DESCHUTES NATIONAL FOREST

MONITORING REPORT

FISCAL YEAR 2009

compiled by:

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Effects of Mechanical Thinning
and
Prescribed Fire in central Oregon Forests

Introduction

In the forests of today, managing wildfires has become a number one priority. A key sign of this would be the amount of money transferred to fire year after year in preparation of the fire season. When it comes to controlling wildfires, it first begins with the way in which stands are managed. The most common management methods are thinning, prescribed burning, and the application of fertilizer. The question that remains to be answered is which of these single methods or combination of methods is the most effective for minimizing wildfire risk and helping to restore natural ecological function. A study was conducted by members of the US Forest Service to answer this very question. This study was conducted by comparing 16 different treatment combinations of thinning, prescribed fire, and slash retention for two decades across a site quality gradient of second-growth ponderosa pine stands.

The overall objectives of the study were to determine the following:

(1) the long-term changes in tree mortality, stand growth, and understory production following thinning, burning, or their combination,
(2) whether thinning residues affect site productivity,
(3) the comparative increase in plant production associated with nutrient flushes from burning verses fertilizer application, and
(4) if and when additional treatment is needed to limit fuel accumulation.

The end results were determined by measuring changes in forest vegetation growth, structure, and composition within these ponderosa pine stands.

Methods

This study was conducted in ponderosa pine stands. Historically, these stands are known to be adaptive to dry, fire-prone climates and have a pre-Euro-American settlement history of frequent, low-severity surface fires that often maintained a dominance of large-diameter, open grown trees. By studying past treatments and their effects on wildfire spread, the Forest Service has been able to develop several criteria that are universally known to be effective in maintaining a strong, fire resistant stand. These criteria include reducing surface fuels, increasing the height of the live canopy (reducing ladder fuels), decreasing tree density, and retaining large, fire-resistant trees within stands. Upon the introduction of a severe wildfire with these criteria in place, flames tend to drop to a surface level fire, in turn, making fire fighting efforts more manageable. Agee and Skinner (2005) suggest that thinning alone is not a panacea and that careful consideration be given to the thinning method and management objectives in fire-dependent forests. The Fire and Fire Surrogate study also supported the combination of thinning with burning to restore forest structure (Youngblood et al. 2007).

The Deschutes National Forest (NF) was the location for this study. Efforts to manage ponderosa pine stand density started back in the early 1980s on the Deschutes NF. At this time, the forest was dealing with a large mountain pine beetle outbreak which greatly impacted the adjoining lodgepole pine forests. The stands in which beetle attack was very minimal were those open stands of vigorously growing trees. Since this outbreak, the Deschutes NF has mechanically thinned approximately 50% of its ponderosa stands and has treated approximately 20% of its ponderosa stands with prescribed fire.

Study Design

To conduct an accurate study within the second-growth forests, there were three ponderosa sites selected: East Fort Rock (representing low site productivity, Sugar Cast (representing moderate site productivity), and Swede Ridge (representing high site productivity). The experiment was a randomized complete block design with three replications of 16 treatments arranged in a 4 X 2 X 2 design. **The design of the study included:**

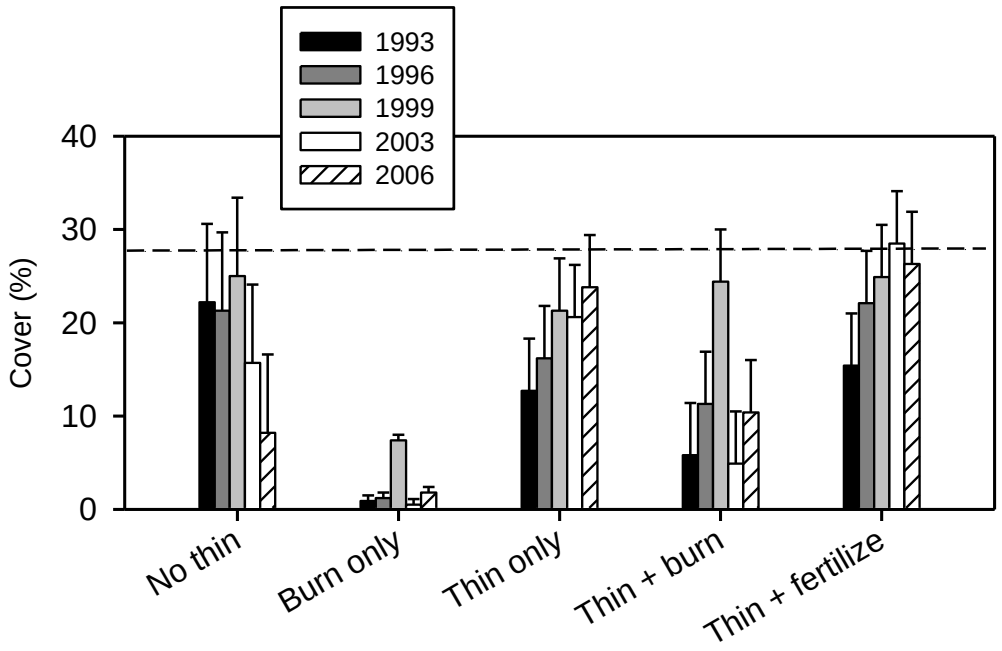
- Thinning + whole tree-removal
- thinning + bole-only removal
- thinning + no removal
- no thin
- two prescribed fire treatments
- two fertilizer treatments.

