



JBLM MONITORING SUMMARY

Public Works Directorate – Environmental Division-
Forestry Branch

Abstract

Forest monitoring tracks how this status changes over time. At JBLM, there are several types of inventory and monitoring, accomplished in-house or by contract. Each of these projects must have appropriate experimental design and field protocols to assure accurate and repeatable measurements. Once collected, the data must receive quality assurance, then be analyzed to produce timber volume and other forest metrics.

FOREST DYNAMICS: PRODUCTIVITY, YIELD AND REVENUES

Annual Timber Harvesting

Harvest Summary (2011-2015)

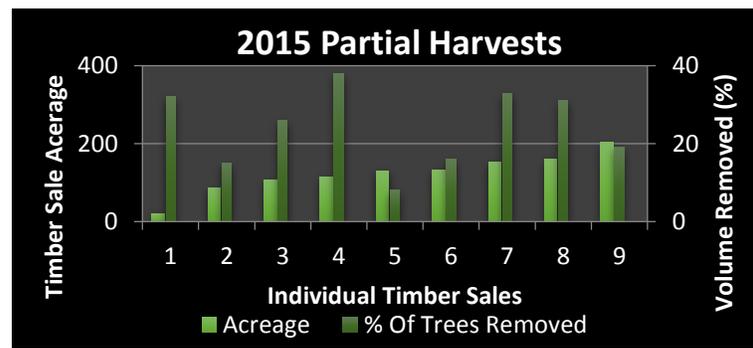
The table below shows: net volume harvested (MBF=1,000 bd. ft.) on JBLM and the number of cords of firewood sold to the general public.

Activity	2011	2012	2013	2014	2015	5-Year Average
Net Volume Harvested (MBF)	11,740	6,977	7,035	7,192	7,802	8,149
Cords of Firewood Sold	503	996	810	486	190	597

2015 Timber Sale Acreage & Percent Volume Removed

JBLM practices partial harvesting techniques rather than the more common practice of removing all trees in a plantation (clearcut) fashion. Figure 1 shows 9 partial harvests which took place in 2015, their respective acreages and the percent of commercial wood volume removed in each timber sale. The Timber Sales for 2015 range in size from 21 acres to 203 acres with the average being 123 acres and the percent volume removed range from 8% to 38% with the average being 24%.

Figure 1. 2015 timber sales and their respective acreages and the percent volume removed.



Landscape-Level Tree Growth & Depletion

Table 2. 2015 timber sales and their respective acreages and the percent volume removed.

Stage	Net Boardfeet (1,000's)	Difference	% Change
2015 PreDepletion	1587496		
2015 PostDepletion	1579945	-7551 _(net)	-0.47
2015 PostGrowth	1628166	+43493	+2.7
	1628166		

reduced the overall merchantable volume by only 0.47% (net volume)

Table 2 shows landscape-level changes in merchantable volume at JBLM. These values are derived from known depletions (harvests) and include estimates on mortality and ingrowth rates (FPS). For example, in 2015 overall merchantable volume increased by 2.7% while harvest activity

MONITORING CONSERVATION MEASURES

Flora and Fauna

Tree Species Composition

JBLM's forests are dominated by Douglas-fir, which comprises 85% of all tree stems greater than 6 inches diameter at breast height (dbh) and 92% of total basal area (summed cross-sectional area of all tree stems at breast height) (Figure 1). Other major species are western redcedar, red alder, and bigleaf maple, at 3% or less of total basal area. All other species combined are less than 2% of total basal area. (It should be noted these estimates are calculated from JBLM Forestry's new stand exam program, which started in 2012. Minor species are mostly under-represented in the data collected to date; estimates for these species will improve in future years.)

Wildlife

At JBLM, monitoring and management of forest wildlife is the purview of the JBLM Fish & Wildlife program.

