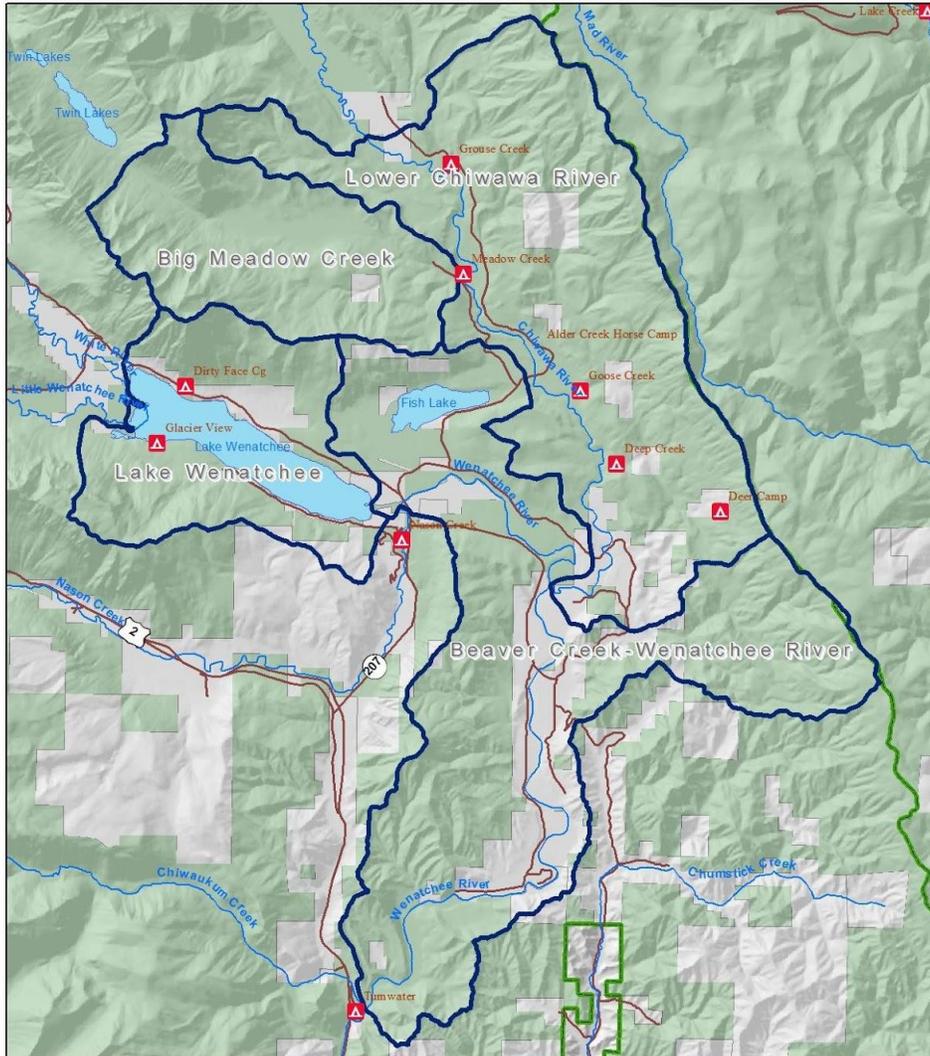


# Upper Wenatchee Pilot Project Collaborative Monitoring Strategy:

A living strategy to be updated annually as needed



## Version 1.0 – Adopted X, 2021

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## Introduction

In 2017, the Okanogan-Wenatchee National Forest (OWNF) received approximately \$1.6 million dollars for collaborative restoration and hazardous fuels reduction work otherwise known as the Chelan Fire Pilot. One critical component within the Chelan Fire Pilot is landscape-scale restoration planning on national forest land through the [Upper Wenatchee Pilot Project](#) (UWPP) covering 75,000 acres near Plain, WA. The Upper Wenatchee Pilot Project was collaboratively developed by the USDA Forest Service (FS) with substantial input from North Central Washington Forest Health Collaborative (NCWFHC), additional stakeholders within a project-level collaborative team, and public input.

