Appendix C – Prescribed Fire

Prescribed fire comprises a large part of the proposed action, including approximately 15,000 acres of landscape burning and approximately 3,200 acres of activity fuel removal (burning of logging slash/debris).

Table 11 displays a summary of the proposed prescribed burning activities. For a list of individual activities and maps, see appendix A. See below for a description of the various types of firelines.

Table 11. Summary of proposed prescribed fire activities

<table>
<thead>
<tr>
<th>Prescribed fire by area</th>
<th>Number of Burn Block Units</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog Creek</td>
<td>81</td>
<td>4,467</td>
</tr>
<tr>
<td>Burke Branch</td>
<td>84</td>
<td>6,838</td>
</tr>
<tr>
<td>Robnett Barrens</td>
<td>30</td>
<td>3,821</td>
</tr>
<tr>
<td><strong>Total all areas</strong></td>
<td><strong>195</strong></td>
<td><strong>15,126</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associated firelines – all areas</th>
<th>Miles</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing – all areas</td>
<td>102</td>
<td>191</td>
</tr>
<tr>
<td>Existing roads</td>
<td>71</td>
<td>129</td>
</tr>
<tr>
<td>Creeks and streams</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>Rights-of-way</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Constructed firelines – all areas</td>
<td>112</td>
<td>110</td>
</tr>
<tr>
<td>Hand lines</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Bulldozer (interior lines)</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Bulldozer (lines along private)</td>
<td>65</td>
<td>63</td>
</tr>
</tbody>
</table>

*Includes 2 miles of roads to be created for timber harvest

Development of Prescribed Burning Units

The Forest Plan standard and guideline FW51.1.2 (G) Fire Use (Prescribed Fire and Wildland Fire-Use Fire) (page 47) states:

Prescribed fire and wildland-fire use may be employed to accomplish oak and other species regeneration, hazardous fuels reduction, wildlife habitat management, ecological restoration, maintenance of fire-dependent plant communities, timberstand improvement and other management objectives. Preference should be given to landscape-scale burns. When possible, natural or existing features, such as streams, roads and trails, should be used as firebreaks.

Proposed prescribed burning units and the associated fire control lines for the proposed project are displayed on maps in appendix A. These units were developed on National Forest System lands in the project area to meet the following needs:

- Reintroduce fire to the ecosystem to maintain the historic oak-hickory forest. This would help reverse the current conversion to dominance by mixed mesophytic, shade-tolerant species such as sugar maple and American beech. While these species were historically a component of the forest, they were a minor one.
- Reduce excess fuel loading as a result of the 2008 and 2009 ice storms and many decades of fire suppression in the project area.
• Reduce non-native invasive species while enabling fire-adapted native plants to be maintained or become reestablished.

To identify potential earth-disturbing activities associated with prescribed fire; approximate locations for prescribed fire control lines have been identified. There is a desire by the Forest Service to provide flexibility for implementing prescribed burning within the project area over the coming years.

The initial intent of delineating burn units was to maximize the prescribed burning of Forest Service-administered land within the project area. This was accomplished by proposing prescribed fire control lines in locations that developed the largest logical burn units within Federal ownership while utilizing to the extent practical existing geographical features (roads, streams, rights-of-way).

The use of existing roads, streams or other barriers minimizes the amount of new control line construction necessary to manage a given prescribed burn, generally making implementation easier while reducing project cost. Efficient prescribed burning would entail the ignition of one or several of these large interior blocks of national forest while using a set of these existing barriers as control lines.

Typically, existing roads, streams or other features do not coincide with the boundaries between national forest and private lands. In most cases, limiting prescribed burning to areas encircled by existing control lines will leave unburned many acres of forest that would otherwise benefit. On the maps in appendix A, we show what these additional units would look like. In most cases, the private/forest boundary would require the construction of fire control lines, greatly increasing the amount of dozer work associated with the project. These additional dozer lines, and their environmental effects will be identified and disclosed in the environmental assessment. This focus on building the largest logical burn units first, then attempting to capture all possible National Forest System acres for burning, results in some burn units close to the Forest / private boundary that may contain:

• Very small potential burn units
• High ratios of dozer line proposed for the acres burned
• Burn units that have shapes that might make them difficult to implement
• Proposed control lines that are not in the best location with regard to topography and would represent a potential escape risk

