from other Oregon spotted frog populations.

Monitoring Results

The frogs at this location appear to be the only remaining representatives of a major genetic group that is now almost extinct[18]. Egg mass counts have been conducted annually since 2004. Annual egg mass counts from 2005 to 2019 fluctuated from year to year, with a low of 15 (2019) to a high of 82 (2011) as shown in Figure 9.

Data

Data is currently being collected on an annual basis with support from the Wetland Wildlife Watch. The information displayed in Figure 9 was retrieved from Wetland Wildlife Watch. Egg mass production is used as an indicator to measure population health.

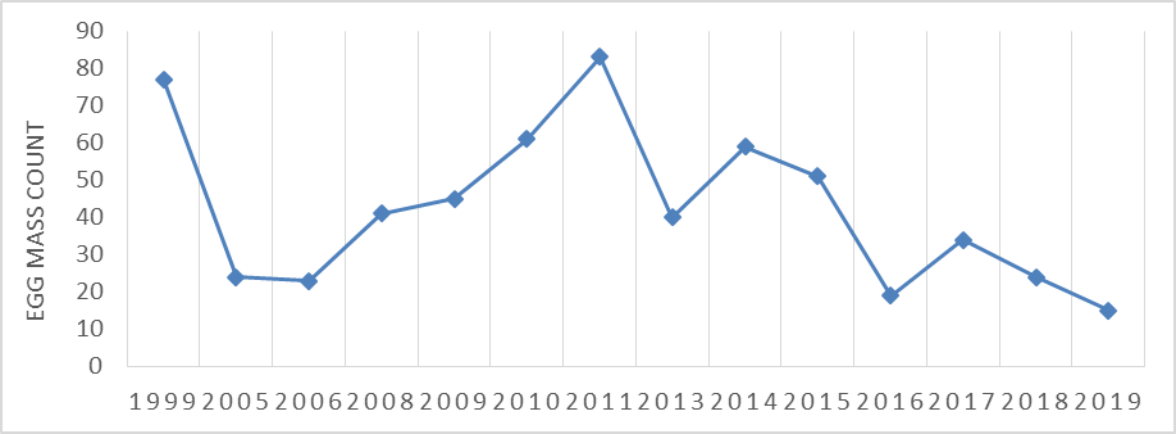

Figure 9. Camas Prairie Oregon spotted frog egg mass counts over time.

[18] Davis, R.J., J.L. Ohmann, R.E. Kennedy, W.B. Cohen, M.J. Gregory, Z. Yang, H.M. Roberts, A.N. Gray, and T.A. Spies. 2015. Northwest Forest Plan–the first 20 years (1994-2013): status and trends of late-successional and old-growth forests. Gen. Tech. Rep. PNW-GTR-911. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 112 p. At the time of the development of this biennial monitoring report this is the current NWFP 20-year report. The next 20-year report is currently being developed. U.S. Fish and Wildlife (USFWS). 2019. Oregon Spotted Frog (Rana pretiosa) 2019 Species Biological Report.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Between 2004 and 2012, the population trend was positive. Egg mass counts after 2012 have declined. In 2018, between 20 and 24 egg masses were located within Camas Prairie. In 2019, 15 egg masses were found and stranding of at least a subset of the masses was observed in May; this count represents the new lowest count for this site since 2004.

It is suspected that the egg mass counts are highly correlated to cyclical water year fluctuations. More investigation is needed to ensure accuracy of the suspected correlation. Current efforts are underway to better understand the hydrology of Camas Prairie to assess if habitat is becoming less suitable for Oregon spotted frogs and to determine if developing a site management plan is necessary.

Status of Visitor Use and Satisfaction

Historic Properties

Are significant (National Register Historic Places (NRHP) eligible) historic properties being maintained, stabilized, and repaired according to historic preservation standards?

- The monitoring question is tracking Forest Plan Standards and Guidelines FW-622 and FW-624.
- Monitoring Indicator: Monitoring data/site condition assessments.

Monitoring Results

The Forest contains more than 1,529 historic properties. Historic properties are divided into two broad categories: archaeological resources and structures of the built environment. The Forest contains 1,431 archaeological sites and 98 built environment historic properties. To achieve monitoring goals, Priority Heritage Assets (PHA) are identified from this list for annual monitoring and condition assessment. The list of PHAs for the Forest includes 48 structures/historic districts and 115 archaeological sites. Condition assessments of built environment resources are conducted annually, and the results of that monitoring for 2017 to 2019 are found in Table 4. Archaeological PHAs are monitored biannually. The 2017 to 2019 condition assessment for all 115 archaeological sites determined that most are in Good (85 sites; 74%) or Fair (30 sites; 26%) condition. The remaining 1,366 historic properties are monitored once every two decades or earlier if there is a potential effect from project activities. This establishes a monitoring and condition assessment target of 69 historic properties each year. This target changes annually as new historic properties are discovered, documented, and evaluated during archaeological surveys. Preservation measures for these resources typically focuses on avoidance in order to sustain the existing form, integrity, and materials of the historic property. Condition assessments were completed on 227 historic properties between 2017 and 2019; most (193 properties; 85%) were found in Good condition. 24 properties (11%) were found in Fair condition and 10 properties (4%) in Poor condition.

Data

Table 4. Condition of Built Environment Historic Properties.

Site	Note	Condition
Clackamas River Ranger District		
Bagby Guard Station, 1913 (NRHP Listed)	N/A	Fair
Bull of the Woods Lookout	N/A	Poor
Olallie Meadows Cabin (NRHP Listed)	N/A	Poor
Olallie Guard Station (NRHP Listed)	SUP	Fair
Oak Grove Ranger Station, (NRHP Listed)	N/A	Poor
Hawk Mountain Cabin	N/A	Poor
Zigzag Ranger District		
Devil's Peak Lookout	N/A	Poor
Zigzag Ranger Station (NRHP Listed)	N/A	Poor
Warming Hut at Ski Bowl (NRHP Listed)	SUP	Good
Timberline Lodge (National Historic Landmark)	SUP	Good
Silcox Hut (NRHP Listed)	SUP	Good
Summit Guard Station	SUP	Good
Clackamas Lake Guard Station	Partial SUP	Poor
Upper Sandy Guard Station (NRHP Listed)	N/A	Poor
Timberline Trail	N/A	Poor

Site	Note	Condition
McNeil Shelter	N/A	Poor
Barlow Road (National Historic Trail-Oregon Trail)	N/A	Fair
Old Oregon Trail Tavern/Paradise Christian Camp	SUP	Fair
Hood River Ranger District		
Cloud Cap Inn (NRHP Listed)	SUP	Fair
Tilly Jane A-Frame (Listed – contributing NRHP)	SUP	Good
Tilly Jane Guard Station and Garage (Listed contributing NRHP)	SUP	Good
American Legion Cookhouse (Listed contributing NRHP)	N/A	Poor
American Legion Amphitheater (NRHP Listed)	N/A	Poor
Cooper Spur Shelter (NRHP Listed)	N/A	Fair
Barlow Road (NRHP Listed)	N/A	Fair
Parkdale WC Ranger's House and Garage (NRHP Listed)	N/A	Fair
Parkdale WC Office (NRHP Listed)	N/A	Fair
Parkdale WC Shop – Rec (NRHP Listed)	N/A	Fair
Parkdale WC Bunkhouse (NRHP Listed)	N/A	Fair
Parkdale WC Shop (NRHP Listed)	N/A	Fair
Parkdale WC Fire Warehouse (not evaluated)	N/A	Fair
Lost Lake Adirondacks (evaluated as eligible)	N/A	1 Poor, 1 Demolished
Elk Meadows Shelter	N/A	Poor
Cairn Basin Shelter	N/A	Poor
Clear Lake Butte Lookout	N/A	Good
Gnarl Ridge Shelter	N/A	Poor
McNeil Point Shelter	N/A	Poor
Barlow Ranger District		
Barlow Ranger's Residence and garage (not evaluated)	N/A	Fair
Barlow Fire Warehouse (not evaluated)	N/A	Fair
Barlow Road (NRHP Listed)	N/A	Fair
Flag point Lookout	Fire Lookout	Fair
Bear Springs Campground Shelter	SUP	Fair
Five mile Lookout and Garage	N/A	Fair
Indian Creek DU Shelter	N/A	Fair
Bear Springs Conference Room	N/A	Fair
Bear Springs Engineer Office	N/A	Fair
Bear Springs Saw Shop	N/A	Fair
Bear Springs WC Residence (1005)	N/A	Fair