Western gray squirrel

Western gray squirrels use habitat consisting of conifer-dominated forest that merges with open patches of oak and other deciduous trees. Habitat loss and fragmentation have caused the disappearance of the squirrel from all of western Washington except JBLM, and even here, the number of individuals shrank to less than 100 in the early 1990s. For about 20 years, Fish & Wildlife and Forestry have actively managed JBLM's forests to create better habitat for this species. In addition, Fish & Wildlife, in cooperation with the State of Washington, has translocated individuals from larger populations east of the Cascade Mountains to JBLM, resulting in increased numbers and a larger geographic distribution (Figure 2).

Bald eagle

Bald eagles are protected by the Bald and Golden Eagle Protection Act. There are 13 nests on JBLM, mostly located at forest edges next to rivers, streams, and wetlands (Figure 2).

Migratory birds

The Migratory Bird Treaty Act (MBTA) protects bird species that migrate seasonally between the United States, Canada, Mexico, Russia, and Japan. The list of protected species includes many familiar forest songbirds and raptors (birds of prey). Of those species which inhabit forests and woodlands, Fish & Wildlife monitors certain raptors by locating nests.

Threatened and Endangered Species

No species of wildlife listed under the federal Endangered Species Act (ESA) occur within JBLM's forests. However, JBLM is required to create suitable future habitat for the northern spotted owl (see Conservation Measures, below). One species of federally-threatened plant, a small floating plant called water howellia, occurs at 24 locations in wetlands within JBLM's forests.

Invasive Plants

Scot's broom

This non-native, fast-growing shrub can, in a few years' time, take over areas, such as tree plantations, where available light reaching the ground exceeds about 50% of full sunlight. In these areas, newly planted tree seedlings will die or have slow growth. Broom produces prolific seed which can remain dormant in the soil for many years. Vehicle traffic, on- and off-road, picks up soil in broom-infested areas and transports it elsewhere; thus, broom has now reached the interior of most of JBLM's forest stands. Forestry has just initiated an aggressive program to control broom in plantations, at logging landings, and along forest roads.

English ivy and holly

English ivy is invading along a "front" moving southwards from Interstate 5. In addition, birds that eat the fruits disperse the seeds, resulting in multiple isolated infestations across JBLM's forests (Figure 3). English holly is a slow-growing understory tree that is widespread as individuals and clumps of trees in most of JBLM's forests. Both species can dominate the forest understory, eliminating all or most native understory plants; ivy does it quickly, holly slowly. Two years ago, Forestry began a program of ivy control; about one-fourth of the infested area has been treated to date. A control program for holly has yet to be initiated.

Non-native blackberries

Himalaya berry and evergreen blackberry thrive in open areas (plantations, landings, road edge) in JBLM's forests, but are less widespread than Scot's broom. Like holly and ivy, these species can dominate, eliminating most native plants. If blackberries are present in the same areas where broom is being controlled, they are also controlled.

Other invasives

Three other invasive plant species of concern to Forestry are periwinkle, archangel, and large St John's wort. These escapees from gardens and commercial landscaping form clumps that gradually expand and exclude native plants. Scattered infestations currently exist on JBLM (Figure 3). A control program was initiated two years ago.

Disease

There have been no known insect epidemics in JBLM's forests for at least several decades. However, in recent years, laminated root rot, a fungus which causes conifers to decline and die, has become widespread (Figure 4). Douglas-fir, the dominant species on JBLM, is highly susceptible. Root rot typically forms infection centers when the fungus spreads from a single infected tree to nearby trees via the roots; over time, the center grows outwards in all directions. A significant proportion of our timber sales program now consists of salvaging dying and recently dead trees due to root rot. There is no effective method to eliminate root rot from a site. Instead, JBLM Forestry's new strategy is to plant resistant (e.g., pine) and immune (e.g., hardwood) tree species to replace trees lost to disease.

High Conservation Value Forests

JBLM Forestry has designated three categories of High Conservation Value forest (HCVF), as defined by the Forest Stewardship Council (FSC) (Table 3, Figure 3):

HCV3 – Contain rare, threatened, or endangered (RTE) ecosystems, including old growth and roadless areas > 500 acres.

HCV4 – Provide basic services of nature in critical situations (e.g., watershed protection, erosion control).

HCV6 – Critical to local communities' traditional cultural identity (cultural, ecological, economic, or religious significance).

