

Final Report (00-2-33)
Task Order No.
Agreement No.

Project Title: The Lick Creek Demonstration – Forest Renewal through Partial Harvest and Fire

Project Location:

The Lick Creek Demonstration Site is located in the eastern portion of the Pomeroy Ranger District, Umatilla National Forest, ± 32 miles west of Asotin, southeastern Washington; centered at longitude 117.4833°, latitude 46.2333°.

Principal Investigators: Benjamin Zamora, Melinda Martin

Project Sponsors:

Funding to initiate the development of the Lick Creek Demonstration Site was provided by the Joint Fire Science Program, USFS Umatilla National Forest, Washington State University, Rocky Mountain Elk Foundation, Blue Mountain Elk Initiative, and Guy Bennett Lumber Company.

Brief Description of Project:

The overall goal of the Lick Creek project was to develop a demonstration of the application and effects of selective, partial harvest on mid-succession forest stands in combination with prescribed fire to enhance forest condition, amenities, and reduce wildfire hazard. Frequent and timely monitoring of the demonstration site would provide documentation to substantiate, clarify, and explain anticipated ecological relationships and treatment effects throughout the demonstration site. The demonstration was to provide opportunity for general public examination and for the Pomeroy Ranger District to begin a long-term monitoring study of a fuels management strategy applied throughout the District.

The specific objectives of the project were (1) to implement four levels of viewable silvicultural and fuels management stand treatment on the Lick Creek site in a replicated manner, (2) prepare documentation of the treatments and treatment effects for public review, (3) initiate a long-term monitoring study of the site to document treatment effects to include response of leave trees, and (4) to assess the economic viability of small diameter timber harvest as a means of accomplishing silvicultural and fuels management objectives. The treatments would represent prescription strategies currently employed by District staff to address management of stand structure, species composition, and fuel conditions in mid-successional forest stands.

Work Summary:

Treatment Design and Installation - The site was divided into three treatment units with wildlife habitat units left between some of the treatment units within the site boundaries. A 150 ft buffer zone was maintained at the bottom of the slope between the treatment units and Lick Creek. Each unit was divided into four subunits to replicate the treatment. The following four treatments were installed in each unit - two levels of harvest, a control, and a burn only treatment. The replication subunits range in size

from 6 to 17 acres, the size being dictated by uniformity of pre-harvest conditions and the facilitation of harvest and prescribed burning operations.

Treatment Schedule - Treatment planning, the timber cruise, and pre-logging stand inventory were conducted in 2000 and 2001. Harvest of the site was completed during the winter of 2001-2002. Preburn inventory was conducted in 2002 - 2003. Slash piles were removed from the site by means of chipping and selected pile burns in the fall of 2003. The prescribed burn of the treatment units was conducted in September and October 2004. The first year of post-burn monitoring was completed in the summer and fall of 2005.

Harvest - A total of 85 acres of the site were harvested in a 40-day period, commencing in mid December 2001. Winter logging in the Blue Mountains is at risk of being stopped at any time because of severe storm conditions and snow accumulation. Fortunately, severe weather conditions never developed until after the harvest had been completed in late January, 2002, allowing harvest to proceed with minimal snow cover. Yarding was conducted for 74% of the harvest area with gravity feed skyline system utilizing a skyline yarder and a motorized support carriage. Ground-based yarding with a tracked skidder was conducted over the remaining 26% of the harvest area. Whole tree yarding was required as part of the treatment prescription to minimize fuel loading on the site. A stationary, pull-through, motorized, radio-controlled delimeter was used to process the whole trees that were yarded to the landing. After delimiting, the trees were sorted according to merchantable (sawlong) or unmerchantable (tonwood, fiber wood), cut to specified lengths, and piled into decks for loading. One-hundred loads were hauled from the site - 51 sawlog loads, 33 tonwood loads, and 16 fiber loads. The total yield of the harvest averaged 27.14 tons per acre for the 85-acre harvest area of the Lick Creek Site. Yield was portioned as follows - sawlog (1171 t, ~ 194 gross mbf), tonwood (761 t), fiberwood (374 t).