Monitoring Discussion, Findings, and Adaptive Management Considerations

A primary objective of the Forest's Heritage Program is the preservation of historic properties. Monitoring is necessary to ensure historic properties area being maintained, stabilized, and repaired according to historic preservation standards.

Historic properties are any prehistoric or historic districts, sites, buildings, structures, or objects that are eligible for or already listed in the National Register of Historic Places. Also included are any artifacts, records, and remains (surface or subsurface) that are related to and located within historic properties and any properties of traditional religious and cultural importance to Tribes (36 CFR §800).

To be eligible for or listed in the National Register of Historic Places (36 CFR §60) a property must possess a quality of significance in American history, architecture, archeology, engineering, or culture, while retaining integrity of location, design, setting, materials, workmanship, feeling, and association and:

- be associated with events that have made a significant contribution to the broad patterns of our history; or
- associated with the lives of persons significant in our past; or
- embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- have yielded, or may be likely to yield, information important in prehistory or history.

Under the National Historic Preservation Act (NHPA), the Secretary of the Interior is responsible for establishing professional standards and for providing guidance on the preservation of the nation's historic properties. The Secretary of the Interior's Standards for the Treatment of Historic Properties are regulatory for projects with a federal nexus and other projects receiving Historic Preservation Fund grant assistance. The Standards apply to a wide variety of resource types, including buildings, sites, structures, objects, and districts and address four treatments: preservation, rehabilitation, restoration, and reconstruction. The treatment Standards, developed in 1992, were codified as 36 CFR Part 68 in the July 12, 1995, Federal Register (Vol. 60, No. 133).

Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project. However, new exterior additions are not within the scope of this treatment. The Standards for Preservation require retention of the greatest amount of historic fabric along with the building's historic form (Grimmer 2017: 12).

Monitoring is completed to evaluate the existing physical condition of historic properties. Individual historic properties, districts, and the National Historic Landmark each have a preservation plan. Preservation plans outline maintenance, stabilization, and repair requirements and guidelines for each element. The physical condition assessments completed during monitoring inform on the status of the requirements and guidelines detailed in the individual preservation plans. Existing physical conditions of historic properties are categorized as either good, fair, or poor.

A historic property is evaluated as *Good* when:

- Elements are intact, structurally sound and performing its intended purpose
- There are few or no cosmetic imperfections
- No element needs repair other than minor/routine maintenance (paint touch up, overgrown vegetation, cleaning)

A historic property is evaluated as *Fair* when:

- There are early signs of wear, failure, or deterioration (building cracks, paint), though the element is generally structurally sound and performing its intended purpose
- There is failure of a subcomponent of the property
- Up to 25% of the property is in need of repair and/or replacement

A historic property is evaluated as *Poor* when:

- The property or elements are no longer performing their intended purpose
- Elements are missing
- Deterioration or damage affects more than 25% of the property
- The property shows signs of imminent failure or breakdown
- The property requires major repair/replacement.

Physical/Biological, Managerial, and Social Settings

Are the physical/biological, managerial, and social settings of each Wilderness Resource Spectrum (WRS) maintained consistent with the standards for wilderness management?

- The monitoring question is tracking Forest Plan Desired Condition: there are nine Wilderness areas on the Forest that will provide primitive recreation opportunities along with scenic, historical and ecological experiences; and Forest Plan Standards and Guidelines A2-005 through A2-035, and A2-048 through A2-050.
- Monitoring Indicator: Wilderness Performance Program score card's ten elements associated with wilderness stewardship.

Monitoring Results

From 2015-2014 the national standards for monitoring wilderness character were measured using the "10-Year Wilderness Stewardship Challenge" (10-YWSC). The performance measure "wilderness managed to a minimum stewardship level" is commonly referred to as the 10-YWSC. The use of the 10-YWSC changed in 2015 at the 50th anniversary of the Wilderness Act, marking the end of the 10-YWSC. The goal of the 10-YWSC was to bring all wildernesses under the Forest Service's care to a minimum stewardship level by 2014. Under this framework, a stewardship score of 60 or greater met this minimum stewardship level. Under the Omnibus Public Land Management Act of 2009 (the Omnibus), five existing wilderness areas expanded (Badger Creek, Bull of the Woods, Mark O. Hatfield, Mt. Hood, and Salmon-Huckleberry), and three new wilderness areas were created (Clackamas, Roaring River and Lower White River). The new wilderness areas were not part of the 10-YWSC, although baseline information was gathered.

Table 5 shows that in 2014, all five of the wilderness areas on the Forest which were part of this challenge scored over 60 and are considered as managed to a minimum stewardship level under all criteria of the 10-YWSC.

Data

Table 5. 10-year Wilderness Stewardship Challenge Data (2014).

Wilderness Name	Designation Year	Challenge FY	10- YWSC Passing	Stewardship Score
Mark O. Hatfield Wilderness	1984	2014	Yes	66
Mt. Hood Wilderness	1964	2014	Yes	69
Salmon-Huckleberry Wilderness	1984	2014	Yes	68
Badger Creek Wilderness	1984	2014	Yes	60
Bull Of The Woods Wilderness	1984	2014	Yes	62
Clackamas Wilderness	2009	2014	No	32
Lower White River Wilderness	2009	2014	N/A	32
Roaring River Wilderness	2009	2014	N/A	40

Monitoring Discussion, Findings, and Adaptive Management Considerations

The direction for 2015 was to follow the new Wilderness Stewardship Performance (WSP) plan to develop new performance measures for each wilderness area. There was no target for meeting a standard, rather, to

set the new standards for each wilderness area. In 2016, the only standard met for all wilderness areas was air quality monitoring. The agency expected scores to drop initially in the first few years as many of the elements are new or revised. The forest is developing a strategy on how to implement the new WSP plan, hopefully with help from partners and volunteers. More information on the WSP can be found at on the wilderness website, or here in the WSP brochure[19].

Off Highway Vehicles (OHVs)

Has the OHV Record of Decision of 2010 been implemented?

- The monitoring question is tracking Forest Plan Desired Condition: activities such as hunting, sightseeing, off-road vehicle use, dispersed camping, cross-country skiing, and fishing are typical.
- Monitoring Indicator: Development and designation of designated trails in the Forest Service Infrastructure application (INFRA) database for roads and trails.
- Background: The Forest manages three areas specifically designated for OHV recreation use. La Dee Flats is one of those areas and is located on the Clackamas River Ranger District. This OHV area has been the main focus for the beginning phases of implementation of the 2010 OHV decision[20]. The other two designated OHV areas are McCubbins Gulch, and Rock Creek and are both located on the Barlow Ranger District. No work has been completed in either of these areas under the 2010 OHV decision.