Figure 1. Typical site conditions in early summer 2006 for burn only (A), thin only (B), and thin plus repeated burn (C). Thin plus fertilize (D) is from 1997, the peak year for understory response to added nutrients.

Discussion

The results of applying the 16 treatments were helpful in disproving certain past conclusions that had been accepted as common knowledge for quite some time. One such conclusion was that of the guaranteed effect prescribed fire would have on understory regeneration and plant vigor. Past studies, such as those by Landsberg (1993) and Busse et al. (2000), have reported short-term, modest reductions in ponderosa pine growth due to prescribed underburning. In truth, the combined effort of thinning and burning results in few changes in stand structure or tree vigor in comparison to thin-only plots. One hypothesis drawn from this study is that fire reacts so differently on this forest due to the combination of a dry climate, infertile soils, and a history of maintaining heavily stocked stands on the Deschutes NF. This study alone helps to discredit a universal notion accepted by many; that prescribed fire triggers positive herbaceous growth.

Figure 2. Total shrub cover between 1993 and 2006. Plots were thinned in 1989, burned in 1991 and 2002, and fertilized in 1991 and 1996. Broken line represents pretreatment shrub cover in 1988. Error bars are standard error.



Conclusion

The study showed that thinning alone proved to be a suitable first step method in restoring ponderosa stands to ecological function. The use of fire or fertilizers was not completely ruled out by this study but the recommendation was made that the choice to introduce other fuel-reduction treatments should be done on a site-specific basis.
This study also made these following discoveries:

1. Low- to moderate-severity prescribed burning following thinning resulted in a short-term reduction in shrub cover. For long term results, repeated burns must take place.

2. Prescribed burning did not change herbaceous plants biomass or diversity in comparison to the large, short-term increase caused by fertilizer application.

3. From a fire risk standpoint, prescribed burning was not required after whole-tree harvesting.

4. Fire alone was an ineffective means for reducing stand density.

Contact: Jo Booser, Silviculurist, Supervisor's Office, Deschutes National Forest

Taken from the paper, Developing resilient ponderosa pine forests with mechanical thinning and prescribed fire in central Oregon's pumice region by Matt D. Busse et al. (2009).

Wizard Fire
Burned Area Emergency Rehab (BAER)
Botany Monitoring Report
Sisters Ranger District

Background

On September 24, 2008 a 30 acre prescribed fire was initiated in the Metolius Research Natural Area (RNA). The one hour burn went well; however, the fire escaped fire lines the next day during the patrol phase. The fire burned both north and east up Green Ridge, ultimately, burning 1,847 acres. Crews worked for 9 days to reach full containment. The Wizard Fire BAER Botany Report recommended follow up treatments that included surveying and treating invasive plant species.

From the Wizard Fire BAER Report

> **Treatment L1- Prevent invasive plant spread and introduction to protect native plant communities.** The goal is to prevent or reduce invasive plant establishment and invasion into the burned area. This would involve surveying the fire area for new infestations and removing any discovered seed sources by manual control as to prevent spread and establishment. Private land owners in the area would also be contacted to encourage cooperative weed management. Improvements to roads and drainages as a result of recommended BAER treatments would need to be monitored for new infestations.
> The probability of completing treatment in the first year is high. Crews will complete the work by this summer. The probability of treatment success is high. The plants are easily seen in bloom by roadside surveys or in vegetative conditions in walking surveys.

There were known populations of dalmatian toadflax (*Linaria dalmatica)* and cheatgrass (*Bromus tectorum*) within the Metolius RNA previous to the Wizard Fire. There were also known populations of diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea biebersteinii*), and St. John's wort (*Hypericum perforatum*) along Road 14 and Road 11. The route to the water source for the fire on Ponderosa Land and Cattle Company land was infested with diffuse knapweed, spotted knapweed, medusa head (*Taeniatherum caput-medusae*) and butter and eggs (*Linaria vulgaris*). There were no known populations within the immediate fire boundaries prior to the fire.

On August 19, 2009 the fire area was surveyed to detect invasive plants and to determine recovery of native species based on an estimate of canopy cover. The survey included driving all roads within the fire boundary, visiting all drop points, and walking dozer and hand lines. Populations along Roads 14 and 11 were manually treated prior to the survey.

Roads

During the monitoring process, access was only allowed on designated routes as to avoid the transportation and spread of invasive species. Two species of invasive plants were detected on or along roads within the fire's perimeter. Cheatgrass was located on road 566, a heavy infestation at the 610 and 680 road's junction and along road 600. A small patch of St. John's wort was located on the 600 road just north of the 650 spur road and another small patch at the entrance of the dozer line on road 625 next to drop point 10. Native plant recovery varied from 5 to 75% canopy cover in the areas surveyed. In areas where the fire had burned hotter and caused soil scorching, there was little vegetation on the ground. In areas where the fire had not burned as intensely, the recovery rate was much greater. Some of the native species found include Virginia strawberry (*Fragaria virginiana*), blackberry (*Rubus ursinus*), arrowleaf balsamroot (*Balsamorhiza* sagitata), snowbrush (*Ceanothus velutinus*), and green manzanita (*Arctostaphylos patula*). There were also many phacelia, penstemon, and bunch grasses.

Intensely burned area off the 600 road

Cheatgrass infestation at the 610/680 junction

Drop Points

The project area consisted of 6 drop points. Cheatgrass was the only invasive species detected at any of the drop points, and that location was drop point 39. Rehabilitation work had been previously completed, including the scattering of debris and the uprooting of trees and rocks. Native vegetation recovery ranged from less than 1% to 50% canopy cover. Native species present within the drop points are the same as those mentioned along the roadsides.