The Okanogan-Wenatchee National Forest adopted the overarching goal statements below to reflect the intent of the Chelan Pilot and input received through a collaborative process with the NCWFHC:

**Goal 1:** Create a more resilient terrestrial and aquatic landscape in the Lower Chiwawa, Big Meadow, Lake Wenatchee, and Beaver Creek-Wenatchee River sub-watersheds to,

- Address conditions that have departed from the historic range of variability to reduce the risk of uncharacteristic wildfire and other disturbances to protect lives, communities, and ecological values
- Promote better outcomes for a broad spectrum of ecological, social, and community resources and values in a manner that recognizes and responds to the important role of natural fire and helps mitigate risk in the wildland urban interface while providing for sustainable user access
- Protect and restore watershed conditions that maintain uplands, late-successional habitat and large old trees, riparian and instream habitat, and water quality and quantity for the benefit of communities and native fish and wildlife
- Design and implement treatments to support the recovery of threatened, endangered, and sensitive species

**Goal 2:** Develop an effective model for collaboration among the USFS, other federal, state, and local agencies, local Tribes, the North Central Washington Forest Health Collaborative and member organizations, as well as a wide range of local landowners, community partners and stakeholders. This collaborative planning effort will increase the shared leadership of the forest and watershed restoration vision and will result in greater support for all management tools needed to implement terrestrial and aquatic treatment actions on this landscape.

**Goal 3:** Optimize the production of ecosystem services and forest products to fulfill the stewardship mandate of the U.S. Forest Service in a manner that reflects a broad spectrum of ecological, cultural, and socio-economic values.

The Upper Wenatchee Pilot Project was developed with a condition-based NEPA approach, meaning that while the range of treatments or activities authorized will be described and analyzed in the environmental impact statement (EIS), the specific locations and methods will be determined during implementation based on defined conditions in the alternative selected in the Decision Notice.

During the development of UWPP, the importance of adaptive management and the desire for a monitoring strategy were noted. These two things are interrelated with meaningful, quantifiable measures of relevant indicators necessary for guiding subsequent management. Additionally, monitoring is an integral part of adaptive management.

**The Okanogan-Wenatchee National Forest Restoration Strategy defines monitoring as the systematic collection and analysis of repeated observations or measurements used to evaluate changes in condition and progress towards meeting a management objective.**

Monitoring in the context of the UWPP will include:

- Implementation Monitoring – helps to evaluate how closely management plan guidelines were followed.
- Effectiveness Monitoring – helps to evaluate whether the management plan achieves the desired conditions.
- Validation Monitoring – helps to evaluate if the underlying assumptions regarding cause and effect relationships are correct.
- Public Perception and Values Monitoring – helps to gage public perception of project implementation, and public values in the project area. This monitoring includes both stakeholder concerns that implementation, effectiveness, and validation monitoring can address and specific efforts aimed at gaging public perception and values.

The Forest Service retains the primary responsibility for implementing monitoring consistent with their policies, project level Best Management Practices, and Restoration Strategy. This document clarifies expectations and roles of the additive and complementary collaborative multi-party monitoring of the UWPP, and aims to devise a plan that will address the overarching questions below.

Implementing required monitoring as well as this UWPP Collaborative Monitoring Strategy requires dedicated funding and resources. The success of this collaborative monitoring strategy is subject to available funding among all parties and other interested stakeholders. Funding is needed to provide a baseline for administrative and implementation monitoring of UWPP as well as establishing a foundation and sampling protocols for evaluating treatment effects when further funding sources have been identified. This strategy will monitor annually monitor the finances and resources going towards monitoring by the federal fiscal year, and develop work plans accordingly.

During review of the Environmental Assessment and collaborative discussions focused on project monitoring, the following overarching questions emerged.

- *What is the status of project implementation: what has been accomplished, what is planned next, and what remains to be completed?*
- *Is implementation consistent with Decision Notice including, are the specific locations and methods determined for treatments during implementation consistent with moving towards the defined conditions in the final proposed action and the Decision Notice.*
- *Are the project goals and the project's Purpose and Need on track to be met?*
- *Are we having the effect that we intended with our treatments and non-treatment areas?*

- *What lessons are we learning that apply to the next phase of implementation and other project planning in north central Washington and the Okanogan-Wenatchee National Forest?*

## Upper Wenatchee Monitoring Sub-group

The Upper Wenatchee Monitoring Subgroup (UWMS) is established and convened by the North Central Washington Forest Health Collaborative (NCWFHC) to work in close coordination with Wenatchee River Ranger District's Interdisciplinary Team (ID Team) to provide external technical review of proposed and ongoing work in the Upper Wenatchee Pilot Project. The UWMS is composed of representatives from organizations involved in local forest management issues, and meets bi-annually in late fall and early spring. The late fall meeting includes review of detailed project implementation plans prepared by USFS, monitoring activities and results to date, and discussion. Review includes evaluation and discussion of implementation plans and their consistency with the overarching project goals and design. The early spring meeting focuses on coordinated planning for monitoring in the season ahead, and emergent topics as needed. The UWMS should be comprised of a diverse group of committed stakeholders including community members, NGOs, local, state, and federal agencies. The group's membership will purposefully work to ensure coordination with ongoing and anticipated monitoring in the project area by existing entities.