We have three types of HCV3: Old Growth, Scattered Legacy Tree, and RTE Ecosystems. Old Growth has an abundance of *legacy*, i.e., large old trees, large snags, large logs, and multiple canopy layers. Scattered Legacy Tree areas have widely scattered individuals or clusters of live legacy trees embedded in younger forest. Our RTE ecosystems are stands dominated by Oregon white oak or ponderosa pine, plus areas where uncommon tree species or unusual plant communities are found.

The floodplain of the Nisqually River, and the steep slopes above the river, Puget Sound, and lower Muck Creek, are protected as HCV4.

There are 501 HCV6 sites, historic and prehistoric, within the FSC-certified forest area.

JBLM also has two categories of Representative Sample Areas (RSAs), as defined by FSC:

Reference: Establish or maintain an ecological reference condition; in our case, to compare managed and unmanaged (never logged) stands.

Non-RTE Ecosystems: Protected areas for species and communities not otherwise protected as HCVFs (e.g., to prevent common ecosystems or components from becoming rare).

Our Reference stands represent the major forest types found on JBLM (historic moist, historic dry, prairie colonization, hardwood). Unusual examples of non-RTE ecosystems include madrone-, Sitka spruce-, and grand-fir-dominated stands, plus one stand with large western redcedar.

Periodically, Forestry revisits HCVF and RSA boundaries. We also conduct site-specific monitoring of old growth, oak- and pine-dominated stands, and stands undergoing ecological restoration treatments.

Northern Spotted Owl Habitat

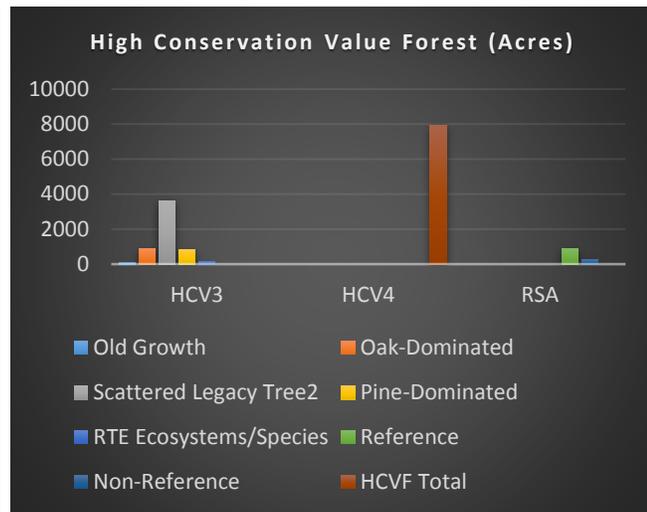
The northern spotted owl is listed as threatened under the Endangered Species Act. Although no spotted owls occur on JBLM, nor is it likely more than a few nesting pairs ever existed here, JBLM had been designated as Critical Habitat for the owl. This is no longer the case because JBLM has an Endangered Species Management Plan (ESMP) approved by the US Fish & Wildlife Service (USFWS).

The ESMP designated an 11,360-acre Spotted Owl Focus Area south of the Nisqually River (Figure 4) where JBLM will manage the forest to hasten development of dispersal, foraging, and nesting/roosting habitat for the owl. The USFWS hopes that, eventually, young owls dispersing

from more secure (from extinction) populations in the Cascade Mountains will utilize JBLM as a “stepping stone” to reach the Olympic Mountains, where owl populations are less secure.

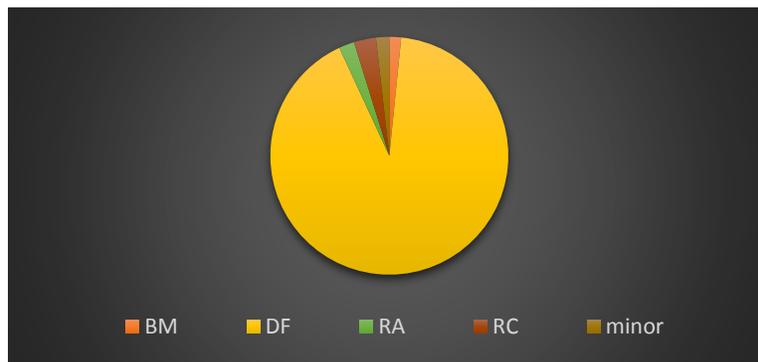
Table 3. Acreage of High Conservation Value Forest (HCVF) and Representative Sample Area (RSA) on JBLM.