Cheatgrass at drop point 39

Drop point 20

Dozer and Hand Lines

The project area consisted of 2 miles of fire line. Cheatgrass was found along the dozer line near drop point 39. Neither cheatgrass, nor any other invasive species, was detected on any other dozer or hand line. Rehabilitation work had been previously done, including the scattering of debris and the uprooting of trees and rocks. Native vegetation recovery ranged from 0 to 50% canopy cover. Native species present are the same as those mentioned along roadsides and at drop points.

Cheatgrass on dozer line by drop point 39

Dozer line at Green Ridge Lookout

Conclusions

Only two species of invasive plants were found. Cheatgrass was the most prevalent while St. John's wort was minimal. Overall, cheatgrass was located in 5 areas: road 566, at the junction of roads 610 and 680, road 600, drop point 39, and on the dozer line next to drop point 39. St. John's wort was found in 2 locations: at the entrance of the dozer line on road 625 and on the 600 road north of the 650 road. Native vegetation recovery varies from 0 to 75% canopy cover throughout the burned area. Drop points and areas within the fires perimeter have higher canopy cover percentages than dozer and hand lines. The scattering of debris appears to aid in the recovery of native vegetation. The study showed that there is a good variety of native species growing back. As for now, the plan for the affected area is to continue monitoring for early detection and remove invasives if possible. At the present time, there is no effective treatment for cheatgrass.

References

Pajutee, October 4, 2008. Wizard Fire Burned Area Emergency Response (BAER) Botany Report. US Forest Service, Sisters Ranger District, October 2008. Wizard Fire Public Tour.

Contact: Maret Pajutee, District Ecologist, Sisters Ranger District, Deschutes National Forest

Wildlife Monitoring

The Deschutes National Forest is involved in a variety of monitoring efforts designed to evaluate the effects of management activities on various environmental factors. Following are a few of the ongoing or planned monitoring efforts designed to evaluate wildlife populations or habitats.

Live Eagle Camera

A live streaming video of a wild eagle nest located at Odell Lake on the **Crescent Ranger District** is part of a cooperative project with the Oregon Zoo, ATT Foundation, The National Fish and Wildlife Foundation, and the Forest Service's NatureWatch Program. The purpose of the project is to bring live video of wild eagles and wild salmon to the Oregon Zoo's Great Northwest Exhibit where the same species are kept in captivity, and to the Internet. The mission of the NatureWatch Program is to provide children and adults the opportunity to safely view, and participate in, activities and programs that raise their level of awareness and understanding of wildlife, fish, and plants, and their connection to ecosystems, landscapes, and people.

The nest monitoring by the eagle cam captures glimpses into what it takes to be an eagle at Odell Lake. Cascade and Lady Odell, the pair's dubbed names, initiated nesting in the late winter. Battling through snow storms, where both the nest and parents were often covered in snow, and enduring very cold weather, an eaglet finally hatched in May, Pengra Crescent Odell. There were many high hopes for this new youngster to make it, for it would be the first successful raised chick since 2006 for Cascade and Lady Odell. Pengra, named after the Oregon State Survey General who surveyed Willamette Pass, left the nest September 2009. In January 2010 the eagle camera was replaced with an updated camera with infrared, for nighttime viewing, and the viewing angle was repositioned. The link below will take you to the USDA Forest Service NatureWatch Eagle Cam website:

http://wwwnotes.fs.fed.us:81/wo/wfrp/find_a_photo.nsf/eaglecam

Bald Eagle Nest Surveys

The **Deschutes National Forest** falls within Recovery Zone 11 (High Cascades) and to a lesser extent Recovery Zone 22 (Klamath Basin) of the Pacific States Recovery Area for the Bald Eagle. The Forest has a goal of producing habitat for 35-45 pairs of bald eagles (LRMP 4-9).

The number of sites occupied by Bald Eagles on the Forest has increased from 31 in 1993 to 39 in 2009 (Table 1). Over the last seventeen years, 554 eaglets have fledged on the Forest, averaging about 33 young per year. Over the last seventeen years, an average of 1.2 young were produced per nesting attempt on the Forest. In 2009, production was on target for the seventeen year average. The recovery goal for productivity per occupied site is 1.00. The Forest's seventeen year average for productivity per occupied site is 0.87; however in 2009 the average productivity

per occupied site was at 0.77. In 2009, the average nesting success per occupied site was 72% (only nests which produced chicks were considered successful). The recovery goal is a minimum of 65% across all zones.

Table 1. Summary of Bald Eagle Nesting on the Deschutes National Forest (1993-2009)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
#of sites occupied	31	31	32	33	35	35	31	34	38	39	42	43	41	46	43	39	39
#of nesting attempts	23	20	24	23	24	25	26	25	31	30	32	37	31	35	30	18	23
success rate per nesting attempt	82%	70%	87%	69%	87%	84%	85%	80%	77%	83%	81%	89%	79%	76%	70%	46%	59%
% occupied territories with nesting attempts	74%	64%	75%	69%	68%	71%	84%	74%	82%	77%	76%	86%	76%	76%	70%	46%	59%
# of young produced	26	22	30	22	28	31	33	29	41	38	41	39	39	50	33	22	30
Avg #young per nesting attempt	1.13	1.1	1.25	.96	1.17	1.24	1.27	1.16	1.32	1.27	1.28	1.05	1.25	1.43	1.1	1.22	1.30
Avg#young per occupied site	0.84	0.71	0.94	0.67	0.80	0.89	1.06	.85	1.08	.97	.98	.91	.95	1.09	.77	.56	.77

Effective in August 2007, the bald eagle was delisted as a threatened species across it's range because it has recovered from being at risk of extinction. It will continue to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. On National Forest system lands, it also will continue to be protected by the National Forest Management Act (NFMA).