US Forest Service has ongoing monitoring at the forest-wide and watershed scale, while they will have specific monitoring commitments tied to the Upper Wenatchee Pilot Project Decision Notice to facilitate implementation and their ongoing monitoring needs.

The role of the UWMS is to complement the existing US Forest Service work and:

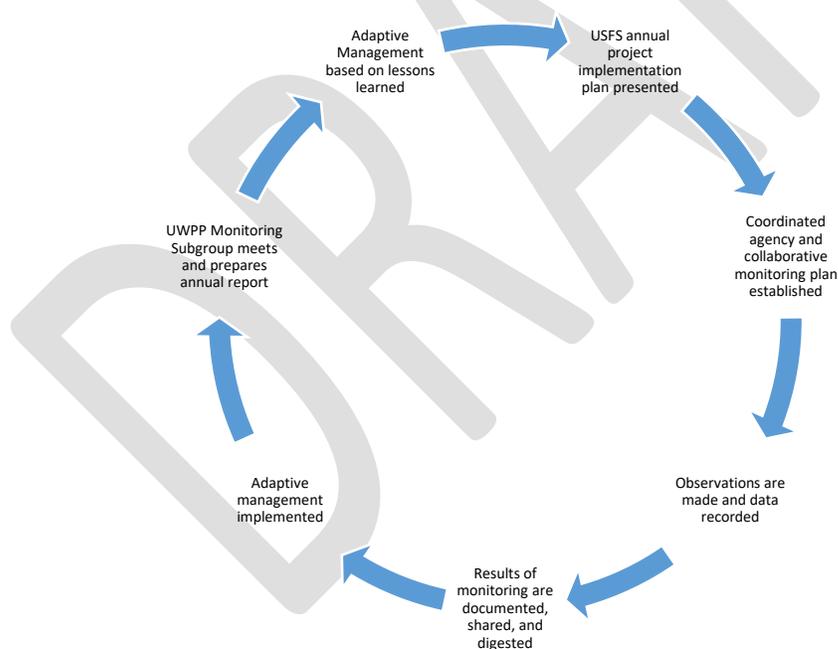
- Coordinate with USFS to track their monitoring resources, activities and results, needs, and sharing of information of other monitoring results such as that done under the DNR's [20-Year Forest Health Strategic Plan Monitoring Framework](#).
- Evaluate project implementation relative to overarching questions, stakeholder interests, and project design including potential/recommended adaptive management actions.
- Review unit maps, boundaries, prescriptions, operations plan, mitigation provisions, and monitoring results
- Organize and host bi-annual meetings in early spring and late fall
- Following the late fall meeting (that includes review of detailed project implementation plans prepared by USFS, monitoring activities and results to date, and discussion) and before the end of each calendar year, produce an annual UWPP Monitoring Memo to share with the full North Central Washington Forest Health Collaborative and interested parties.
- Develop an online project page for displaying and sharing monitoring activities and results
- Develop an annual multi-party monitoring workplan
- Evaluate public awareness of and support for the project and implementation underway

- Evaluate short- and long-term treatment impacts on stakeholder identified ecological indicators
- Work to ensure resources are available to support this plan including funding
- Train interested individuals on monitoring protocols
- Assist the WRRD with regular project updates to the public

The subgroup will require coordination and facilitation, which will be addressed in its first year of operation. The subgroup will aim to operationalize and actualize this monitoring strategy by identifying the “how” and “who” behind the work, including a greater definition of roles.

## Process

The monitoring strategy considers spatial scales of monitoring ranging from individual project actions to the larger landscape that encompasses the Upper Wenatchee project area. Temporal scales are also important, some measures need to be evaluated during project action implementation and some after a complete treatment that includes several smaller projects to evaluate overall change. The process of providing clear project implementation information, establishing coordinated monitoring plans, conducting monitoring activities, and sharing the results to inform adaptive management is a vital and ongoing process that will evolve as project implementation occurs.



