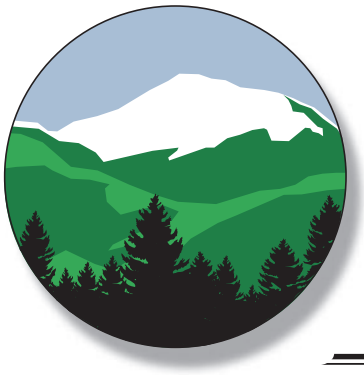

Caring for a Wild and Scenic River

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Abstract—*The Middle Fork Clearwater Wild and Scenic River was established under the 1968 Wild and Scenic Rivers Act. Forest Service managers gradually became concerned with the increasing loss of the large, old ponderosa pine and Douglas-fir that characterize much of the river corridor and adjacent uplands. The perceived dilemma was how to maintain both high esthetic values and a seral forest that was resilient in the face of wildfire, insect attacks, and disease presence. The Lochsa District on the Clearwater Forest developed guidelines for management within the corridor. Prescriptions included shelterwood with reserves, group selection, and prescribed fire. These treatments maintained the highly esthetic character, improved big game winter range, reduced fire hazard, maintained soil stability on steep slopes, realized an economic return, and set up these forests for long-term resiliency.*

Introduction

The Management Setting

The Wild and Scenic Rivers Act was passed in 1968. Among others, it named the Middle Fork Clearwater as a Wild and Scenic River, designated as a recreation river. Recreation rivers are managed for their high scenic quality but are readily accessible by road and may have development along their shores. Private lands along the Middle Fork, downstream from the National Forest, are encumbered with scenic easements, authorized and funded through the Wild and Scenic Rivers Act. These easements limit development and land-disturbing activities to preserve the scenic quality of the corridor. Management actions on both private and federal lands need to preserve and enhance the outstandingly remarkable values for which the river was designated. For the Middle Fork, this includes maintaining a forested setting along the river. For many years after designation, this was interpreted to exclude timber harvest.

Years of fire exclusion and years of drought resulted in conditions that made river managers rethink that interpretation. Under natural conditions, these lower river breaks would have underburned every 25 years or so. This would have maintained seral ponderosa pine and Douglas-fir in fairly open stand conditions. Instead, 60 years of fire exclusion has allowed grand fir and additional Douglas-fir to become established and grow into dense stands. Over the past decade, north-central Idaho has experienced droughty conditions. Drought, coupled with these dense stand conditions, has put stress on the older overstory ponderosa pine, making them vulnerable to insects and diseases. Many have died. Even without active management, the character of the forest was shifting and becoming more vulnerable to drastic change

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Table 1—Fire regime condition classes.

Condition class	Fire regime	Example management options
Condition class 1	Fire regimes are within an historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
Condition class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.	Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime.

From: Schmidt and others 2002.

as a result of intense wildfire. This is a significant departure from historic fire effects. Most of this area would be classed as Fire Regime Condition Class 3 (Schmidt and others 2002; see table 1), well outside its historic disturbance regime, and at risk of losing key ecosystem components.

The Clearwater Forest Plan (Anonymous 1987) designated the area within ¼ mile of the river as Management Area (MA) A7, to be managed as a wild and scenic river. The breaklands farther than ¼ mile from the river are to be managed for big game winter range and timber management, with a high visual quality objective (MA C4). Since the late 1990s, elk populations have declined, with at least part of the cause being lack of high quality winter forage.

Soils are shallow on these steep breaklands and are inherently unstable. Mass wasting is a natural soil movement or landslide occurrence that supplies woody debris and cobbles for anadromous fish spawning gravels. Any treatments would need to be designed to limit additional soil movement.

Private Land Guidelines

Private landowners within the Wild and Scenic River corridor, downriver from the forest, were the first to address these changing forest conditions. Their sites were drier and started showing symptoms of stress sooner. Landowners wanted to manage their forests to keep them healthy. The scenic easement holder (the Forest Service) could have said “no harvest” as long as the trees were green, as the easements only allow the landowner to cut dead trees. Rather, working with the forest landscape architect, local ranger

district personnel developed harvest guidelines that would maintain the forest appearance but develop healthy stands, resilient to disturbance, over time. These guidelines were generally to remove no more than 20 percent of the canopy at a time, to keep road construction off of the steep ground, and to retain the large seral trees (Jones 1998). These guidelines were used successfully on a number of private properties over several years.

National Forest Proposal

The East Bridge project area was chosen for assessment because past harvest had created landscape patterns that did not fit the natural pattern. There were straight lines at the edges of clearcuts and "gun sight" breaks on the ridgelines. These conditions did not meet the visual goals for lands along the river corridor. It looked like an easy fix: just feather the edges and take a few more trees off the ridgeline, and things would be just fine. That isn't exactly how it worked out.