The bald eagle has been designated a Regional Forester's Sensitive Species and will be included on this list for at least the 5-year post-delisting ESA monitoring period. In addition, the Fish and Wildlife Service (FWS) issued the National Bald Eagle Management Guidelines that are intended to help people minimize activities that could interfere with eagle's ability to forage, nest, roost, breed, or raise young. Such impacts to bald eagles, where they may constitute "disturbance", are prohibited by the Eagle Act. Because of it's delisting, the Forest Service is no longer required to consult with FWS on activities that could affect the bald eagle.

Northern Spotted Owl Nest Surveys

Managing for spotted owls and their habitat became a focus in the late 1980s and early 1990s. The **Deschutes National Forest** identified spotted owl habitat in 1992, then again in 1998 using improved data sets, photos, and GIS layers not available to biologists in 1992. Although the 1998 version of spotted owl habitat identification was an improvement over the 1992 effort, newer information is now available which allows us to improve upon the 1998 effort. Most notably, a forest-wide photo

interpretation (PI) layer which was completed in 2000. The new PI layer shows the impact of the recent budworm epidemic, which caused high mortality on an estimated 50,000 to 60,000 acres of forested habitat on the Deschutes National Forest (Eglitis pers. comm. 2001). The latest PI layer gives us the most accurate depiction of tree size class and canopy cover that has ever been available. Finally, earlier habitat identification efforts focused on specific plant associations, while recent observations have shown that habitat can be, and is being used by owls regardless of plant association, if the proper forest structure exists. Additional corrections have been made as well as updates taking into account losses due to wildfires since 2003. A brief chronology of mapping efforts and results (including the 2001 effort) is described in the 2006-2009 Programmatic BA. Likewise, the U.S. Fish and Wildlife Service (USFWS) published the *Environmental Baseline Update for the Northern Spotted Owl on the Deschutes National Forest, Oregon* in December of 2001.

In 2002, the Deschutes National Forest began an ongoing investigation of all known active and historic spotted owl nest sites and nest stands on the Forest. Objectives of the investigation included: 1) locate, determine status, and record the location (GPS) of all identified nest sites for the 42 spotted owl pairs on the Deschutes National Forest, 2) at each nest site, collect vegetative and topographic features to describe and analyze nest site characteristics, 3) within each forest stand containing a nest site, compile and/or collect stand examination data to describe and analyze nest stand characteristics, and 4) at each nest stand, collect and examine all regurgitated pellets to describe prey use. A database of all data collected was developed and is being refined. Table 2 is a summary of spotted owl nest surveys conducted through 2009.

Several sites are no longer considered potentially viable due to stand replacement fire occurring within the home ranges. These sites were surveyed after the fires (Davis, Eyerly, Cache Mountain, Link, B&B, Black Crater, Lake George, and GW fires) for 1-2 years to determine if sites were still active. No spotted owls were detected. Sites being removed from further consideration include Davis Mt., Abbot/Cabot, Brush Creek, Key West, Cache Mt. West, Cache Mt. East, Santiam Pass, Bear Valley, Spring Creek, First Creek, Dry Creek, Canyon Creek, Upper Canyon, Lucky Lake, Suttle, Suttle 96 and Suttle South . Therefore, the total number of spotted owl sites for the Deschutes National Forest has been reduced from 44 to 27 at this time.

The Moore Creek nest, Crescent Ranger District, has not been found since it fell out of the nest tree in 2004. Moreover, no successful rearing of young at this site has been recorded since 2002. In 2009, the new Moore Creek nest was found along with the pair plus a fledgling. The Hamner Butte pair, Crescent Ranger District, also produced one fledgling in 2009. The pair had not reared a recorded fledgling since 2003. In 2009, 4 of the 8 surveyed nests were occupied. Of the 4 occupied sites only 2 produced young, Hamner Butte and Moore Creek.

Table 2. Spotted Owl Nest Survey Summary

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
# of sites surveyed	23	9	33	25	21	27	25	16	29	32	15	30	32	20	10	8	8
% of knownsites surveyed	57%	22%	82%	62%	52%	70%	61%	38%	69%	73%	36%	71%	74%	61%	32%	26%	26%
# of occupied sites	17	9	28	19	11	15	5	5	10	8	9	8	8	6*	7	6	4
% of surveyed sites occupied	73%	100%	84%	76%	52%	56%	20%	35%	34%	25%	60%	27%	25%	30%	70%	75%	50%
# pairs attempting to nest	5	5	9	10	0	7	1	3	0	3	4	1	2	0	0	1	2
% of occupied sites, nesting	29%	56%	32%	53%	0%	47%	20%	75%	0	38%	44%	13%	25%	0	0	12%	50%
# of young	2	6	13	12	0	7	2	5	0	5	4+	2	1	0	0	1	2
# of young/nest	0.4	1.2	1.4	1.2	0	1	2	3	0	1.67	1.0+	2	1	0	0	1	1

*Barred owl detected at one site – not counted as occupied.