Type of HCVF or RSA	Acres
HCV3*	5,317
Old Growth	75
Scattered Legacy Tree	865
Oak-Dominated	3,640
Pine-Dominated	856
RTE Ecosystems/Species	141
HCV4	3,178
Total HCVF*	7,953
RSA	1,131
Reference	863
Non-RTE Ecosystems/Species	268
Total HCVF + RSA*	8,806



*Accounting for overlap between designations.

Figure 2. Tree species as percent of basal area in JBLM’s forests.



DF = Douglas-fir, RC = western redcedar, RA = red alder, BM = bigleaf maple, minor = western hemlock + Oregon white oak + ponderosa pine + lodgepole pine + black cottonwood + Oregon ash + Sitka spruce + grand fir + Pacific madrone + western yew.

Figure 3. Geographic distribution of western gray squirrel, bald eagles, and water howellia on JBLM.

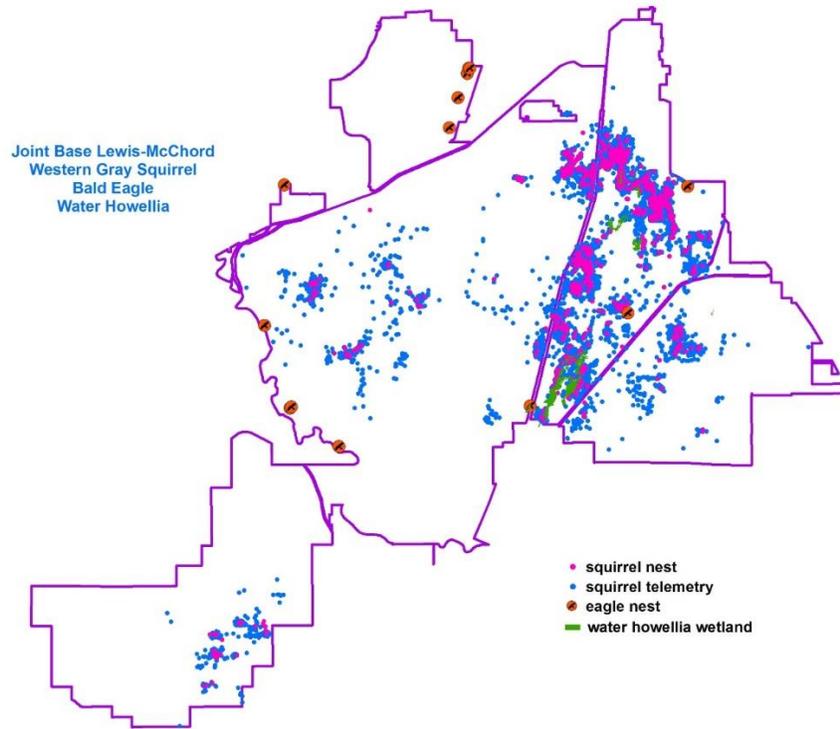


Figure 4. High Conservation Value Forests, Representative Sample Areas, and Northern Spotted Owl Focus Area at JBLM.