The objective of the annual process established by the UWPP Monitoring Subgroup is to increase communication and coordination, clarify expectations and roles, and reduce redundancy in efforts. This means the process and monitoring strategy will identify:

- Current and future FS monitoring commitments and monitoring leads
- Appropriate areas, emphasis, and roles of third-party monitoring
- Short-term monitoring priorities and long-term objectives

- Note that some long-term objectives extend beyond UWPP implementation
- Resources available that are associated with monitoring activities, and resources needed to achieve shared goals
- Routine, methodology, and products by which monitoring information is shared
  - Future implementation plans and reports of both implementation and monitoring activities to date for annual reporting and meeting
  - Benchmarks for adaptive management discussions between phases of project implementation
  - Roles and appropriate methodologies for the monitoring itself and reporting.
  - Documentation and data sharing in a way that is meaningful to stakeholders and useable for USFS.

This monitoring strategy will be revised annually to incorporate the annual workplan, and new information as needed.

## Stakeholder Identified Issues

This monitoring strategy evaluated stakeholder identified issues raised during project collaboration and/or in public comments that monitoring can help to inform. These issues help to frame the monitoring topics and indicators that we will track, which are detailed in sections below.

### Pre-treatment Tree Monitoring

*Stakeholder identified issue:* Prescriptions should be site specific and evaluation of treatment impacts requires a record of pretreatment vegetation

*Monitoring action:* Annually collect and maintain USFS Stand Recon/Diagnosis forms on stands to be treated as a baseline, and photo interpretation that drove landscape analyses and assessments at the start of the project. Follow DNR's Stand Level Monitoring Protocol (Appendix B) to collect some third-party baseline monitoring data in stands to be treated in the first phase of treatment and non-treated control (reference) stands nearby. Note: USFS will not collect stand exam data from all treatment units, but will have stand recon/diagnosis forms completed that have a qualitative component that validates (or not) the need for treatments and what the treatment might look like. If need arises, UWPP Monitoring Subgroup can provide 3<sup>rd</sup> party support to complete these forms for proposed stands.

### Conditional NEPA

*Stakeholder identified issue:* Because the project is conditional NEPA, details will emerge as the project is implemented and will also be based on additional data collected. Conditional NEPA approach allows treatments to be identified based on the actual condition at the site, and therefore may deviate from what was presented in the EA if the condition varies.

*Monitoring action:* Clear, transparent, and regular communication to annually document what treatments are proposed, what information (surveys, stand exams, etc.) is necessary to inform future treatments, and comparison against range of action proposals in the final Decision Notice. USFS field recon notes and any 3<sup>rd</sup> party analyses will be used for this monitoring.

## Forest Structure After Commercial Thinning

*Stakeholder identified issue:* How well do the treatments match the prescriptions?

*Monitoring action:* Utilize DNR Stand Level Monitoring Protocol from the 20-Year Forest Health Strategic Plan Monitoring Framework and associated Survey 123 application for individuals to collect data on post-treatment forest structure conditions, while also maintaining records of anecdotal and other information collected from post-treatment visits.

USFS currently plans to use designation by prescription to implement the project, which can be either contract marked or operator select. The USFS Sale Administrator will monitor, while UWPP Subgroup can act as a 3<sup>rd</sup> party monitor in addition. Stand-level monitoring plots will include no-cut areas such as Northern Spotted Owl Habitat to characterize stand level densities, but the data will also be used to evaluate adherence to the prescribed density targets within the treated areas. Data will be cataloged, stored, and contained within our annual monitoring report.

Basal area (BA) will be used as a surrogate for canopy cover with basal area targets likely to achieve the desired canopy cover derived from existing stand composition and the silvicultural prescriptions. For project development, residual stocking (BA) was determined through FVS simulations and a resulting canopy cover values. A spherical densiometer can be used to estimate this value in the field. Additionally, future photo interpretation and/or LIDAR will facilitate monitoring of basal area and canopy cover at the courser scale to complement stand level monitoring.

The need for snags and downed wood will be determined during USFS's prescription development and success at achieving those targets for individual subunits will be determined primarily by professional opinion of the USFS contract administrator. Collaborative baseline monitoring will make note to USFS of highly valuable snags in proposed treatment units, while post-implementation monitoring of stands will include review of snags and downed wood.

### Northern Spotted Owl Habitat

*Stakeholder identified issue:* Treatments will negatively affect Northern Spotted Owl habitat.