Note: Contact is Lauri Turner, Wildlife Biologist, Deschutes National Forest

Whychus Riparian Protection Survey

Background

The cold, clean water and rugged scenic qualities of the Whychus Creek riparian corridor have attracted visitors with a variety of interests for years. Whychus Creek contains a diverse native fish assemblage with redband trout being the most abundant species within the range of this project. Bull trout are present near the mouth of Whychus Creek and may have once occupied upper Whychus Creek. In the upper reaches, irrigation diversions, small dams, overfishing, and habitat degradation made it unsuitable for bull trout. Historically, summer steelhead trout and spring chinook salmon spawned and reared in Whychus Creek and these species were recently reintroduced to the stream starting in 2007.

The close proximity of Whychus Creek to Sisters and the lack of developed campgrounds have allowed the creation of several user created dispersed campsites along with several user created roads and fords across the creek. In addition, there were several Forest Service system roads near the creek that were not maintained and were analyzed to be closed under past projects.

Over time, the impacts of focused recreational use, such as off-roading and dispersed camping have impaired sensitive streamside riparian habitat. This use has contributed to compacted streamside soils, increased sedimentation, runoff to streams, and the loss of streamside vegetation. Stream crossing and “creek crawling” with vehicles can lead directly to stream pollution, bank sloughing, destruction of trout and potential salmon habitat, and the spread of invasive plants to downstream areas.

In 2005, the Sisters Ranger District inventoried these sites from the town of Sisters up to North Fork Whychus Creek near the Three Sisters Wilderness boundary. A Forest Service interdisciplinary team made recommendations and mitigations for a project that was eventually approved under a Categorical Exclusion. The project was implemented from 2005 to 2007. It accomplished the protection of sensitive riparian and streamside habitat by reducing compaction from vehicles and recreation uses through the placement of boulders and woody debris, and by closing specific user-created roads and trails. Some dispersed camping areas were closed or pulled back from the edge of Whychus Creek. The intent was to provide a limited number of quality dispersed camping opportunities and a more pleasant non-motorized experience that would protect important fish and riparian habitat along Whychus Creek. A few new sites were added to the initial list after 2005 and a total of 59 sites were protected which resulted in the closure of 1.1 miles of system roads and the closure of an unknown amount of user created roads (Figures 1-3).

Walk in campsite along Whychus Creek downstream of the 1514 road bridge.

Road 400 closure at vehicle ford to protect Pole Creek.

Three sites in the lower reach that were closed off with boulders have received active restoration in the form of upland and riparian plantings. These restoration efforts have been undertaken by Wolftree and Sisters High School Interdisciplinary Environmental Expeditions (IEE) students. These sites are known as Footbridge, Turtle Beach, and Broken Bridge Bend.

Turtle Beach: Site restored by Sisters High School through the planting of small shrubs and trees.

Survey Results

Between July 9 to 17th, 2009, the 59 protected sites on Whychus Creek were surveyed for three days to see if the sites had been damaged or breached and if there were other sites that were overlooked or had become heavily used recently. The sites were split into lower, middle and upper reaches: Mainline footbridge (just above Sisters) to lower end of private land; upper end of private land to USGS gauging station; and USGS gauging station to North Fork Whychus Creek. Nine sites (15 % of the sites) were breached. Four sites were breached in the lowest reach which is closest to the town of Sisters, three sites were breached in the middle reach, and two in the upper reach. Seven of the breached sites were at campsites and a single boulder was moved to create vehicle access to a campsite closer to the stream. At the two other breached sites, vehicles had driven cross country around boulders to access closed system roads.

Boulder moved below the 1514 bridge to access a campsite next to Whychus Creek.

During the restoration, one large interpretive sign was placed in each of the three reaches, and several smaller signs were placed at individual campsites. Signs were designed with *Respect the River* themes to educate people on why the restoration was done and how to camp and recreate while causing less impact to the stream and riparian areas. A large sign in the lower reach was vandalized with spray paint and about half of the smaller signs were vandalized. Trash at campsites and day use areas was noted as being most common in the lower reach, but overall amounts of trash at all sites was surprisingly low. Volunteers and field rangers have also helped to keep sites cleaner the last few years.

Small sign broken off at a dispersed campsite off the 1514 road.

Recommendations

- Coordinate future closures with recreation/trails so it fits with other planning efforts on Whychus Creek.
- Continue to close and rehabilitate unneeded system roads and user created roads in the Upper Whychus watershed that may not be adjacent to streams or riparian areas.
- Increase field ranger and law enforcement patrols of lower and middle reaches, especially during the warmer months, on weekends and after the school day lets out.
- Define and construct single trail networks where multiple trails exist; select or reroute trails away from the stream if possible.
- Boulder work on unfinished sites, breached sites and new sites was completed at the seven high priority sites using approximately 80 boulders on 7/28/09. At least 72 boulders will be needed at lower priority sites to complete road closure work.
- Replace large sign at footbridge and small signs at campsites.
- Continue to clean up trash and vexar plant tubing at restoration sites as planted trees and shrubs grow.