Data

The data shown in Table 6 are the same as what was displayed in the previous monitoring report. There have been no changes in the data. The table does not capture data on trails that were existing and already in use, and did not have any changes in the 2010 OHV decision. Other trail monitoring is captured through the Trail Assessment and Condition Surveys (TRACS) program. TRACS is the required methodology for conducting trail inventory, condition assessment, and prescriptions for NFS trails.

Table 6. OHV Record of Decision implementation status.[21]

NFS Road Number	OHV Route Designation	OHV Class	Route Status	OHV Trail Number	Approx. Miles
4611	Closed to All Traffic	CL	Closed	-	1.0
4610000	Mixed-Use Route (MU)	MU-I, II, III	MU	-	4.4
4610011	Closed to All Traffic	CL	Decommissioned	-	0.7
4610011	Convert to Trail	I, II, III	Converted	802	0.17
4610011	Convert to Trail	I, II, III	Converted	800	0.1
4610012	Closed to All Traffic	CL	Decommissioned	-	0.3
4610013	Convert to Trail	I, II, III	Converted	802	0.2

[19] wilderness.net/NWPS/documents/FS/WSP%20Brochure.pdf
[20] fs.usda.gov/nfs/11558/www/nepa/25167_FSPLT2_025466.pdf
[21] Miles shown are approximate. Where routes are closed, OHV Class is listed as CL, for Closed. For designation there are three types of OHV class vehicles. Class I (quads, 3-wheelers) are vehicles that are 50-inches wide or less, and have a dry weight of 800 pounds or less with a saddle or seat and travels on 3 or more tires. Class II (jeeps, sand rails, SUVs, etc.) are vehicles wider than 50 inches and have a dry weight more than 800 pounds. Class III (motorcycles) are vehicles on two tires that have a dry weight less than 600 pounds.

NFS Road Number	OHV Route Designation	OHV Class	Route Status	OHV Trail Number	Approx. Miles
4610014	Convert to Trail	I, II, III	Converted	803	0.7
4610015	Convert to Trail	I, II, III	Converted	802	0.3
4610016	Convert to Trail	I, III	Converted	801	1.2
4610017	Closed to All Traffic	CL	Decommissioned	-	0.3
4610018	Closed to All Traffic	CL	Decommissioned	-	0.1
4610018	Convert to Trail		Decommissioned	-	
4610018		I,III	Decommissioned	-	0.1
4610019	Closed to All Traffic	CL	Decommissioned	-	0.3
4610020	Closed to All Traffic	CL	Closed	-	0.1
4610024	MU	MU-I, II, III	MU	-	0.2
4610112	Convert to Trail	I, II, III	Converted	800	0.9
4610113	Convert to Trail	I, II, III	In the process of being converted	802	1.7
4610115	Closed to All Traffic	CL	Decommissioned	-	1.2
4610115	Convert to Trail	I, III	Converted	804	1.2
4610120	MU	MU-I, III	MU	804	0.1
4610120	Closed	CL	Closed	-	0.7
4611000	MU	MU-I, II, III	MU	-	1.5
4611012	Closed to All Traffic	CL	Decommissioned	-	0.2
4611014	Closed to All Traffic	CL	Decommissioned	-	0.2
4611120	Closed to All Traffic	CL	Decommissioned	-	0.4
4611120	Convert to Trail	I, III	Converted	804	0.5
4611121	Convert to Trail	I, III	Converted	806	1.6
4611125	Convert to Trail	I, III,	Converted	805	0.2
4611130	Convert to Trail	I, III	Converted	805	3
4611135	Closed to All Traffic	CL	Decommissioned	-	0.5

Monitoring Discussion, Findings, and Adaptive Management Considerations

The OHV Record of Decision continues to be implemented. As such, there are no recommendations for changes to the Forest Plan or to OHV-associated management activities.

Level of Satisfaction

Are people having a high level of satisfaction during their visit to the Mt. Hood National Forest?

- The monitoring question is tracking Forest Plan Desired Condition: Outdoor recreation opportunities on the Forest are available in a variety of settings. Opportunities for dispersed recreation in a roaded setting are plentiful. Activities such as hunting, sightseeing, off-road vehicle use, dispersed camping, cross-country skiing, and fishing are typical. Opportunities for dispersed recreation in unroaded areas are less plentiful.
- Monitoring Indicator: The percent visitor satisfaction for developed sites, general forest areas, and designated wilderness.

Monitoring Discussion, Findings, and Adaptive Management Considerations

The report and final results for the FY2016 National Visitor Use Monitoring (NVUM) have not be released. The NVUM data is collected through visitor surveys every five years, as such, the most current data available on visitor satisfaction is from the FY2011 NVUM report. The NVUM program provides science-based estimates of the volume and characteristics of recreation visitation to the National Forest System, as well as the benefits recreation brings to the American public. Information about the quantity and quality of recreation visits is required for the Forest Plans, Executive Order 12862 (Setting Customer Service Standards), and implementation of the National Recreation Agenda. The NVUM program ensures that all visitor statistics for National Forests and grasslands produced by the Forest Service use a standardized measure. These standards were established by the Forest Service in the 1970s; however, their application is now stricter than in the past. For example, visitors must be physically recreating on Forest Service managed lands for a visit to count. They cannot be passing through, viewing from a non-Forest Service managed road, or just using restroom facilities.

An important element of outdoor recreation program delivery is evaluating customer satisfaction with the recreation setting, facilities, and services provided. Satisfaction information helps managers decide where to invest in resources and to allocate resources more efficiently toward improving customer satisfaction. Satisfaction is a core piece of data for national- and forest-level performance measures. To describe customer satisfaction, several different measures are used. Recreation visitors were asked to provide an overall rating of their visit to the Forest, on a 5-point Likert scale[22]. About one-third of visitors interviewed on the Forest rated their satisfaction with fourteen elements related to recreation facilities and services, and the importance of those elements to their recreation experience. Visitors were asked to rate the specific site or area at which they were interviewed. They rated both the importance and performance of these elements using a 5-point scale. Although the satisfaction ratings specifically referenced the area where the visitor was interviewed, the survey design does not usually have enough responses for any individual site or area on the forest to present information at a site level. The information is generalized to understand overall satisfaction within the three site types: day-use-developed, overnight-use-developed, general forest areas, and on the Forest as a whole (including designated wilderness).

About 78 percent of the visits to the Forest are very satisfied with their recreation experience. Another 18 percent are somewhat satisfied. Satisfaction index scores for perception of safety were over 90 percent across all types of sites. In dispersed settings, the facility condition and access items were at 85% satisfied, above the national target.

[22] The scale for importance ranged from “not important” to “very important”. The scale for performance ranged from “very dissatisfied” to “very satisfied”.

Measureable Changes Related to Climate and Other Stressors

Water for Municipal Use

Is the production of pure, clean, raw potable water being sustained for municipal use?

- The monitoring question is tracking Forest Plan Desired Condition: The Bull Run continues to be managed for high quality water; and Forest Plan Standards and Guidelines: FW-084, FW-130, and D-001 to D-021.
- Monitoring Indicator: Changes on the quality and quantity of sustainable municipal waters supply.
- Background: For decades, more than a dozen communities have relied upon surface waters originating from the Forest for municipal use, including large sectors of the Portland metro area. Six watersheds on the Forest have been designated special status by the Forest Plan, as amended by the NWFP, and the Omnibus (see Table 7 for a listing of these watersheds). A primary management goal for these watersheds is to serve as a municipal water source. Activities that are planned and implemented within must be consistent with specific standards and guidelines intended to protect the quantity and quality of water.

Table 7. Special Status Watersheds.