Authorized impacts of treatment on designated critical habitat for the Northern Spotted Owl (NSO) were analyzed during project development primarily in terms of suitable nesting, roosting, and foraging (NRF) habitat, based on modeled priority habitat. Quantification of treatment impacts on suitable habitat will be limited to subunits where density management is occurring.

Canopy cover is the primary metric for determination of downgraded and degraded acres but number of canopy layers, tall trees, abundance of snags and coarse wood are also important determinants of NSO NRF habitat suitability. In all instances, the professional judgment of the Forest Service and U.S. Fish and Wildlife Service biologists will take precedent for determining habitat status. Treatments that alter forest structure but retain canopy cover >60% "maintain" NRF habitat without altering its function. Treatments that reduce canopy cover below 60% to a minimum threshold of 40% will "downgrade" habitat functionality to dispersal only.

*Monitoring Action:* The monitoring subgroup will pay particular attention to acres that change areas from habitat to non-habitat and from NRF to dispersal-only with the thresholds above for implementation monitoring, and the amount of time until it comes back into habitat with effectiveness and validation monitoring.

Additionally, spotted owl surveys have historically occurred in the project area and were conducted during UWPP project planning to inform the NEPA. The monitoring subgroup will catalog this baseline information, document US Forest Service's schedule of future surveys and results, and highlight areas where these surveys not only inform but directly influence project implementation.

## **Social Monitoring**

*Stakeholder identified issue:* Effective fuel reduction and ecosystem restoration require public understanding and support

*Monitoring Action:* The monitoring subgroup will define a set of tactics that include public surveys (providing information on survey respondent support for project objectives, survey respondent understanding of forest issues), field tours, feedback from the Implementation Review Team, and ongoing collaborative discussion. Feedback to the collaborative and FS primarily consists of informal communications but could involve more formal documentation as well.

## **Water Quality, Quantity, and Aquatic Habitat**

*Stakeholder identified issue:* There is an urgency of addressing the current limiting factors to fish habitat and watershed function in the project area, and not degrading habitat further with treatment impacts.

*Monitoring action:* A combination of implementation and effectiveness monitoring actions will be outlined in close coordination with USFS ongoing watershed best management practices monitoring efforts forest-wide, with the UWPP providing a project area focus for emphasis on the timing, sequencing, and effectiveness of actions taken in this project to improving watershed function annually and over time.

## **Community Fire Protection/Risk Reduction**

*Stakeholder identified issue:* Number of cross-boundary projects implemented and percent Wildland Urban Interface (WUI) treated. Urgency for implementation of measures prior to the next wildfire, and effectiveness of treatments when a fire comes on assisting in fire management including suppression and mitigating fire impacts.

*Monitoring Action:* Implementation monitoring will track the timeliness and strategic implementation of fuel reduction efforts, while surveys in the effectiveness monitoring of fire management staff after an event will help to understand the impact of treatments on suppression and mitigation activities.

## Natural Disturbance

*Stakeholder concern:* How do unplanned actions, such as windstorm or fire, affect the ability to achieve the stated purposes and how are the impacts of such actions incorporated into the environmental review?

*Monitoring Action:* Annually and as events occur, monitoring must make note of changed conditions and whether they alter project assumptions and plans for implementation in the project area. Treatment effectiveness monitoring occurs post fire disturbance from all fire size classes. This is completed for each disturbance that has a spatial interaction with a treatment that has a fuels reduction or risk reduction objective. The effects are documented within the Interagency Fuel Treatment Decision Support System treatment effectiveness extension. On larger disturbances Burned Area Emergency Rehabilitation (BAER) is conducted. The process and intent of BAER is to environmentally analyze the effects from wildfire, including fire severity mapping, erosion potential, flooding and other resource damage. These efforts are already being performed by the USFS to an extent; however the data and results are not consolidated and readily available. UWMS will work to support consolidation and interpretation of data and results to inform adaptive management discussions.

*\*\* Note: If management actions in response to a disturbance are proposed, specific monitoring questions and actions may be developed unique to the proposal.*

## Implementation Monitoring

Monitoring of implementation evaluates adherence to the overarching project design, guidelines, and prescriptions. Typically, implementation monitoring is carried out by a combination of USFS employees that may include a contracting officer, botanist, geologist, soil scientist, wildlife biologist, and/or hydrologist to make certain observations. Most implementation monitoring is informed by qualitative professional judgement, on a unit by unit basis. Qualitative monitoring can be useful for determining general trends, spot checking that basic assumptions are correct, and to determine treatments which may need quantitative monitoring due to unexpected outcomes.

