

TITLE: Effects of western spruce budworm defoliation on the northern spotted owl and its habitat in Southcentral Washington

LOCATION: The east slopes of the Cascade Mountain Range in southcentral Washington, including portions of the Gifford Pinchot National Forest, Yakama Indian Reservation, Mt. Baker-Snoqualamie National Forest, and intermixed state and private lands.

DURATION: Year 1 of 2-year project (building on funded FY05 EM project) **FUNDING SOURCE:** Base

PROJECT LEADER: Beth Willhite, Forest Health Protection, 503-668-1477, bwillhite@fs.fed.us

COOPERATORS:

Wildlife Biologist: Vince Harke, US Fish and Wildlife Service (USFWS) (pending administrative approval)

Wildlife Biologist: Gina King, Yakama Indian Nation (YIN)

Remote Sensing Specialist: Jim Ellenwood, Forest Health Technology Enterprise Team (FHTET)

GIS Specialist: Julie Johnson, Forest Health Protection (FHP)

Private Industrial Forest Landowner: Hancock Timber Resource Group, *contact: Rich Potter*

Washington Department of Natural Resources (WADNR)

Gifford Pinchot National Forest

Mt. Baker-Snoqualamie National Forest

PROJECT OBJECTIVES:

The objective of this project is to investigate the subregional, landscape-level effects of western spruce budworm (*Choristoneura occidentalis*) defoliation since 1985 on northern spotted owl (*Strix occidentalis caurina*) populations and on spotted owl habitat by analyzing relationships among defoliation, changes in habitat, and trends in owl demography.

JUSTIFICATION:

Linkage to FHM Detection Monitoring

Annual cooperative insect and disease aerial detection survey records indicate an ongoing western spruce budworm outbreak in southcentral Washington since 1985. Similarly, FHM CVS/FIA ground plots in this region have recorded budworm defoliation during this period. Although these surveys have detected and documented this major disturbance, they generally are not adequate to fully evaluate the extent and severity of disturbance effects upon two primary management concerns in this area: the habitat of species associated with late-seral forests, and northern spotted owl populations.

Significance in terms of the geographic scale

This project covers a large, biologically significant sub-region of the range of the northern spotted owl. Disturbance events in the project area are typical of those occurring in other portions of northern spotted owl habitat that occur along the east slopes of the Cascade Mountain Range in both Washington and Oregon.

Biological impact and/or political importance of the issue

This project addresses important, complex, and oftentimes controversial issues regarding the northern spotted owl, which is a federally listed Threatened and Endangered (T&E) species, including issues surrounding management of eastside Northwest Forest Plan (NFP) Late Successional Reserves (LSRs) and Habitat Conservation Areas (HCAs), eastside mixed conifer forest health and sustainability, and the scale and severity of effects of native defoliator outbreaks upon extensively-managed and intensively-managed forest stands.

Feasibility or probability that the project will be successfully completed

There is a high probability that this project will be completed. It utilizes existing datasets for owl demography, vegetative inventory, budworm defoliation (incidence and intensity), and satellite imagery. It has the support of the USFWS, the FHTET remote sensing unit, and key land managers.

DESCRIPTION:

a. Background: Late Successional Reserves were created by the 1994 Northwest Forest Plan to provide habitat for the northern spotted owl and other species associated with late successional forests. Forests affected by the NFP on the “eastside” of the Cascade Mountains crest typically are dense, multilayered, mixed conifer forests having a large component of true firs. These forests developed from a previously more open, earlier seral condition during the past century as a result of fire suppression and selective logging of seral species. The same features that make these eastside mixed conifer forests suitable owl habitat (dense, multiple canopy layers, high levels of dead wood) also make them highly susceptible to habitat degradation and loss as a result of frequent mid- to large-scale disturbances caused by defoliators, bark beetles, and fire. To date, very few studies have examined the effects of western spruce budworm defoliation upon owl habitat, and those studies that have been undertaken were conducted on federal lands at the scale of individual LSRs (e.g. Hummel (2003) examined changes in fire hazard associated with budworm defoliation based on data collected in a Research Natural Area in the Gotchen LSR on the Gifford Pinchot National Forest, Maffei and Eglitis (late 1990’s) looked at changes in vegetative structure and composition on two LSRs on the Deschutes National Forest). This project will examine the functional effects of western spruce budworm defoliation at a broad landscape scale, including all forestland (federal, state, tribal, and private ownerships) covered by the NFP within the sub-regional project area. It will evaluate defoliation-associated changes in forest vegetative cover resulting from crown degradation, tree mortality, and logging that has occurred in response to the outbreak since 1985, and owl response to defoliation in terms of demography (survival, reproductive rates, occupancy, movement).

b. Methods:

Vegetation analysis units will be defined by layering boundaries of 1) Northwest Forest Plan land management designations lying east of the Cascade Mountain crest, applicable aerial survey reporting areas, and polygons of western spruce budworm defoliation since 1985 over satellite images generated by LANSAT Thematic Mapper (30m resolution). Rule-based intersections of defoliation polygons will be used to define defoliation categories (e.g. areas with 4 or more consecutive years of defoliation) for spatial analysis. Satellite images representing pre-outbreak (1984) and current (2004) vegetative conditions, and possibly one intermediate outbreak year, depending on the results of owl demographic data analysis, will be used to evaluate changes in vegetative conditions (percent cover) in the study area between 1984 and 2004 resulting from tree mortality and logging. Ground-based inventory plots (CVS/FIA) will be used to characterize mortality, percent cover, tree density, and species composition throughout the study area. In addition, budworm impact plots taken in 1999, 2000, and 2001 in three 125-acre owl cores (nesting, roosting, forage habitat) in the Gotchen LSR will be remeasured in 2005 to describe, on a local scale, changes attributable to budworm defoliation and associated events. Owl demographic data collected in the region since 1985 (e.g., the 1987-1989 radio-telemetry study, the ongoing Spotted Owl Demographic Study) will be correlated chronologically with defoliation data and vegetative data to gain deeper insight into interactions among budworm defoliation, vegetative change, and owl responses.

c. Products: GIS layer with labeled pixels showing change categories, color maps depicting change by defined categories, owl core tree data from 2005 ground survey, synthesized data in the form of a report.

d. Schedule of Activities (revised):

March 2005-May 2005 – Create GIS layer of project boundary, acquire satellite imagery, develop rules and classify satellite imagery, randomly select ground plot locations for verifying remote sensing signatures.

June 2005-August 2005 – conduct field work (ground verify remote sensing signatures, collect owl core tree data).

June 2005-June 2006 - compile databases for project (CVS/FIA, owl demography, etc.) analyze satellite imagery, owl demographic data, vegetative inventory data, enter and summarize field data.

June 2006-August 2006 – complete field work (ground verify remote sensing signatures, enter and summarize field data).

September 2006 February 2007 - analyze satellite imagery, owl demographic data, vegetative inventory data, deliver products and complete final report.

e. Progress/Accomplishments:

- Created final project boundary GIS layer based on NW Forest Plan boundaries and western spruce budworm defoliation history.
- Acquired project satellite imagery of the project area for 1984 and 1993 to use in the change detection analysis.
- Julie Johnson and I traveled to Ft. Collins in May to work with Jim Ellenwood and Vern Thomas to develop rules and compile data layers for initial image classification and to generate a set of random ground sample points for signature verification.
- Contacted cooperating landowners regarding project; obtained permission to collect project data on their lands, reached agreement to share pertinent information.
- Received GIS layers from a number of individual cooperators depicting location and timing of pertinent management activities. Acquisition of remaining GIS layers is ongoing.
- Hired two summer crew persons.
- Summer crew worked 2 months collecting owl core data tree data and ground data for remote sensing signature verification. Worked progressed more slowly than anticipated – the crew was able to complete less than ½ of the ground verification plots (80 out of 200). It took much longer to navigate between ground verification plots than originally estimated (original estimate = 10 plots per day; actual production averaged 3 plots per day). Many of the plots are located far away from the base station (4-5 hour drive), in rough terrain, and in remote areas away from roads. One additional field season is required to complete the field work before final analysis can be accomplished.

COSTS¹:

	Item	Requested FHM EM Funding	Other- Source Funding	Source
FY2005 (completed)		\$30,200.		
Administration	Salary	10,000		
	Overhead	1,900		
	Travel	1,000		
Procurements	Contracting	15,000	7,500	FHTET
	Equipment	500		
	Supplies	1,800		
FY2006 Proposed:		\$29,500		
Administration	Salary	15,300		
	Travel	6,300		
	Vehicle/Miles	4,300		
Procurements	Contracting	2,500	1,250	FHTET
	Contracting	1,000		
	Supplies	100		
FY2007 Proposed:		\$2,500		
Administration	Salary			
Procurements	Contracting	2,500	1,250	FHTET

¹Cost estimates are based on the following:

FY 2005 (completed)

Summer survey/signature verification crew: salary for 2 people for 2 months = \$120/day x 2 = 240/day x 40 days = \$10,000

Overhead assumed at 19% = \$10,000 x 0.19 = \$1,900

Travel for summer crew = per diem for 2 people for 5.5 days @ \$182/day = \$1,000

FHTET = \$15,000, matching funding by FHTET = \$7,500

Equipment = \$500

Satellite Images: 3 @ \$600.00 each = \$1,800

FY2006 Proposed

Summer survey/signature verification crew: salary for 2 people for 10 weeks = $\$250/\text{day} \times 50 \text{ days} = \$12,500$,
plus 60 hrs OT for greater work efficiency at distant locations = $\$2,800 + \$12,500 = \$15,300$

Travel for summer crew = per diem for 2 people for 9 weeks = $\$198/\text{day} \times 3.5 \text{ days} \times 9 \text{ weeks} = \$6,237$

Vehicles (WCF) = $\$300/\text{month} \times 2.5 \text{ months} = \750

Mileage = $\$3,000$

FHTET = $\$2,500$, matching funding by FHTET = $\$1,250$

Contract to compile and summarize individual private industrial landowner proprietary information = $\$1,000$

Supplies = $\$100$

FY2007 Proposed

FHTET = $\$2,500$, matching funding by FHTET = $\$1,250$