Special Status Watersheds	Municipality
Bull Run Watershed	City of Portland
The Dalles Watershed (Includes Dog River and Mill Creek)	City of The Dalles
Alder Creek	City of Sandy
Fifteenmile Creek	City of Dufur
Gordon Creek	City of Corbett
Crystal Springs	Hood River Valley rural residents

Monitoring Results

Between 2017 and 2019, the quantity and quality of waters originating from the Forest and used by providers for municipal purposes was maintained. Variations in the quantity and quality of waters originating from the Forest over that timeframe were not aberrant to a point of deficiency or scarcity that could be attributed to forest management activities or projects.

No known curtailment restrictions or boiling/flushing notices were reported as a result of active management within Special Status Watersheds. Municipalities did not indicate the need for any measures to rely on alternative emergency storage or groundwater reserves. Standard procedures for addressing potential supply shortages during high-use periods were sufficient.

The Portland Water Bureau (PWB) announced another detection of cryptosporidium in 2019; an ongoing issue with source waters in the Bull Run watershed on the Forest. Through their communications plan, they released media announcements to inform the public and consumers that water was safe to drink. The PWB has been managing their water quality to ensure that the likelihood of the contaminant to be taken up by consumers and sicken them continues to remain very low.

Data

All work scheduled or planned to occur within Special Status Watersheds was evaluated. Sampling and observations were mostly anecdotal, and included review of EAs and decision notices, and in-house schedules.

Individual municipalities and media were checked or queried for occurrences of aberrant treatment needs or special water management measures. Announcements from municipalities of curtailment restrictions, reports of boiling and flushing notices as per Oregon Health Authority (OHA) and Department of Environmental Quality (DEQ) requirements were evaluated.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Vegetation management activities have not been implemented in any of the Special Status Watersheds. Slash abatement activities in the form of pile burning have occurred within The Dalles Municipal Watershed. Several dozen hand piles were burned. These were small, well distributed piles intentionally located well away from, or connected to any water sources. There have not been any effects upon water quality or quantity detected as a result of the slash burning.

Timber pre-sale activities to define vegetation treatment units have taken place around the recently established Crystal Springs contributing watershed. These planned activities were analyzed for the Polallie Cooper Hazardous Fuels Reduction EA. The units are located outside of the Crystal Springs contributing area. All treatments were designed with BMPs/PDC to avoid effects to the Crystal Springs area so that water quality and quantity would not be affected. Treatments, including timber harvest activities are scheduled to begin soon in the first quarter of FY2021 (September-December 2020). Monitoring of these activities would continue throughout their implementation and after completion.

Tree Mortality

What are the current tree mortality rates and patterns across the Forest?

- The monitoring question is tracking Forest Plan Standards and Guidelines: FW-381 through FW-383.
- Monitoring Indicator: Detectable acres of high tree mortality (i.e., insect and drought stress).

Monitoring Results

Fire suppression reduced the size and intensity of fires across the forest thereby reducing tree mortality related to fire. These activities increase tree growth rates, vigor, resistance to pests and resilience fire, and reduce mortality rates within stands thereby leading to growth rates exceeding mortality rates. Also by reforesting after disturbances, growth rates increase quickly; stands are fully stocked sooner and trees are free to grow and occupy sites. Fire suppression has kept the number of acres burned to a relatively small number. However, other mortality factors remain present and above background levels across the forest. Stand densities remain high and stands are susceptible to above baseline levels of mortality from insects and disease.

Data

Tree mortality forest wide is measured in a number of ways. There are a number of causes of tree mortality, differing depending on the type of insect or disease, geographic distribution of the affected area(s), and the types of plant species affected. Information on tree mortality across the forest is derived from the following sources: Annual Forest Insect and Disease Aerial Detection Survey; 1947-2014; Forest Health Protection, State and Private Forestry, Pacific Northwest Region, Forest Service, U.S. Department of Agriculture; Washington Department of Natural Resources, Resource Protection Division, Forest Health; Oregon Department of Forestry, Forest Health Management.

One method used to capture tree mortality information is through aerial detection survey. This kind of survey is conducted from an aircraft flying over the forest using remote sensing technology to capture forest health information. More information on Aerial Detection Survey[23] is available at the Forest Service website.

Table 8. Fire information considered in tree mortality review.[24]

Year	Number of Fires	Acres
2010	67	4,646
2011	56	8,373
2012	86	104
2013	77	2,246

[23] https://www.fs.usda.gov/detail/r6/forest-grasslandhealth/insects-diseases/?cid=stelprdb5286951

[24] Displays the number of fires reported in the Individual Wildland Fire Reports and that are stored in Fire Stats http://firestats.cc/ database.

Year	Number of Fires	Acres
2014	127	5,641
2015	96	108
2016	60	9
2017	73	697
2018	55	89
2019	70	16
10-year median	72	403

Table 9. Approximate mortality by infestation

Infestation	Average Acres Per Year	Approximate Mortality
Western Pine Beetle	278	1,971
Silver Fir Beetle	56	1,568
Mountain Pine Beetle	230	2,285
Ips	736	12,405
Fir Engraver	3,711	28,517
Douglas-fir Engraver	7	34
Douglas-fir Beetle	1,016	8,724

Monitoring Discussion, Findings, and Adaptive Management Considerations

Forest pests caused over-story mortality events during the last five years which may have caused localized patches above the average observed pattern of growth and loss. The data shown in Table 9 are cited from the Annual Forest Insect and Disease Aerial Detection Survey (2019). The random placement of data plots across the forest should capture some of those site specific differences. The rest of the Forest has incurred about 1-2 dead trees per acre, if that, over the last five years. Overall, 55,000 trees were killed on about 6,000 acres between 2014 and 2019. Fires are another large contributor to tree mortality across the Forest (Table 8). Within fire burned areas, tree mortality and the rate of mortality varies among different burned areas. Overall, the forest has had a median of 403 acres burned annually from 2010-2019. Based on this information, active management could be focused on stand density reduction to reduce inter-tree competition, increase forest resilience, increase resistance to pests, and reduce the size and intensity of wildfire.

Meeting the Desired Conditions and Objectives in the Plan

Growth and Productivity over Mortality

Is total growth and productivity exceeding mortality over all forest disturbances? Every five to ten years?

- The monitoring question is tracking the Forest Plan objective of long term sustained yield capability and timber growth since previous decade.
- Monitoring Indicators: Track growth, harvest, stocking, and mortality by land use allocation over time.

Data

The following growth and mortality averages were calculated from Forest Inventory and Analysis (FIA) data collected in non-wilderness areas on the Forest. The averages are for 2001-2007 and 2011-2017. Plot data were used to estimate growth and mortality for trees greater than 4 inches in diameter-at-breast-height (DBH). There were 199 forested plots with data and 10 plots which were missing data. Data were simulated for 10 that were missing data. On average, in forested non-wilderness areas:

- Growth is measured at approximately 177 cubic feet per acre per year; and,
- Mortality is measured at approximately 42 cubic feet per acre per year.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Forest health improvement projects increase tree growth rates, vigor, resistance to pests, resilience to fire, and reduce mortality rates within stands thereby leading to growth rates exceeding mortality rates. Reforestation allows growth rates to increase more quickly and realize a "fully stocked" stand. Vegetation project outcomes generally have reduced fuel loads, increased tree growth and vigor, reduced stand susceptibility to insect and disease outbreaks. Reforestation activities have increased stocking and growth within stands.

A change in management activities may be warranted to increase the pace and scale of vegetation management projects (i.e., thinning) so that tree growth rates can increase and mortality rates decrease. A change may also be warranted for the Forest Plan to allow for projects to more easily comply with some standards and guidelines which routinely have exceptions or project-level amendments.