Contact: Nate Dachtler, Fishery Biologist, Sisters Ranger District, Deschutes National Forest

Matsutake Mushroom Program

Ecology of the American Matsutake

The American matsutake (*Tricholoma magnivelare)* is a highly desirable, edible mushroom that is found in a variety of habitats and plant associations in the Pacific Northwest. Matsutake mushrooms only appear for a limited duration during the fall, after cold nights and early morning fog triggers the emergence of mushrooms. The edible mushrooms do not necessarily reappear every year at all sites; however, the underground fungal body does remain present even if mushroom caps are not seen. The location of matsutake mushrooms is often inferred by the presence of candystick (*Allotropa virgata*), a perennial plant that is easily recognized by its striking red and white striped stem. Candystick forms mycorrhizal associations with matsutake to obtain nutrients and is visible above-ground when matsutake mushrooms are not.

Natural climatic and disturbance events and forest management practices have an effect on both matsutake mycelia and mushroom production. Fire and weather related soil disturbances can reduce both mycelial and mushroom production, while timing of first frosts, autumn moisture, and seasonal snowfall effect mushroom production. Soil disturbances can also effect matsutake production. Matsutake harvest methods such as raking to uncover the mushroom caps disturb the mycelia mat and the mycorrhizal connections with host roots and result in reduced mushroom production. Disturbance and compaction associated with road building and skid trails may disrupt mycorrhizal connectivity. Prescribed fire or natural fire both influence ectomycorrhizal community dynamics and succession in coniferous forests to varying degrees depending on intensity and the length of time since fire introduction.

Candystick

American matsutake mushroom

Matsutake as a Special Forest Product

The mushroom program is a four forest program between the Deschutes, Umpqua, Willamette and Fremont-Winema National Forests. A permit may be purchased and is valid at any of the participating district offices. The Matsutake harvest season starts the day after Labor Day and lasts for approximately 60 days. The record year for those forests for permit sales was 1994 with over 4,700 total permits sold. The Crescent Ranger District averages 300 permits sold for about $30,000 of revenue per season for the past 10 years. The majority of the permits are sold on opening day. It is not uncommon for the district to serve 150 or more people before 10 a.m. on the first day of the season.

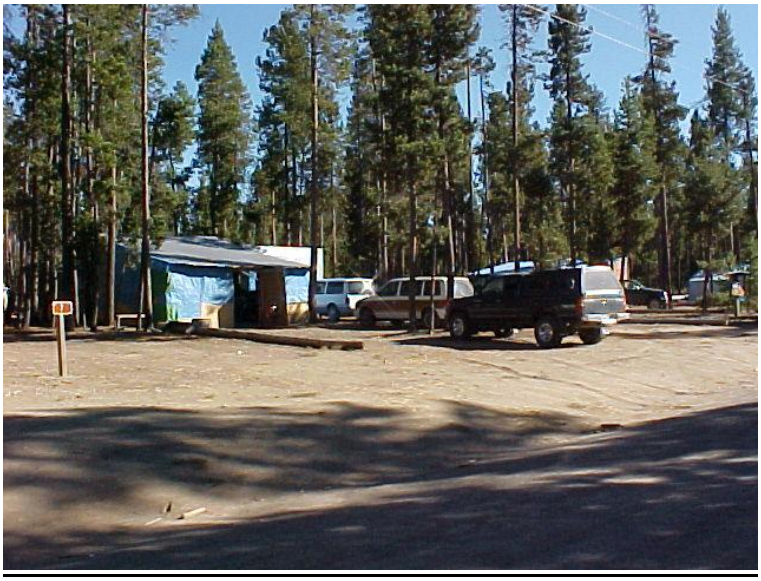
Opening Day 2005

One of the most consistent threats to fruiting Matsutake populations is improper mushroom harvesting techniques. The most valuable mushrooms (grade #1 has a closed veil) typically grow under the duff with the only visible indicator being a slight lift or cracking of the duff layer. This lack of visibility when combined with high prices at the buying stations tends to promote harvester raking of the shiros (mushroom fruiting ring) allowing them to find more mushrooms with less time and effort. This raking is often very deep and can destroy the shiro, often eliminating mushroom production for years. As part of our management plan, we require harvesters to watch a 10 minute power-point presentation on proper harvesting techniques and fire prevention techniques prior to their permit purchase.

Mushroom Camp & Harvester Community

Mushroom Camp was established during 1997 and 1998 and originally had 222 sites. Since then, we have closed those sites adjacent to the main road (5814) and have about 200 sites available for camping during Matsutake season. The camp is managed under a special use permit. Individuals are charged $5 per day or $110 per person to camp for the season. The special use permitee provides water, garbage, and toilet services to the campers. In recent years, we typically get 100 to 150 people staying in camp for the season. The Forest Service contracts out dust abatement for the camp with the expense ranging from $7,000 to $18,000 depending on the type of abatement product used.

Many of the matsutake harvesters were born in Southeast Asia, mainly from Cambodia, Laos, Thailand, and Burma. Many of them immigrated to the U.S. as refugees and now live around Stockton, California or Tacoma, Washington. There are also a small number of Hispanic and Caucasian harvesters. In camp, the harvesters have separated themselves into communities, the two largest being the Hmong - Mien and the Laotian - Thai communities. The majority of harvesters that stay in camp during the season live in structures built of poles and blue tarps. They typically use woodstoves for both cooking and heat. There are very few recreational motor homes or store bought tents used.



Harvester living space in mushroom camp

Relationships- Partnerships- Collaboration

Crescent Ranger District staff has been nurturing relationships with our Matsutake stakeholders since the mid 1990's. Through the years, there have been several organizations helping to bridge the communication gap between the harvesters and the Forest Service. These partners have facilitated public meetings, provided interpreters, and assisted harvesters to provide input on our planning projects.