Qualitative observations of these changes typically involves a walk-through and professional opinion, while quantification involves data collection. When data are required, third party monitoring may be involved to complement US Forest Service capacity. Importantly, not all settings or treatments are likely to require the same rigor of monitoring. Additional observation of implementation comes with frequent public tours and is further enabled by the UWMS.

The anticipated minimum standard for qualitative monitoring is a walk-through and narrative text describing conditions relative to the design criteria, prescriptions, constraints, and mitigation in the treatment area. Photos may be included, and walk-throughs need to occur before and after treatment. Table 1 looks at indicators representing project goals that could serve as implementation monitoring benchmarks.

At its most basic, implementation monitoring keeps track of the number of acres, or miles treated, by treatment type and monitors adherence to the FS standards and guidelines. Geospatial

data on treatment locations are available from FS. The FS is responsible for documenting adherence to the standards laid out by the Decision Notice.

**Table 1.** Implementation Indicators representing project goals that the Upper Wenatchee Monitoring Subgroup is interested in tracking at regular intervals.

Objectives	Indicators	Schedule
Treatment Implementation	Acres treated, consistency with NEPA	Annual accounting
Treatment Implementation	Implementation of Mitigation measures	Pre- and Post-treatment
Treatment Implementation	Basal area/acre	Pre- and Post-treatment
Fire & Fuels	Treatment of activity, ladder, surface fuels, and piles	Post-treatment
Habitat maintained	Canopy cover, canopy layers, professional judgment	Post-treatment (ensure adequate pre-treatment baseline)
Snags and woody debris retained	Snags and coarse woody debris/acre	Pre- and Post-treatment
Hazardous fuels reduced	Change in fuel model	Pre- and Post-treatment
Soils minimally disturbed	Detrimental soil disturbance, Effective ground cover	Pre- and Post-treatment
Minimal impact to important plants	Plant distribution and abundance	Pre- and Post-treatment
Legacy trees retained	Large trees in units	Pre- and Post-treatment
Roads	Miles of road maintenance and decommissioning accomplished	Annual tracking of progress
	# of fish passage barriers removed	
Community Wildfire Risk Reduction	Acres of fuel breaks implemented and maintained (both shaded fuel break and WUI fuel break)	Pre- and Post-Treatment
	Coordination and alignment of fuel break with adjacent landowner treatment	

Prescribed Fire/Air Quality Monitoring	Acres burned, number of burn days, air quality intrusions	Fall and spring
Changed current condition	Identification of conditions that may influence implementation	Annual discussion

Implementation monitoring details:

- Treatment implementation for consistency with NEPA is both a GIS and field exercise. USFS sale administrators and ID Team already conduct this, while UWPP Monitoring Subgroup will complement with third-party validation and engagement.
- For vegetation management monitoring, UWPP will utilize:
  - Informal quick field visits to marked and treated stands, with particular attention paid to treatment of slash piles and fuels created by the project.
  - Implementation of the DNR Stand Level Monitoring Protocol for baseline and post-treatment plots, including use of Survey 1, 2, 3 app for data collection so it is stored and available for reporting.
  - Tracking of completed project implementation on an annual basis with treatment data provided by October 31<sup>st</sup> of each year from USFS Region 6 data staff to DNR’s Forest Health Tracker (<https://foresthealthtracker.dnr.wa.gov/>) at the project level and [within the context of progress across all-lands in the Upper Wenatchee priority landscape](#).
  - Imagery and/or lidar based drone flight imagery for treatment unit monitoring in a selected sample of units, in conjunction with field plots. The existing lidar covers pre-treatment conditions and can be compared to post-treatment drone data. Potentially more accurate and complete for monitoring canopy cover for NSO habitat, large trees, basal area, and other vegetation indicators. DNR Forest Health and Resiliency drone could be used for this, or work can be contracted out.
- Specific road restoration/maintenance opportunities were identified during project recon for the UWPP and are included in the EA and project record. These sites will be tracked by UWPP Monitoring Subgroup through the project implementation phase and associated contracts. Sites will be monitored for implementation and effectiveness on an annual basis by phase. Monitoring not only addresses stakeholder and resource concerns, but will be necessary for adaptive management of the pilot project. A roads report is generated annually for the Okanogan-Wenatchee National Forest for TS contracts, CMRD (forest crew), contract ERFO, etc. US Forest Service can run a modified query for the project area to provide this subgroup inform UWPP annual monitoring report and plans.
  - Monitoring should follow [National Aquatic BMP monitoring: Roads A-F, I protocols](#). USFS ID Team will monitor a statistical sampling of projects forestwide, while the UWPP Monitoring Subgroup will aim to specifically add

complementary data by implementation and effectiveness monitoring of Road BMPs on a project basis in the case of UWPP particularly through stakeholder and 3<sup>rd</sup> party efforts. Training may be necessary prior to subgroup engagement.