Rate of Harvest

What is the rate of harvest of stands available for timber management?

- The monitoring question is tracking the Forest Plan objective to produce a continuing supply of wood products, maintain an even flow of harvest, and provide apositive economic return to the government.
- Monitoring Indicator: Timber harvested by land allocation.

Monitoring Results

Harvest rates have fluctuated over time but are currently seeing an increasing trend. Timber sales continue to be awarded following the policies and processes described in Forest Service Handbook and Manuals.

Monitoring Discussion, Findings, and Adaptive Management Considerations

While timber sales continue to occur at a regular rate, project planning is not generating enough areas fast enough to meet the desired goals for rate of harvest as identified in the Forest Plan. Based on this outcome, it is recommended that Forest management activities around planning efforts should be increased or the complexity (and associated time it takes to complete those projects) should be decreased. It will take some time to see if the recent updates to the NEPA made by the Council on Environmental Quality would resolve issues related to planning time to implementation.

Awarded Timber

How much timber is being awarded?

- The monitoring question is tracking the Forest Plan objective of producing a continuing supply of wood products, maintain an even flow of harvest and provide a positive economic return to the government
- Monitoring Indicator: Awarded timber each fiscal year.

Monitoring Results

The Forest Plan identified an allowable sale quantity (ASQ) of 189 million board feet (MMBF) per year. The NWFP, which amended the Forest Plan, predicted a Probable Sale Quantity (PSQ) of 67 MMBF. In 1995, the PSQ level was adjusted downward to 64 MMBF to reflect the need to protect areas around spotted owl activity centers. The current PSQ for the Forest is 64 MMBF. In addition to PSQ, the Forest has an annual schedule of timber targets ultimately set by congressional appropriation. In fiscal year (FY) 2017 the target scheduled the Forest to offer for sale approximately 29.9 MMBF. In FY 2018 and 2019 the Forest realized a required increase in target scheduled. While the Forest continues to meet its targets for timber volume awarded, the annual awarded volume is well below (approximately half) of the Forest's PSQ.

The awarded volumes are shown in Table 10.

Data

Table 10. Awarded timber each fiscal year.

Fiscal Year	Amount of Timber Awarded (MMBF)	% of Forest Target Achieved	% Stewardship	Value of Stewardship Projects Funded
2017	28.65[25]	96%	77%	$1,873,540
2018	35.39	118%	64%	$2,221,230
2019	35.69	108%	27%	$1,043,730

Monitoring Discussion, Findings, and Adaptive Management Considerations

The Forest attempts to provide a mix of contract types that are either traditional timber sales or stewardship contracts. Much of the revenue generated from the stewardship contracting projects remains on the Forest and is used to accomplish restoration projects such as fuel reduction projects, road maintenance, road decommissioning, fish passage projects, and wildlife habitat enhancement. Some projects are accomplished directly by the stewardship contractor and some are funded by retained receipts generated by the project and the value of the timber removed. Table 10 shows the value of restoration projects funded by retained receipts each year. In addition to that funding, a similar quantity of matching funds were contributed by partners.

The Forest made regular progress on planning projects that authorize timber sales and stewardship contracts. EAs typically take two or three years from inception to decision. Table 11 shows the EAs that were completed and their associated volumes. These EAs and their decision notices document the negative and beneficial effects of providing this volume. Additional incidental volume accrues through small firewood contracts and permits. The information in these tables suggests that the forest continues to meet, and in some cases exceed, the increasing target schedules.

Table 11. Completed planning efforts.

Name	Date	Volume MMBF
Goat Mt. Thin	September 2016	27
Polallie Cooper Hazardous Fuel Reduction	November 2017	8

[25] A timber sale of 855 MBF was awarded in 2017 but did not count toward this total because it was previously offered in 2016 but received no bids in 2016. The 2018 Biennial Monitoring Report showed that the Forest exceeded expectations in 2016 by 3.3 MMBF.

Name	Date	Volume MMBF
Hunter Integrated Resource Project	March 2018	20
Crystal Clear Restoration	June 2018	50
Rocky Restoration Project	February 2019	6
North Clack Integrated Resource Project	January 2020	48

Timber Land Base

Are there any changes in the land base available for producing timber?

- The monitoring question is tracking Forest Plan Desired Condition: Timber harvest comes from lands suitable for growing timber.
- Monitoring Indicator: Change in acres of land use allocations permitting timber harvest.

Monitoring Results

In 2017 to 2019 there were no changes to the land base available for producing timber. The land base available for producing timber is defined within management area (MA) direction for each of the MAs that are described in the Forest Plan. Many of the MAs overlap one another. The information in this section is denoted by what would be defined as the dominant MA, even though other MA objectives may also be nested within the area. In some cases the MA may cover a higher percentage than what Table 12 shows but in those cases the MA would not be the dominant MA, therefore those acreages are not displayed in this section.

Data

Approximate land base percentages for each of the Forest's MAs (Table 12) are based on the dominant MA status as described in the Forest Plan and as estimated from GIS spatial analysis. The table denotes which of those MAs have allowances for timber harvest activities. Percentages displayed in the table are approximates and were derived using GIS data systems.

Table 12. Land base percentages[26].

Management Area	Emphasis	% of Forest in MA	Timber Harvest Should Occur?[27]	Timber harvest may occur, but only when harvest supports MA goals, objectives, or desired future conditions.
A1	Wild Rivers (Outside of Wilderness) & Scenic and Recreational Rivers	1-4%	No	No (A1: Wild) Yes (B1: Scenic & Recreational)
A2	Wilderness	31%	No	No
A3	Research Natural Area	0%	No	No
A4	Special Interest Area	2%	No	Yes
A5	Unroaded Recreation	1%	No	Yes

[26] The data displayed in this table are considered approximates and are generated using spatial data systems (i.e., GIS). Note that some of the MAs round to 0% due to the minimal nature of the land base occupied; assuming less than one percent but greater than zero would be appropriate.
[27] Where 'Yes' is indicated, this would be the case where the MA overlaps Matrix. Where these MAs are overlapped by the NWFP's LSRs or Riparian Reserves, the answer in this column would be 'No', and the answer in the adjacent column would be 'Yes.'

Management Area	Emphasis	% of Forest in MA	Timber Harvest Should Occur?[27]	Timber harvest may occur, but only when harvest supports MA goals, objectives, or desired future conditions.
A6	Semi-Primitive Roaded Recreation	0%	No	Yes
A7	Special Old Growth	0%	No	Yes
A8	Not applicable			
A9	Key Site Riparian	1%	No	Yes
A10	Developed Recreation	0%	No	Yes
A11	Winter Recreation Areas	1%	No	Yes
A12	Outdoor Education Area	0%	No	Yes
A13	Bald Eagle Habitat Area	0%	No	Yes
B1	Wild Rivers (Outside of Wilderness) & Scenic and Recreational Rivers	1-4%	Yes	No (A1: Wild) Yes (B1: Scenic & Recreational)
B2	Scenic Viewshed	16%	Yes	Yes
B3	Roaded Recreation	1%	Yes	Yes
B4	Pine-Oak Habitat	2%	Yes	Yes
B5	Pileated Woodpecker/Pine Marten Habitat Area	0%	Yes	Yes
B6	Special Emphasis Watershed	10%	Yes	Yes
B7	General Riparian Area	Not Mapped	Yes	Yes
B8	Earthflow	3%	Yes	Yes
B9	Wildlife/Visual Area	0%	Yes	Yes
B10	Deer and Elk Winter Range	1%	Yes	Yes
B11	Deer and Elk Summer Range	1%	Yes	Yes
B12	Backcountry Lakes	0%	Yes	Yes
C1	Timber Emphasis	24%	Yes	Yes
D	Bull Run Watershed	9%	No	No
LSRs	Habitat for northern spotted owls and other dependent species	25%	No	Yes

Management Area	Emphasis	% of Forest in MA	Timber Harvest Should Occur?[27]	Timber harvest may occur, but only when harvest supports MA goals, objectives, or desired future conditions.
Riparian Reserves	Protection of streams and other aquatic resources	30%	No	Yes

Monitoring Discussion, Findings, and Adaptive Management Considerations

The most recent changes to the Forest's MAs occurred in 2009 under the congressional action of the Omnibus which designated three new wilderness areas, expanded existing wilderness areas, and designated nine new Wild, Scenic, and Recreational River corridors. Over 30 percent of the Forest is designated wilderness.