Our current partner in this effort is the Alliance of Forest Workers and Harvesters (Alliance). The primary focus of the Alliance has been to promote and provide harvester education. The Alliance provides mushroom monitors that help to monitor harvester activities in the field and teach them proper harvesting techniques. The monitors also share their experiences with the Forest Service giving us the information that we need to make sound management decisions and adapt the program to best meet the needs of the resource and the people who depend on it.

In addition to providing monitors, interpreters, and facilitating meetings; the Alliance and their predecessors have played a key role in helping the harvesters to understand our planning process and help break down the barriers that have prevented them from participating in the past. Between 2002 and 2008 there were more than 45 meetings held with the harvester community to exchange information about the BLT (a vegetation management project on the Crescent Ranger District) planning area. The trend that began with BLT has carried over into other planning projects and the harvester community has continued to provide valuable input. The Alliance on behalf of the harvesters is also a partner in our formal collaboration for the Rim-Paunina planning area.

2005 Meeting with mushroom harvesters in Stockton, CA.

Crescent/OSU Administrative Study on Matsutake

In 2009, the Crescent Ranger District and Oregon State University entered into a cooperative agreement to begin the pre-work to implement an administrative study focused on matsutake. This cooperative effort is being led on the District by Tami Kerr, Special Forest Products, and Christina Veverka, Botanist, under the auspices of Kristin McBride, Natural Resources Team Leader. District staff has been working closely with Dan Luoma, Assistant Professor at OSU, who is designing the study and serving as the technical expert for the project.

Overview: The purpose of the administrative study is to examine the potential effects of forest thinning treatments on the abundance of matsutake within BLT, a project area with productive matsutake habitat. This study will provide valuable information to help resource specialists both on the District and elsewhere in managing matsutake within forest stands.

Study Design: Various treatments have been prescribed for the BLT area with the intent of reducing fuels and increasing stand health. Due to concerns expressed by the mushroom harvesters, all BLT units that were identified as highly productive for matsutake were either dropped from treatment or designated for winter-only logging.

Within the winter-logged units, the administrative study will examine the effects of variable canopy closures (resulting from logging) on matsutake across 3 forest cover types: mixed conifer, ponderosa pine, and lodgepole pine. Approximately 275 plots are currently being installed in 16 of the BLT units. Within each of these plots, a shiro (mushroom fruiting ring) was identified and marked in the fall of 2009, with soil samples taken around the shiro and analyzed for the presence of the matsutake mycelium through DNA analysis. The existing canopy cover will be recorded at each plot, to compare with post-logging canopies. Additional environmental data, such as soil moisture and density, will be examined on a subset of the plots. After the units have been thinned, the plots will be revisited in the fall of this year; with the resulting canopy covers recorded and soil samples taken.

Funding: Initial funding for the project is on a ‘shoe-string’ budget, with $5,000 contributed by Special Forest Products for the study design and field layout. An estimated $16,800 is needed to fund the DNA soil analysis, with additional funds required for the analysis of the first year of data. Thus far, $15,000 of Forest Service money has been acquired to fund the data collection and most of the soil analysis for 2010. The Forest Service is the financial support for this study and if dollars become unavailable for the next year, then the project would simply not be able to continue.

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Monitoring Fuel Treatments

on

FS/BLM-Managed Lands in Oregon and Washington

Background

In 2005, the Oregon State Office BLM and Region 6 Forest Service issued separate memos outlining a monitoring strategy for the fuels management program. At the time, the fuels program had no standard protocols or data standards that would allow units or subunits to share data. Monitoring was a rather haphazard occurrence, dependent on the presence of a person or small group of people with the interest and drive to conduct any monitoring. Often when such a person or group left the local unit or subunit, the established monitoring program fell into disuse. Few monitoring programs were systematic, limiting the ability of the fuels program to identify clear trends in the effectiveness of fuels treatment prescriptions.

There are solid reasons to evaluate whether thinning and other treatments to reduce fuel risk and improve ecological conditions are effective. Some of the questions of interest are:

- What is the relative value of one treatment over another?
- How does this vary with ecosystem?
- How is ecosystem structure being altered?
- Is the investment in treatment time, personnel, and funding worth it?

The fuels management and fire ecology program leads in the Oregon State Office and Pacific Northwest Regional Office decided to craft direction that would establish a systematic monitoring approach and common database for both agencies. An interdisciplinary team consisting of fuels managers, silviculturists, and vegetation ecologists from the State Office, Regional Office, and the field developed this direction with release to the field in late 2005.

A BLM National-level fuels program review in the spring of 2008 included an assessment of fuels treatment monitoring in Oregon and Washington. Their findings indicated that program implementation was spotty with some units having robust programs, some units with minimal programs, and some units with no program at all. Knowing the locations and types of vegetation treatments is an increasingly important factor in the management of large and long-duration wildfires; however, the 2005 direction did not cover this facet. These factors indicated a need to revisit, revise, and reissue the 2005 monitoring direction.

Accordingly, a new interagency, interdisciplinary team was convened that included a broader array of natural resource specialists to rewrite the direction and somewhat expand its scope to a wider array of vegetation treatments. This direction is intended to meet monitoring needs within the Pacific Northwest Region and BLM Districts in Oregon and Washington.

The basic precepts of this monitoring remain:

- Objectives should be clearly defined and attainable.
- Monitoring should be designed within the context of the entire fuels and vegetation management programs for a given agency and unit.
- The program should be practical with reasonable costs and based on a set of core attributes, not on "wish lists".
- The monitoring program should be suitable for both forest and rangeland ecosystems.