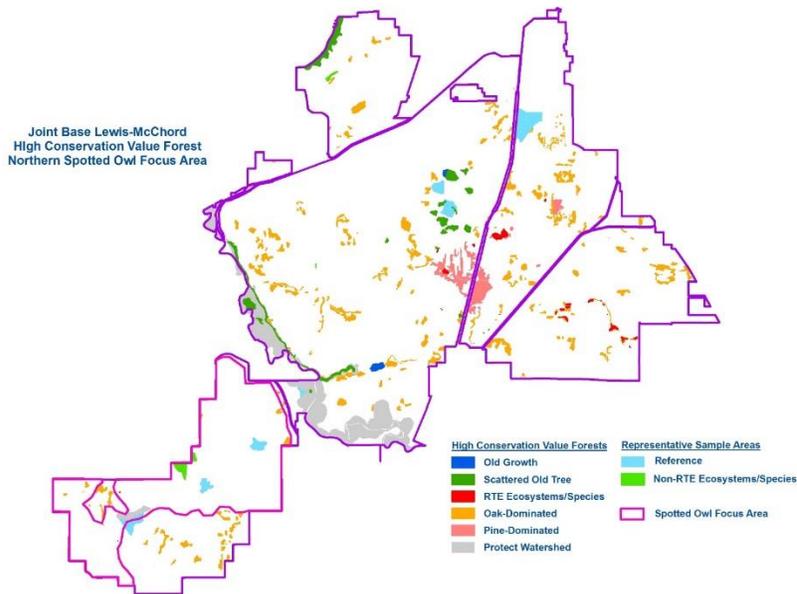
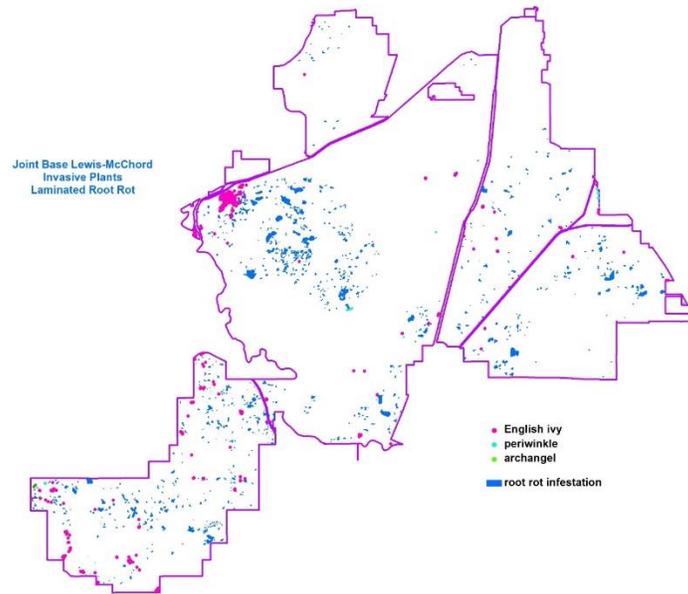


Figure 5. Locations of non-native, invasive species and laminated root rot on JBLM.



ENVIRONMENTAL AND SOCIAL IMPACTS

Social Impacts

JBLM forest managers take account of ‘social impacts’ when managing the forest. This means incorporating the results of Social Impact Assessments into planning and operations, and monitoring social impacts. Social Impacts of forest management can be positive or negative, intentional or unintentional.

JBLM forestry periodically completes Social Impact Assessments, and to tries to minimize or eliminate any negative changes. Mitigation can include changes to the forest management plan, or processes/procedures to ensure any negative effects are eliminated or reduced, wherever possible.

Environmental impacts

Herbicide application in forested areas is regulated by Department of Defense. There are strict standards mandated by the JBLM Integrated Pest Management Plan. Applications and reporting of herbicides is monitored by the JBLM hazardous materials group. Forestry operations strive to minimize pesticide amounts by selecting the correct herbicide for the target species, lowering application rates but not effectiveness, and seeking application methods to maximize the absorption of herbicides by the target. These methods leave less exposure of herbicides to the environment and to workers. Below is a table showing the amount of chemicals applied during the 2015 fiscal year.

Commercial name of pesticide / herbicide	Active ingredient	Quantity applied annually (lbs)	Size of area treated (Acres)	Reason for use
Rodeo	Glyphosate	68	50	Site Prep
Polaris sp	Imazapyr	20	50	Site Prep
Sulfomat Xtra	Sulfometron Methyl(1) and Metsulurin Methl(2)	(1)3.5 & (2)0.94	50	Site Prep
Element 3A	Triclopyr	17.8	16	Weed Control
Opensight	Potassium Salt of aminopyralid	2.0	16	Weed Control