The NWFP identifies approximately 40 percent of the Forest as "Matrix" lands. Within the total matrix allocation, approximately 14 percent of the Forest land base is "timber emphasis", wherein the primary objective is timber production. The remainder of matrix land that is outside of timber emphasis designation, the emphasis on vegetation management exists, however timber management is undertaken in these areas as a means to meet other (primary) resource objectives (e.g., scenic viewshed, deer and elk winder range, special emphasis watershed, etc.).

Based on this information, a change to the Forest Plan may be warranted regarding the designation of acres defined as suitable for timber harvest.

Regeneration Requirements

Are we meeting the 5-year regeneration period required by the National Forest Management Act (NFMA)?

- The monitoring question is tracking Forest Plan Desired Condition: Areas harvested are adequately restocked within five years of final harvest (36 CFR §219.27), and Standards and Guidelines: FW-358, C1-019 through C1-021.
- Monitoring Indicator: Meeting stocking guidelines in the Forest Plan as tiered to the Forest Service Handbook.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Reforestation activities have resulted in an increase in acres becoming fully restocked. This information was obtained from surveys for areas that have naturally regenerated to fully stocked levels, and areas where fully stocked status was obtained through both natural regeneration and plating. Events that reduce stocking below fully stocked as defined by the Forest Plan will continue to happen. The reforestation program is designed to identify and restock these areas using the best processes available. A change to the Forest Plan or to management activities is not recommended at this time.

Suitable Miles

How many miles are suitable for passenger cars and high clearance vehicles?

- The monitoring question is tracking the Forest Plan direction provide safe, efficient access for the movement of people and materials involved in the use and management of the Forest, and Standards and Guidelines: FW-419 and FW-420.
- Monitoring Indicators: Miles of road being maintained each year for all vehicles. Miles of roads providing safe access for use and management of the Forest.

Monitoring Results

Routine road maintenance activities, timber sales as well as partnerships and permits positively influenced the monitoring results. Maintenance activities occurred through:

- The annual road maintenance program;
- Permits and partnerships; and,
- Active timber sales.

The annual road maintenance program, timber sales, permits and partnerships performed necessary road maintenance to roads on the system to meet road maintenance objectives and provide more miles of safe access to the forest. Approximately 370 miles of road on the forest have an operational maintenance of level[28] 3-5. Approximately 160 miles of road have received some road maintenance each year. These have activities have helped to move some road miles toward providing (or continuing to provide) safe access for use and management of the forest.

Many roads dependent on their position on the landscape, frequency of use, type of use and original construction require little to no maintenance yearly while still continuing to provide safe access for use and management. Based on available data in the monitoring results as well as other indicators, the Forest does not maintain enough road miles each year to maintain all operational maintenance level 3-5 roads (roads maintained for passenger cars) commensurate to their objectives and standards. Each year approximately 160 miles out of 370 miles of road are maintained for passenger vehicles. While not all roads need each maintenance activity provided yearly, for the purposes of this report we will assume that on average each road mile will need some form of maintenance every year to keep them at standard without accruing deferred maintenance. This would indicate that less than half of the roads or 43 percent identified for operational maintenance level 3-5 (maintained for passenger cars) are being maintained regularly to the given standard.

Monitoring Discussion, Findings, and Adaptive Management Considerations

It is necessary to increase the maintenance of the roads in the Forest Plan area to meet all standards of the maintenance level. Increasing the number of miles of road maintained in a given year will allow more roads to meet the Forest Plan standard and road management objectives. Increasing the number of miles maintained each year is not feasible given the current declining budget model, increasing occurrence of deferred maintenance on roads, and increasing road maintenance costs.

The miles of road being maintained each year is less than half the number of miles of maintenance level 3-5 roads designated on the Forest. Some of these road miles are repeat maintenance each year and the indicator does not take into account for repeat maintenance. Tracking maintenance more closely will allow us to track the progress more precisely. While road maintenance is an iterative process, it is important to perform necessary maintenance yearly or we will not progress as necessary. The Forest Plan describes that we are to base the construction, reconstruction, and maintenance on the management objectives of the road. The indicators for this monitoring report demonstrate that we do not meet the standard of the maintenance required. As budgets decline, the number of miles maintained to standard may also decrease. Declining budgets, accumulation of deferred maintenance and increasing costs of road maintenance may be the reasons we are not progressing or trending in a positive direction towards maintaining all road miles to their standard. As we continue to make decisions which convert road maintenance levels to a lower operational maintenance level standard, we may see some improvement in the percentage of roads maintained for passenger cars. As we approach the minimum level of roads needed to meet safe and efficient travel and management of the forest, we may have less opportunity to reduce maintenance levels and remove roads from the system.

A change to the Forest Plan is not recommended at this time. Forest Plan standard FW-420 states that all arterial and collector routes need to be maintained for low clearance vehicles. Some collector routes are more valuable and have a greater use than others. It may be useful to define a different standard for the design vehicle to allow maintenance to be applied to more valuable routes based on other factors. More information would be necessary to inform decisions for this factor. If this change was determined warranted, this may

[28] Maintenance levels are defined on page 18 of the Forest's Travel Analysis Report available on the forest website. fs.usda.gov/detail/mthood/workingtogether/?cid=stelprd3818668

allow us to focus maintenance for passenger cars on certain roads and reduce the operational maintenance levels on other roads that have a more limited use.

Travel Management

Are road management activities being implemented in accordance with the latest access and travel management direction?

- The monitoring question is tracking Forest Plan Standards and Guidelines: FW-419 through FW-424.
- Monitoring Indicators: Miles of road converted into desired maintenance level and/or that have achieved the road management objectives.

Monitoring Results

The following list of management projects over the period of this monitoring report resulted in decisions that would (upon implementation) convert more miles of road into the desired maintenance level as well as making progress towards the latest travel management direction. Table 13 summarizes the approximate miles of road that were changed to a decommissioned or closed status. These projects also allowed the interdisciplinary team to take a hard look at recommendations from the Travel Analysis Report[29] (TAR) and moved more roads towards the road management guidance identified from that report.

- Forest planning/vegetation management projects:
    - Polallie Cooper Hazardous Fuels Reduction
    - Hunter Integrated Resource Project
    - Crystal Clear Restoration
    - North Clack Integrated Resource Project

Table 13. Approximate miles of closed and decommissioned roads.

Miles	Status Update	TAR Likely Needed
2	Decommission	No
7	Decommission	Yes
1	Closure(storage)	No
49	Closure(storage)	Yes

Monitoring Discussion, Findings, and Adaptive Management Considerations

A change to forest management activities may be warranted. While there has been progress toward the desired maintenance levels and recommendations of the TAR, it is an iterative process, and we have more progress to make. Changes to the road system are considered each time we enter a planning area and those changes would likely bring us closer to the desired future condition for a minimum road system. While decisions have been made, not all decisions made have completed implemented. Implementing more or all of the decisions made during the same year or following year as the decision is signed would bring us closer to our desired management objective conditions on the ground. Although it would be helpful, implementing in that way would require significantly more funding which is not available at this time.