The initial proposal would have addressed the short-term scenic quality from the highway but would not have addressed the long-term maintenance of the forest or dealt with winter range concerns (Klinger 1998, Talbert 1999). It would have repaired existing problems with scenic quality but would not have developed a forest that would be healthy and resilient for many decades to come. The selected alternative for the project dealt with both the existing scenery problems and long-term forest health. The guidelines developed and tested on private lands were adopted for this project, which has now been implemented as the East Bridge Timber Sale and the East Bridge Prescribed Burn (table 2).

Table 2—Summary of East Bridge treatment units.

Treatment unit	Current vegetation	Prescription	Expected results
1, 1A	Mixed conifer, marginal stocking, root rot active	Group selection followed by underburn and spot planting	Develop a two-storied stand of early seral xeric conifers
5	Mixed conifer, very active root rot	Shelterwood with reserves followed by underburn and planting	
4, 6	Xeric mixed conifer, active root rot	Group selection followed by underburn and spot planting	
11	Xeric mixed conifer, low stocking in overstory, high stocking in small trees	Prescribed fire	Reduction in understory stocking, higher percentage of seral species in understory

Ecology and History

Fire-Resistant Species

The forest in the East Bridge area is a dry forest, dominated by ponderosa pine and Douglas-fir at lower elevations. Both ponderosa pine and Douglas-fir are fire resistant due to their thick bark. As elevation increases, grand fir and western redcedar are more common. Grand fir and western redcedar are found on moist, relatively warm sites. They are very susceptible to fire damage, especially at young ages. The low-elevation ponderosa pine and

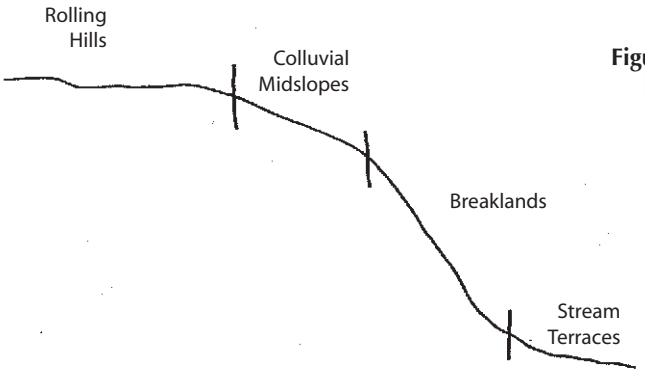

Figure 1—Schematic drawing of landtype groups.

Douglas-fir were maintained by frequent fires, returning at 25-50 year intervals. These fires removed much of the grand fir and cedar, some of the young Douglas-fir and ponderosa pine, and a few of the older trees.

Frequent Fires, Low Intensity/Severity

Prior to the early 1900s, fires burned frequently in the East Bridge area. The low, steep southerly aspect slopes dried out faster than the high-elevation rolling hills above them (figure 1). These fires left evidence in the large, old ponderosa pine on sites that will support grand fir and western redcedar, as well as numerous fire scars at the base of many of those pines and Douglas-firs. The East Bridge area is in a transition zone from low-elevation dry sites to higher elevation, more moist sites.

Landtype Associations

Landtype associations (LTAs) are landform classifications that follow the National Hierarchy of Ecological Units (Cleland and others 1997). They are aggregates of site-specific landtypes and subsets of the subsection classifications. The primary landtype association in the East Bridge area is 23A, which is composed of stream breaklands on southerly and westerly aspects, with shallow soils. These stream breakland landtypes are typically steep – with 60 percent or steeper slopes. They are some of the hottest and driest sites on the Clearwater National Forest. The parent material is micaceous gneisses and schists associated with the border zone of the Idaho Batholith. These are prone to mass wasting, and over 75 percent of the area is rated as high to very high risk of mass wasting (Mital 1998). Mass wasting is a general geological term for dislodgement and down slope movement of soil and rock material. The fire regime is a frequent fire return interval (25 to 50 years) with non-lethal or mixed severity. Stands on this LTA were typically uneven-aged, composed of small, even-aged groups. Fire suppression has successfully excluded fire from the area for about 70 years (Hazelbaker 1998).

Fire Exclusion

In the early 1900s, frequent fires swept through this area. The last large fire burned in 1934. These fires left scars on the bases of the big, old ponderosa pine but didn't kill them. Since then, human population growth and increased national forest management resulted in highly successful fire suppression. With the exclusion of fire on these sites, Douglas-fir representation increased and grand fir and cedar invaded the open understories.