Given the expanded scope of the direction, new precepts include:

- This monitoring program will not replace already existing and established monitoring programs in other disciplines, but, instead, coordinate with and supplement them.
- Data standards will include those needed by all resource areas that may participate in the program, sometimes requiring that data be collected using more than one method.

Specific Monitoring Objectives

There are basically two reasons to implement fuels treatments: One is to alter fire behavior by reducing fire hazard (and by implication, risk) to protect communities, municipal watersheds, and key wildlife habitat; and the other is to improve ecological resiliency by reducing the departure of landscapes from a reference range of sustainable conditions. To meet the first need, we are implementing a practical, feasible set of measures at varied levels of intensity. To evaluate improvements in ecological resiliency, we will continue to use the Fire Regime Condition Class (FRCC) metric, in use in the Region/States since 2004.

To monitor fire hazard:

1. Provide a systematic, standardized set of protocols for monitoring direct (first order) vegetation treatment effects that allow data and information sharing between units and agencies.
2. Establish core attributes to monitor first order treatment effects and data standards for those attributes.
3. Establish minimum requirements for quantitative monitoring.
4. Provide guidance and standard protocols for conducting qualitative monitoring.

To monitor ecological resiliency:

Continue to use FRCC at Regional, subregional, and landscape scales. This particular strategy does not monitor fire behavior directly, since treatments may not be affected by wildfire for many years, if at all. Fuels treatments alter fire behavior and fire effects by altering vegetation structure. These changes also affect other resource values such as wildlife habitat, grazing availability, and other vegetation management considerations, so the strategy uses terms and descriptions that apply to many disciplines. Nevertheless, altering fire behavior or fire effects is the primary

consideration in all fuels treatments, and the primary objective in fuels treatment NEPA documents. This monitoring plan has indirect implications for fire behavior and fire effects.

Monitoring Program Questions

1. Did the prescription result in the desired/intended vegetation structure and species composition?
2. Did the treatment regimen meet or exceed key land use plan standards and guidelines for direct effects?

Monitoring Program Basics

There are two basic sets of protocols – extensive and intensive. The Fire Regime Condition Class process is an extensive protocol primarily for use at the watershed and subwatershed scale, although the process is marginal for small subwatersheds. The (FEAT/FIREMON Integrated) FFI system is an intensive protocol primarily for use in stands. There are also two basic approaches within these basic sets – quantitative and qualitative. Within stands, ocular estimates, photos, and walk-throughs are qualitative methods while stand exams, range inventories, FRCC, and FFI plots are quantitative. The FFI protocols are based on existing quantitative procedures. Predictive models must be used for monitoring items we cannot measure directly except at great expense. Examples of this type of monitoring include emissions production and soil heating models.

All monitoring should be centered on the management question one is trying to answer, not the method. The specific nature of the question will narrow the potential choices. The needed scale and intensity of monitoring will further narrow the choices and affect the costs.

The fuels program addresses three main areas:

1. Alterations to fire regime condition class,
2. Alterations to potential fire behavior and
3. Alterations to potential fire effects.

Other programs can use this strategy to help address whether vegetation treatments:

- Move the ecosystem towards the historical or natural range of variability.
- Improve forage quality and quantity on deer and elk winter range or wild horse management areas.
- Enhance or create specific wildlife habitat elements such as snags, downed logs, or a specific plant community type or structure.
- Improve forage quality and quantity in grazing allotments.
- Improve tree growth rates in plantations.
- Reduce hazardous fuels created by land management activities such as timber sales and silvicultural thinning.

Potentially, many other applications may find this strategy useful, including applications not yet foreseen.

Core Attributes

The core attributes of the strategy identify the aspects of vegetation that it incorporates, along with some indication of the possible scales that may be used.

1. Changes in the fuels complex (watershed, subwatershed, and stand scales)
    a. Surface fuels – downed wood, piles, litter and duff
    b. Ladder fuels – shrubs, conifer regeneration, lichens, and needle drape
    c. Live fuels – grass, forbs, shrubs, and trees of all sizes and types
2. Invasive species
3. Stand density – trees and shrubs
4. Stand health – insects, disease, wind throw or wind damage, and other disturbance factors for tree and shrubs
5. Snags
6. The mix of seral structure stages/fuel characteristic classes (watershed and subwatershed scales)
7. Direct effects (stand scale)
    a. Mortality of targeted or protected species, size classes, etc.
    b. Emissions of PM10 and PM2.5
    c. Soil heating, compaction or displacement
    d. Dead fuel consumption (downed wood, litter, duff, etc.)
    e. Residual stand damage (nonlethal scorch, cat faces, etc.)

Implementation

In order to summarize quantitative monitoring results at the State Office/Regional Office level, we will develop a method for compiling the vegetation data collected through the FFI protocols and the soils data collected using other methods. The State Office/Regional Office will assume responsibility for designing collection methods so that units will not need to deal with IT security issues between the agencies at their level. The intent is to develop a protocol that requires minimal effort at the field level to forward data.

The first year will be a pilot to allow us to adjust the protocols based on these results. Data will be summarized on the subgeographic area basis to determine what changes, if any are needed. We expect that any changes will be of the nature of fine-tuning rather than major. While we expect that many of the data management particulars will be handled adequately by FFI, we will also develop additional direction as needed to cover data stewarding, including data storage, requirements for consistency and other specifics as need arises.

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