The Forest is trending in a positive direction towards meeting the goals and desired outcomes of system road management. Miles of road are being converted and objective maintenance levels are progressing towards the desired future condition. The Forest continues decommission roads and is moving towards an effective and affordably sustainable transportation system.

[29] fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd486512.pdf

Management Systems and Productive Capacity of the Land

Productive Capacity of the Land

Are management activities being implemented so that they do not substantially and permanently impair the productive capacity of the land?

- The monitoring question is tracking Forest Plan Standards and Guidelines: FW- 022 through FW-038.
- Monitoring Indicator: Extent of detrimental soil disturbance in an activity unit.

Monitoring Results

Between 2017 and 2019 BMP monitoring was conducted on a total of two activity units where ground-based logging or mastication methods were employed to determine if BMPs were implemented, and if whether they were effective at minimizing impacts to water quality from ground disturbing activities. Although the BMP monitoring is intended to evaluate the effects to water resources, the extent of ground impacts on soil resources can be assessed simultaneously. Both of the monitoring sites were located on the east side of the Forest (Basalt and Voodoo contract areas). Monitoring concluded that the extent of detrimental soil conditions had been limited at both sites (less than 15% and less than 10% respectively). Contract administrators had used contractual clauses to keep the footprint of the primary trails and landings limited in size and extent. They also ensured that a portion of those surfaces were waterbarred and covered with a protective layer of slash afterward.

In 2017 and 2019 post-project soil conditions were monitored at ten sites across the Forest, five on the west zone and five on the east zone. This monitoring effort was conducted to estimate the extent of detrimental soil conditions in units after thinning and slash abatement treatments had been completed. Data helped to determine if the extent of detrimental soil impacts had been contained, and if target limits in the Forest Plan were being achieved. Results indicated that while the extent of detrimental soil impacts had been contained in all ten of the units monitored, post-project conditions in 6 of those exceeded the limits established in the Forest Plan.

Restorative actions aimed at enhancing or restoring the productive capacity of the land occur on an annual basis as do measures to protect it. The Forest has an annual target of 1,200 acres assigned it by the Regional Office to restore degraded areas or to enhance and maintain the existing productivity of soil on select sites. The Forest exceeded their assigned target each year between 2017 and 2019 by a combined 71 percent by enhancing and restoring soil productivity on about 12,728 acres. Exceeding the assigned target can be attributed primarily to successes in securing partnership funds and retained receipts to conduct erosion control, noxious weed control, pre-commercial thinning, reforestation, road closures and decommissioning, riparian plantings, dispersed campground rehabilitation, and repair of user-created OHV trails. These accomplishments have offset by an order of magnitude the sampled post-project conditions where the extent of detrimental soil impacts exceeded chosen limits in the Forest Plan.

Data

The Forest conducts BMP monitoring annually and soil condition monitoring semi-annually to determine if ground disturbing activities are impairing the productive capacity of the land. Additionally, individual sites are identified where the intensity of effects resulting from human use and disturbance has been high. BMPs and PDC are defined and prescribed during planning phases of a project to limit the extent of detrimental soil impacts. Projects to enhance and restore soil and site productivity are planned and implemented every year too. Results of BMP monitoring are reported in a national corporate database every year. Soil condition monitoring is voluntarily conducted by individual soil specialists, typically every other year. Data are managed and stored locally. The results of soil restoration accomplishments are also entered annually into several primary corporate data systems to compile from.

Monitoring Discussion, Findings, and Adaptive Management Considerations

Though the majority of post-project conditions in sampled activity units have been good, results of the soil condition monitoring indicate that challenges are being encountered to contain the extent of detrimental soil impacts within chosen limits. Previously managed second-growth stands where there are some lasting ground impacts from past management have been particularly difficult. Existing effects compounded by second entry impacts can make limits hard to achieve.

Data indicated that certain soil types were more prone to compounding impacts than others. Sampled sites underlain by soils that developed on earthflow landforms were the most susceptible, while soils derived from glacial till were the least. Other causal factors are also to be considered, including soil moisture conditions, operator experience and investiture, and extent of prior detrimental impacts.

Efforts to contain unwanted impacts should re-intensify. It is recommended to enhance coordination between soil specialists and contract administrators to identify prone sites prior to operations, and monitor together soil conditions and empower operators to achieve mutually beneficial objectives. Sites where objectives are difficult to achieve and challenges remain should be integrated more fully and innovatively into annual inventories of post-project restoration opportunities (utilize more fully KV and retained receipts funds to capitalize on post-project restorative work).

Conclusion

As the Forest maintains a focus on long-term outcomes of management with respect to key social, economic and ecological systems, the following recommendations are a result of this monitoring report. Monitoring suggests that forest management activities are being conducted in a manner that meets the Forest Plan desired conditions, goals, objectives and standards and guidelines for most areas (Table 1). However, monitoring data suggests the forest is in a declining trend for early seral habitat type for deer and elk even though some vegetation management projects include the creation and enhancement of forage at a small scale. A change in management strategy at the project and landscape level is recommended for these species. In an effort to see a positive trend for deer and elk habitat, itis recommended that future projects should incorporate big game forage enhancement opportunities to a greater extent. On trend with recommendations related to management activities, mortality at the stand-level would benefit from increased pace-and scale vegetation treatments because reducing inter-tree competition would generally increase forest resilience and resistance to pests, as well as reduce size and intensity of wildfire. To facilitate such actions, it is also recommended to increase the number of projects the Forest analyzes and implements where the driving purpose and need of the project is related to providing forest products in addition to continuing beneficial integrated resource work. Monitoring results also show recommendations for the Forest to increase internal engagement between soil specialists and project contract administrators to benefit soil inventory and planning.

While the Forest is actively participating in applying Environmental Analysis and Decision Making (EADM) towards gaining efficiencies, the recommendations in management activities would also be connected to realizing improvements in the Forest's planning processes under the NEPA. Newly enacted NEPA regulations from the CEQ will be applied to future planning projects on the Forest.

Monitoring the amount of timber awarded each year resulted in two recommendations to change or update the Forest Plan: 1) PSQ; and, 2) acres classified as suitable timber for harvest. Currently, the Forest has an annual awarded timber volume that is about half of the PSQ identified in the Forest Plan. Thirty years of amendments to the Forest Plan have not resulted in updates to the calculations of the acres that are considered suitable for timber harvest. Having a better understanding of suitable timber harvest acres would likely benefit many aspects of land management decision making.

Transportation system monitoring resulted in a recommendations to update FW-420 so that roads are maintained in a more efficient and practical manner. Changing this standard would likely reduce costs and time spent on maintaining roads that hold a classification level for which they are not utilized.

Additional monitoring is needed before recommendations can be made regarding the populations of the

Oregon spotted frog at Camas Prairie. A new low count of egg masses was documented in 2019. However, it is suspected that the egg mass counts are highly correlated to cyclical water year fluctuations. More investigation is needed to ensure accuracy of the suspected correlation. Current efforts are underway to better understand the hydrology of Camas Prairie to assess if habitat is becoming less suitable for Oregon spotted frogs. Development of a site management plan may be necessary.

The Forest will continue its commitment to monitor and evaluate the effectiveness of our management actions. This process will continue to allow the Forest Plan to remain an active, relevant, usable document.