Existing Stand Conditions

Current forest structures are multi-layered with shrubs, saplings, poles, and large trees. Crowns low on the boles of the trees create a ladder-fuel condition that could easily carry fire through the stand into the crowns and kill even the large, old ponderosa pine. Many of these large trees survived at least seven understory fires without major damage but have a low fire-survival potential with the current fuel conditions. Most of the seedlings, saplings, and poles are grand fir and Douglas-fir. Competition from these young trees has put the older ponderosa pine under additional stress. With this additional stress, they are beginning to succumb to insects, disease, and drought.

Prescriptions

Management Objectives

High Scenic Quality (Long Term Vs. Short Term)

River managers were concerned that maintaining the existing forest cover in the short term could set the area up for stand-replacing fires in the future. The resulting bare slopes and risk of ugly scars from mass wasting of bare soils would diminish scenic values. Managers wanted to make these stands more resilient to fire effects in order to maintain a scenic forest in the long term. Due to the heavy fuel loads and arrangement, it was unlikely this could be accomplished using only fire without harvest.

Soil Stability

Most of the project area has inherently unstable slopes, but Unit 5 caused particular concern for soil stability. There was already a small, active slope failure within the boundary. Stand composition was almost entirely Douglas-fir, with extensive root rot mortality. The concern was that the continued mortality would eventually result in reduced soil stability. Other units also had steep slopes and high risk of mass wasting.

Fire Hazard Reduction

U.S. Highway 12, a major east/west route between Idaho and Montana, runs along the river. The increased fire hazard, due to stand structure and composition, combined with a higher risk of human-caused ignitions, pointed to the need to reduce the fire hazard. The project area is adjacent to the little town of Syringa, which also raised a concern for the potential of urban interface fires.

Shrub Rejuvenation

These breaklands are low elevation sites, used by wintering big game animals. As the shrubs aged and the canopy closed, available forage was reduced. As seral species, shrubs need more open growing conditions to grow vigorously and produce abundant forage. Good winter range forage is one of the keys to maintaining the good elk herds for which central Idaho is well known.

Establishment of Seral Species

Habitat types range from mesic Douglas-fir types (*Pseudostuga menziesii/ Physocarpus malvaceus*) through the moist grand fir types, to moist western

redcedar types (*Thuja plicata/Adiantum pedatum*) (Cooper 1991). Without periodic disturbance, the understories of these stands filled in with climax tree species – Douglas-fir, grand fir, and western redcedar. As the older ponderosa pine lost vigor and were subject to increased competition from understory trees, they began to succumb to insects, disease, and drought. They were disappearing from these stands. There was little opportunity to establish additional ponderosa pine, which is very fire tolerant and moderately shade intolerant, and which was much more abundant on the site historically.

Technical Details

Prescriptions were developed for shelterwood with reserves, group selection, and prescribed fire (FSM 2470).

Shelterwood With Reserves

Unit 5: This unit was not directly adjacent to the river corridor, but it is visible in the middle ground and background. Cedar and grand fir habitat types were both common, with mesic Douglas-fir/ninebark on the drier ridges. The existing forest was dominated by Douglas-fir and grand fir, with an understory of tall, old shrubs. Root rot was gradually reducing conifer stocking levels. The stand was not meeting resource management objectives to provide big game winter forage, contribute to timber production, maintain slope stability, and provide high visual quality. Harvest provided an opportunity to rejuvenate the decadent shrubs and re-establish ponderosa pine for long-term health of the breaklands landscape which would, in turn, provide for high quality scenery from the river corridor.

The prescription for this unit called for a group shelterwood with reserves harvest system, leaving about one-half of the area in untreated groups, followed by an underburn. The groups have about 135 ft^2 of basal area; so overall, the stand will be left with 60 to 70 ft^2 of basal area per acre. Ponderosa pine was favored as leave trees where it occurred. This prescription was designed to be similar to a mixed severity fire. Trees were left in swales and along active landslides to maintain short-term soil stability and provide material for large woody debris in streams when slides would occur. The openings were to be planted with ponderosa pine to assure recruitment of this early seral species. There were few ponderosa pines in the overstory, and those present were poor seed producers. These stands would be maintained as two-storied stands.

Group Selection

Units 1, 1A, 4, and 6: Units 4 and 6 are directly adjacent to the river corridor and highway. All are a little drier than Unit 5. The predominant habitat type is grand fir/ninebark (*Abies grandis/Physocarpus malvaceus*) (Cooper 1991). They have an old ponderosa pine overstory that is gradually disappearing as the trees die. Clumps of Douglas-fir and grand fir are common throughout the stands, both between the older ponderosa pine and under the pine canopies.