- Monitoring of roads maintenance activities usually occurs annually at the USFS OWNF Forest Level by the Engineering/Roads shop. They will be able to track and supply information to the UWPP Monitoring Subgroup on an annual basis for road maintenance/decom performed during TS, stewardship, other contracts, ERFO and/or road crew work.
- A good reference here for aquatic indicators is UWPP Aquatic Habitat Assessment and Restoration Strategy Report – Appendix B, Table B1 (Summary table of the REI pathways and indicators)
- Riparian Habitat monitoring will be focused on implementation monitoring of Riparian Reserve design criteria as defined in the final Decision Notice, while some baseline monitoring may also capture field recon notes that are helpful to inform ongoing project implementation. Post-treatment riparian habitat monitoring will be done with field verification of layouts and implementation of RR guidelines and with [National Aquatic BMP Vegetation A, B, C protocols](#).
- Instream habitat projects are routinely monitored for ARBO II<sup>1</sup> compliance by USFS staff, and could be monitored by the UWPP Monitoring Subgroup on a UWPP project basis with [National Aquatic BMP Aquatic Ecosystem A, and B protocols](#).

## Effectiveness Monitoring

Effectiveness monitoring helps to evaluate whether the management activities achieves the desired conditions. Effectiveness monitoring is driven by the Purpose and Need that guided the design of the treatments. At a minimum, effectiveness monitoring must assess if we have created the conditions we predict will influence potential fire behavior, hazard and risk reduction to shared values in the Upper Wenatchee watershed and Late-Successional Reserve with project treatments. Elements of aquatic restoration effectiveness monitoring could include documenting fish passage above corrected barriers, documentation of floodplain inundation and side channel connectivity, and reduction in sediment delivery to streams. Monitoring should also assess how

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<sup>1</sup> In 2013 a Biological Assessment (BA) describing effects of aquatic restoration activities was prepared by the U.S. Forest Service, Pacific Northwest Region, Bureau of Land Management (Oregon State Office) and the Bureau of Indian Affairs. The document, a re-initiation of a 2007 BA, is titled “Fish Habitat Restoration Activities Affecting ESA-Listed Animal and Plant Species and their Designated or Proposed Critical Habitat and Designated Essential Fish Habitat under MSA found in Oregon, Washington and parts of California, Idaho and Nevada”, and describes the effects of funding or carrying out aquatic restoration activities in Oregon and Washington (ARBA II) Subsequently, updated Biological Opinions (BOs) were issued in response to ARBA II. On April 25, 2013 the National Marine Fisheries Service (NMFS) issued the Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in States of Oregon and Washington (USDC NMFS 2013). In addition, on July 1, 2013 the US Fish and Wildlife Service (FWS) issued the Endangered Species Act – Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (USDI FWS 2013). These two Biological Opinions are collectively known and will be referred to as “ARBO II”

effectively project actions increased forest ecosystem resiliency. Some questions may be answered immediately post-treatment, while others may require years.

**Table 2.** Social and ecological stakeholder issues addressed by measuring indicators.

<b>Stakeholder Identified Issue</b>	<b>Indicator</b>	<b>Timeline</b>
<b><i>Social monitoring</i></b>		
Outreach	Documented outreach events	Assess Annually
Community support and engagement	Tribal, stakeholder, and public knowledge, attitudes, and questions about UWPP. Cross boundary implementation, Wyden Amendment projects	Assess Annually
<b><i>Ecological monitoring</i></b>		
Water Quality, Quantity, and Aquatic Habitat	Sediment deposition in creeks	Ongoing for USFS, annual assessment by UWPP
	Road density reduction (upland/riparian reserves)	USFS Roads/Engineering will have data, while USFS Wildlife and Aquatics will help interpret progress toward goals. Review with UWPP Monitoring Subgroup annually.
	Proportion of project area of high, medium, and low drought vulnerability	Re-assess at the same frequency as re-running the landscape evaluation for the project area. Potentially every 5 years.
Large Tree Retention and Survival	Large tree abundance	Post-harvest for abundance (can be compared to pre-harvest stand data where available)
	Large tree vigor (height, crown, diameter)	Assessed at set intervals post-harvest
	Insect and disease conditions	Included in annual state aerial survey, complemented by ground surveys at set intervals.
Late	Northern spotted owl habitat	Habitat to be assessed post-