Chipping for Biomass Fuel - Whole tree removal from the harvest site meant that large slash piles accumulated at the landings at the top of each unit. These piles were large, ranging from 1.41 tons/acre to 4.67 tons per acre and were considered a hazard to the conduct of the prescribed burn because of their location and potential to initiate escape fire. Removal of the piles proceeded in the late fall of 2003 through a service contract to a local contractor to chip the slash for sale as biomass fuel. Because of limited road access, the chipper was stationed at a site that provided access to haul trucks. Slash from the piles was transported by trucks to the chipper for processing. Slippage of some slash piles down the steep slopes of the site made some of the slash inaccessible to loaders. This material was pile burned after the slash chipping had been completed. A total of 33 piles yielded 482.44 dry t of chipped wood for sale as biomass fuel.

Prescribed Burn - The burn was conducted from in a five-day period from September 30 – October 4, 2004. The burn prescription targeted reduction of fuels and understory fire-intolerant and shade-tolerant tree species on the site as the principal objectives. The principal Ignition pattern was strip head-fire over most of the site with backing fire used through heavy fuel accumulations and down very steep slopes. Flame-lengths were to be kept under 4 ft to limit fire intensity. Seven burn units are designated, combining treatment units to facilitate control and consistency in the character of the burn. Ignitions started at highest points of the site and progressed down-slope and to lower elevations within the site

over the burn period. Surface fuels were typically a mosaic of grass and woody fuel patches, intermixed with live shrub and tree materials. The small live tree component was especially significant in the higher elevation units. The live shrub component was most significant in the lower elevation and environmentally warmer units. Woody fuel loading varies across the Lick Creek site according to treatment. The highest woody fuel loadings were in the commercial yarding units harvest with fuelbeds in the Fire Behavior Fuel Model 10 and 11 categories depending on the mix of herbaceous and live fuels and amount of overstory.

Monitoring - Five permanent plots are distributed within each treatment unit near the center from the top to the bottom of the unit. The plots were inventoried pre- and post-burn. Pre-harvest plots were sampled in the same locality as the permanent plots but do not represent the exact location of the permanent plots. The plot is circular with a diameter of 50 m. The center of the plot is the photo point from which a radial sequence of photos is taken of the entire perimeter of the plot. Two 25-m transects from the plot center along the contour of the slope are used to collect point and microplot data for the following overstory and understory attributes: fuel loading, species composition and canopy coverage, tree density by diameter class and species, stand canopy stratification, height, and composition, and soil surface coverage and composition. A series of digital photos are taken of 1-m² microplots along each transect.

Synopsis of Findings:

Stand structure was significantly altered by harvest with reductions of overstory canopy coverage by as much as 70% in some treatments. The majority of the dominant mid-story canopy layer was eliminated by the harvest. However, a substantial amount of the understory tree layer of short and less than 3 in. dbh remained intact after harvest. The prescribed burn damaged the majority of the understory layer but the full extent of the mortality was not fully expressed in the 2005 inventory. Herbage production increased dramatically in areas of moderate fire intensity but did not show a similar response in areas of high fire intensity. Less than 1% mortality was evident in 2005 in the leave tree populations across the all of the harvest treatment units. A low degree of mortality is evident in the overstory of the burn only treatments but the condition of many of the trees suggests that greater levels of mortality are to be expected in coming years. Fuels reduction varied greatly among treatment replications with the most uniformity reduction in the commercial yarding treatments and the greatest variation in the burn only treatments. Contractor revenue profits from the harvest and biomass fuel were modest and dependent on the provision of service contracts by the USFS Pomeroy Ranger District in addition to the release of the products to the contractors for independent sale.

Deliverables Cross-Walk:

Proposed	Delivered	Status
Establishment of a permanent long-term demonstration site for public and professional observation.	Implementation of treatments	Done
	Installation of sign boards	In progress
	Preparation of brochure	In progress
	Development of website	In progress
Documentation of silvicultural treatment effects on forest health in the Blue Mountains.	Pretreatment documentation	Done
	Establishment of monitoring system for post treatment effects	Done
	First year post treatment monitoring	Done
Outreach activities	Poster - Zamora B, Martin M. 2006. Conference: Fuels Management - how to measure success. 28-30 Mar 2006, Portland OR	Done
	Publication - Zamora B, Martin M. 2006. The Lick Creek Demonstration - Forest Renewal through Partial Harvest and Fire	Done
	Publication - Zamora B, Martin M., The economic viability of small diameter timber harvest to accomplish fuels management objectives - a case study in the Blue Mountains of southeastern Washington	In progress
	Publication - Zamora B. The use of digital photography in monitoring vegetation and soil surface fire effects	In progress
	Publication - Zamora B. Fire severity and first year post-burn vegetation response	In progress