The group selection method was chosen for these units to produce a disturbance similar to a low-severity fire. Harvest was followed with slash burning in the openings. Removals targeted groups of grand fir and Douglas-fir in root rot pockets, leaving the old ponderosa pine where possible. The openings were one-half to one acre in size. About 25 percent of the acreage was treated. Spot planting of ponderosa pine in the small openings

was prescribed to assure establishment of this desired species. Two factors reduced the likelihood of natural regeneration. First, the overstory trees are old and are not reliable cone producers. Secondly, the shrubs in ninebark habitat types often respond to disturbance with profuse growth, occupying the site and precluding seral conifer establishment (Steele and others 1992; Fire Effects Information System 2003). Planted trees would also have an advantage over naturally regenerated seedlings. They are larger and are established sooner so are more likely to stay above the ninebark. The intent was to maintain these stands as three-storied stands with even-aged groups.

Prescribed Fire

Unit 11: This unit had scattered large, old ponderosa pine and Douglas-fir trees, with an understory of smaller Douglas-fir, grand fir, and a few western redcedar and ponderosa pine. These ranged in size from seedlings to small pole-sized trees. Distribution of these younger trees was very clumpy, with some shrub-filled openings still present. The stocked areas were usually overstocked for this site. Underburning was proposed to reduce stocking levels and remove some of the small late seral and climax trees. Fuel loads were rather high, and the fire management team proposed implementing this prescription over two to four entries. The first entry would consist of burning under moderate conditions to remove the most flammable fuels and kill some of the grand fir and cedar trees. Subsequent burns would gradually reduce more of the fuel load and remove more of the grand fir, cedar, and small Douglas-fir. The intent was to develop more open, two- or three-storied stands that have a dominant component of ponderosa pine.

Implementation

Project Design With Interdisciplinary Team

The interdisciplinary team made several trips through the area to look at desired conditions. This focused the project on the key items that would make this a success: retention of the large, old ponderosa pine; retention of considerable canopy to maintain scenic quality and soil stability; and reduced stocking levels to maintain forest health.

The East Bridge Timber Sale sold in 1999. It included yarding with skidders, skyline systems, and helicopters. The majority was yarded with helicopters.

Prescribed Fire

In September 1999, Unit 11 was burned for the first time. Aerial ignition with a sphere dispenser was used. Ignition was timed to take place just before a front moved through with expected rain showers. These materialized the day following ignition and limited fire spread within the unit. About one-third of the area within the unit actually carried fire. Shrubs and small trees in those areas were top-killed as expected. A few of the large, old ponderosa pine trees were also killed because the fire was able to get inside the boles through old fire scars.

In October 2002, this unit was burned again. The same aerial ignition technique was used. This time, most of the area actually carried fire (figure 2). Shrub rejuvenation was more extensive, and more of the small tree seedlings and saplings were killed. The resulting stand is a patchy, open stand that is

Figure 2—Smoke generated over the entire burn unit.

weighted to the early seral species. Additional burning is planned in another three to five years.

Shelterwood With Reserves

This unit was harvested in 2003, using a helicopter logging system. It will develop into a two-aged ponderosa pine forest. This would be typical of forest structure and composition under periodic fires. The open stand conditions are conducive to shrub growth for winter use by big game. Shrubs that were top-killed by prescribed burning after harvest are resprouting, and redstem ceanothus (*Ceanothus sanguineus*), a preferred browse species, has germinated profusely (figure 3). Adjacent stands provide more dense vegetation for thermal cover.

Figure 3—Redstem ceanothus seedlings after harvest and underburn.

Group Selection

These were recently logged (spring of 2003) with a helicopter yarding system. There is little evidence of disturbance when viewed from the highway along the river (figure 4). There may be a short-term visual impact when the stands are underburned this fall. The emphasis in these units was maintaining visual quality. Additional entries will likely be needed to reduce fuels and improve browse conditions.

Conclusions

Each of the prescriptions met the objectives of improving forest health and resiliency while maintaining a forested appearance from the scenic river corridor. Some retained more forest cover, but all were within the range that could

Figure 4—View of group selection harvest.

be expected from natural disturbances. The group selection treatments created small patches where fuel loads were reduced but left ladder fuels in the remainder of the forest. Shelterwood treatments and prescribed fire treatments produced a more uniform fuel reduction. Group selection that included intermediate treatments (thinning) between the groups that were removed would have also reduced fuel loads more uniformly over the treated area.

The biggest challenge in implementing all of these treatments was field layout. Treatment units are located on very steep breaklands along the Middle Fork Clearwater River. Slopes over 60 percent are common. Both personnel safety and work productivity were concerns. Post-treatment monitoring is also a challenge. Fortunately, no one was injured and the layout work was completed on time, but the results could have been different.

Overall, the scenic quality has been retained, the seral forest was maintained, big game winter range was improved, fuel loads were reduced and ladder fuels that could lead to stand replacing fire were removed.

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