Successional Habitat	(Nesting/Roosting/Foraging and connectivity)	treatment for retention standards at stand scale. Pre-phases of project implementation at broader scale. And as part of re-running landscape evaluation for project scale.
	Late successional vegetation (quality, quantity, and connectivity)	Assessed before every phase of project implementation at a minimum, and in re-running landscape evaluations at full project scale.
	Presence of Late-successional focal species: Multiple surveys types including remote cameras	Ongoing
Herbaceous Cover	Herbaceous composition	TBD
	Native herbaceous cover of disturbed stands (i.e. landings and restored roadbeds)	Annually post-disturbance ideally for large areas, and design a spot-check system longer term
	Acres with detected change in conditions by vegetation and disturbance type.	Change detection will be run by DNR to cover the project area at regular intervals, assess if this will work
Forest Condition and Treatment Need	Change in forest structure class relative to landscape evaluation goals.	Every 4-5 years
Fire risk reduction	Fire regimes/change in fuel model	Every 4-5 years, unless a major event or action occurs
	Survey results from fire managers	Assess as events occur
	Duration of implementation effectiveness	TBD
Response to natural disturbance	How are wildfires or other natural disturbances impacting the condition of the landscape?	Upon occurrence

## Validation Monitoring

The Upper Wenatchee Pilot Project proposed actions were based on assumptions relying on the best available science. Some critical questions testing the validity of those assumptions of cause and effect relationships include:

- Did the terrestrial landscape treatments and fuel breaks reduce risk from wildfire to values including habitat and community?
- Did forest thinning promote and expedite development of late successional habitat?
- Are forests sustainable and resilient when facing disturbance?
- Did watershed function improve, and is it more sustainable in the face of disturbances?

The UWPP Monitoring Subgroup in coordination with the USFS ID Team will develop a longer-term validation monitoring strategy, hopefully in conjunction with research partners, to achieve validation monitoring during and after project implementation. One approach will be to consider following the same process used to prepare the landscape evaluations for the project area that informed project development, including re-running the departure analyses after a large portion of the project area has had implementation completed.

## Public Perception and Values Monitoring

The concerns and values raised by stakeholders and the public in project development through collaborative meetings and public comments have informed the implementation, effectiveness, and validation monitoring sections in this strategy. Additionally, the UWPP Monitoring Subgroup is committed to working with the project partners and the local community to define the perceptions and values that we will use to inform future monitoring efforts in addition to those already identified.

## **Appendix A: 2021 Upper Wenatchee Monitoring Subgroup Workplan**

The first year's workplan of the Upper Wenatchee Monitoring Subgroup will be a combination of operationally establishing the workgroup and setting up a foundation for long-term success, while also collecting baseline project information.

In 2021 the workgroup will be established within the North Central Washington Forest Health Collaborative, and will host the first annual UWPP Monitoring Meeting in the late fall/winter of 2021 followed by a release of a first annual monitoring report.

The group will work from the final Upper Wenatchee Pilot Project Record of Decision and implementation plan, including Phase 1 of implementation, to link this strategy to project specifics.

The group will continue to understand the existing monitoring commitments, US Forest Service monitoring workplan and points of contact, capacity and resources available (and needed) to US Forest Service, and common methodologies for data collection. This information will help to set a shared set of expectations of monitoring in the UWPP, and assist in prioritizing and further defining the role of third-party and collaborative monitoring in this project.

Additionally in 2021, the following monitoring will occur:

- Selection of some long term no-treatment (control or reference) plots in coordination with USFS ID Team for monitoring
- Confirmation of procedures, protocols, and forms for specific monitoring actions including identification of training needs for 3<sup>rd</sup> party monitoring
- Baseline field monitoring in proposed Phase 1 project implementation units using DNR Stand Level Monitoring Protocol, including virtual and in-field training on protocol and Survey 123 app
  - Includes review of unit boundaries and draft prescriptions for DxP to inform baseline monitoring
- Informal review of pre-marked stands by DNR staff through use Good Neighbor Authority in UWPP project area
- Review of any remote cameras monitoring wildlife in the project area
- Lake Wenatchee Fire Adapted Communities Coalition public survey in summer 2021