Appendix A: Monitoring Program Matrix

Plan Component	Monitoring Question	Indicator(s)
I) The status of select watershed conditions.		
Standards and Guidelines: FW-055 to FW-058 NWFP Standards and Guidelines: Aquatic Conservation Strategy, General Monitoring Objective (1).	Have Best Management Practices (BMPs) been implemented and are they effective at managing water quality consistent with the Clean Water Act?	U.S. Forest Service National BMP Annual Monitoring Protocols.
II) The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.		
Standards and Guidelines: FW-137 NWFP Standards and Guidelines: Riparian Reserves & Aquatic Conservation Strategy	Are Standards and Guidelines effective in maintaining or enhancing fish habitat capability?	Number of stream miles currently occupied by representative fish species (i.e., steelhead, chinook, coho, and bull trout).
NWFP Standards and Guidelines: Survey and Manage Species.	Are habitat improvement projects contributing to the persistence of Survey and Manage species?	Acres of habitat enhanced for Survey and Manage species.
Standards and Guidelines: FW-375 to FW-377, FW-384, Forest Plan Amendments #13 and #15.	Are known populations of invasive species continuing to spread? Are new infestations occurring?	Acres of surveyed lands with new and active invasive species infestations. Acres treated for invasive species.
Standards and Guidelines: FW-001 to FW-021, B8-001 to B8-055.	Are projects designed to prevent reactivation or acceleration of landslides, debris slides, debris flows, and earthflow areas?	Description of projects that are near landslides, debris slides, debris flows, and earthflow areas and how the projects affect stability.
III) The status of focal species to assess the ecological conditions required under §219.9.		
Desired Condition: Habitat is managed for the pileated woodpecker.	What is the trend for mature and late-successional habitat needed for pileated woodpecker persistence?	Acres of late-successional and old growth habitat on the Forest tracked over time.
Desired Condition: Habitat is managed for the American pine marten.	What is the trend for mature and late-successional habitat above 3500 feet needed for American marten persistence?	Acres of late-successional and old growth habitat above 3500 feet elevation on the Forest tracked over time.
Desired Condition: Habitat is managed for other wildlife species represented by the named management indicator species.	What is the trend for oak pine habitat needed for gray squirrel persistence?	Acres of oak pine habitat tracked over time.

Plan Component	Monitoring Question	Indicator(s)
Desired Condition: Habitat is managed for other wildlife species represented by the named management indicator species.	What is the trend for early-seral habitat needed for deer and elk persistence?	Acres of early-seral habitat tracked over time.
IV) The status of a select set of the ecological conditions required under §219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.		
Standards and Guidelines: FW-139 to FW-147 NWFP Standards and Guidelines: Riparian Reserves & Aquatic Conservation Strategy.	Are Standards and Guidelines effective in maintaining or enhancing aquatic habitat complexity?	Number of stream miles currently occupied by Endangered Species Act listed fish species (i.e., steelhead, chinook, coho, and bull trout).
NWFP Standards and Guidelines: Late-Successional Reserves.	What is the trend for mature and late-successional habitat needed for northern spotted owl recovery?	Acres of late-successional and old growth habitat on the Forest tracked over time.
Standards and Guidelines: FW-175.	What is the trend for Oregon Spotted Frog populations at Camas Prairie?	Tracking visual encounter surveys over time.
V) The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.		
Standards and Guidelines: FW-622, FW-624.	Are significant (National Register eligible) historic properties being maintained, stabilized, and repaired according to historic preservation standards?	Monitoring data and/or site condition assessments.
Desired Condition: There are five Wilderness areas on the Forest that will provide primitive recreation opportunities along with scenic, historical and ecological experiences. Standards and Guidelines: A2-005 to A2-035, A2-048 to A2-050.	Are the physical/biological, managerial, and social settings of each Wilderness Resource Spectrum (WRS) maintained consistent with the standards for wilderness management?	Wilderness Performance Program Score Card – 10 elements associated with wilderness stewardship will be selected[1].

[1] The WSP framework contains four mandatory elements (agency management actions, workforce capacity, education, and wilderness character baseline) and the will select six other elements from a list of 15: Invasive Species; Air Quality Values; Natural Quality of Wilderness Character; Natural Role of Fire; Water; Fish and Wildlife; Recreation Sites; Trails; Non-Compliant Infrastructure; Motorized Equipment / Mechanical Transport Use Authorizations; Agency Management Actions; Opportunities for Solitude; Opportunities for Primitive and Unconfined Recreation; Cultural Resources;

Plan Component	Monitoring Question	Indicator(s)
Desired condition: Activities such as hunting, sightseeing, off-road vehicle use, dispersed camping, cross-country skiing, and fishing are typical.	Has the Off-Highway Vehicle Record of Decision 2010 been implemented?	Development and designation of designated trails in INFRA Roads and Trails databases.
Desired condition: Outdoor recreation opportunities on the Forest are available in a variety of settings. Opportunities for dispersed recreation in a roaded setting are plentiful. Activities such as hunting, sightseeing, ORV use, dispersed camping, cross-country skiing, and fishing are typical. Opportunities for dispersed recreation in unroaded areas are less plentiful.	Are people having a high level of satisfaction during their visit to Mt. Hood National Forest?	Percent visitor satisfaction for (1) developed sites, (2) general areas, and (3) designated wilderness.
VI) Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.		
Desired Condition: The Bull Run continues to be managed for high quality water. Standards and Guidelines: FW-054-060, 078-079, 84, 130 FW-071, D-001 to D-021.	Is the production of pure, clear, raw, potable water being sustained for municipal use?	Changes in the quality and quantity of sustainable, municipal water supply.
Standards and Guidelines: FW-381 to FW-383.	What are the current tree mortality rates and patterns across the Forest?	Detectable acres of high tree mortality.
VII) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.		
Objective: Long term sustained yield capacity and timber growth since previous decade.	Is total growth and productivity exceeding mortality over all forest disturbances? Every five to ten years?	Track growth, harvest, stocking, and mortality by land use allocation over time.
Objective: Produce a continuing supply of wood products, maintain an even flow of harvest and provide a positive economic return to the government.	What is the rate of harvest of stands available for timber management?	Acres of timber harvested by land allocation.
	How much timber is being awarded?	Awarded timber each fiscal year.

Livestock Grazing; Outfitters and Guides; Other Special Provisions (e.g., dams, airstrips, mines); Workforce Capacity; Education; and, Wilderness Character Baseline.

Plan Component	Monitoring Question	Indicator(s)
Desired Condition: Timber harvest comes from lands suitable for growing timber.	Are there any changes in the land base available for producing timber?	Change in acres of land use allocations permitting timber harvest.
Desired Condition: Areas harvested are adequately restocked within five years of final harvest (36 CFR 219.27). Standards and Guidelines: FW-358, C1-019 to C1-021.	Are we meeting the 5-year regeneration period required by the National Forest Management Act?	Meeting stocking guidelines in Forest Plan as tiered to Forest Service Handbook.
Goal: Provide safe, efficient access for the movement of people and materials involved in the use and management of the Forest. Standards and Guidelines: FW-419, FW-420.	How many miles are suitable for passenger cars and high clearance vehicles?	Miles of road being maintained each year for all vehicles. Miles of roads providing safe access for use and management of the Forest.
Standards and Guidelines: FW-419 to FW-424.	Are road management activities being implemented in accordance with the latest access and travel management direction?	Miles of road converted into desired maintenance level and/or that have achieved the road management objectives.
VIII) The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).		
Standards and Guidelines: FW-022 to FW-038.	Are management activities being implemented so that they do not substantially and permanently impair the productive capacity of the land?	Extent of detrimental soil disturbance in an activity unit.

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