Where burn units join private property, we have the ability to partner with the adjacent landowner and create a burn unit that includes both National Forest System lands and private property. This partnership is encouraged under the Wyden Amendment (Public Law 105-277, Section 323 as amended by Public Law 109-54, Section 434). The Wyden Amendment authorizes the Forest Service to enter into cooperative agreements with willing Federal, tribal, state, and local governments, private and nonprofit entities, and landowners for the protection, restoration, and enhancement of fish and wildlife habitat, and other resources on public or private land that benefit those resources within the watershed (FSM 1587.15). Partnering with private landowners in the location of fire control lines will greatly increase the likelihood that these smaller, irregular-shaped units will be included in the project and will also extend the ecological benefits of burning to private lands in the project area. The Forest Service already has some Wyden Agreements that do not appear on the maps.
Private landowners considering partnering with the Forest to accomplish prescribed burning, should be aware of the following:

- An overall benefit to the Federal government must be demonstrated. Not all of the land you own may qualify.
- The use of this authority is non-compulsory – the private landowner must be a willing participant and all activities would need to be under a signed, cooperative agreement.

By partnering with adjacent landowners through Wyden Agreements, several things may be accomplished:

- Increase the size of identified burn units along the Forest boundary by expanding the burn unit to an appropriate fire control feature on lands of other ownership, such as a road, agricultural land, stream, etc.
- Using existing features on lands of other ownership would likely reduce the overall amount of newly constructed control lines associated with the project, thereby, reducing costs and environmental effects and increasing benefits to a larger number of acres. These benefits include increasing the overall total number of acres treated to reduce fuels, encouraging the restoration of the native oak/hickory forest, and reducing non-native invasive species.
- Partnering with adjacent owners could also reduce the risk of escaped fire in some instances or may enable the Forest Service to burn areas of National Forest System lands that might otherwise be difficult to implement if the Forest Service was limited to acres within its ownership boundary.

We encourage adjacent landowners who are interested in developing a Wyden Agreement to partner with the Forest Service for prescribed burning to let us know by providing comment.

Proposed fireline locations displayed on the maps are based on our most current information. Before implementation, these control lines will be field verified to ensure that they are located in the appropriate location, and that the appropriate control line will be used (hand line, bulldozer, etc.), depending on circumstances at the time of implementation.

Burn units may be dropped or combined, or divided as appropriate at the time of implementation. Such changes would be compared to the analysis of effects prepared for this project before implementation would begin. As a result of combining burn units, some interior control lines would not be needed. This would typically result in less impact than analyzed for some resources.

**Firelines (control lines)**

**Existing**

**Open Roads**

We would use identified existing Forest Service and county-maintained roads to stop the spread of prescribed fire in the project area. Public use of these roads would be limited during prescribed fire implementation to protect firefighters and for public safety.
Creeks and Streams
We would use identified creeks and streams to stop the spread of prescribed fire in the project area. Some removal of leaf litter and detritus using a leaf blower may be required during dry conditions.

Rights-of-Way
We would use identified utility rights-of-way to stop the spread of prescribed fire in the project area. Mowing, using a tractor, may be necessary in some locations to remove tall grass and small shrubs.

Constructed Firelines

Level 1 Roads
Identified, existing level 1 roads would be reopened as level 2 roads and used in their current locations as firelines. We would remove encroaching vegetation including small trees (generally less than 5 inches diameter breast height) and accumulated forest debris including fallen trees, branches, and leaf litter. Following use during prescribed burning, these roads would revert to level 1 roads.

Bulldozer
Some of the newly constructed line involving the use of a bulldozer would be done by “back blading.” In this method, the bulldozer is operated in reverse, using the weight of its blade to lightly skim the surface of the ground, pulling small sticks and leaf litter out of the fireline. Back blading results in much less soil disturbance than going forward and pushing debris with the bulldozer.

There are certain conditions under which a new fireline may not be constructed using a bulldozer. These include, but are not limited to:

- Wetland and riparian buffers
- Steep slopes

As a new fireline is being constructed, these areas would be flagged, and a lower-impact type of fireline would be constructed. This could include:

- Hand line – an 18- to 40-inch-wide line is created, and fuels are removed using hand tools. These tools may include (but are not limited to) leaf rakes, leaf blowers, chainsaws, shovels, pulaskis, and council rakes.
- Wet line – use of water to stop the forward spread of fire either by pretreating the fuels or extinguishing the leading edge of the fire. This method is often used where water can be pumped from a nearby source (stream) or access for an engine is available and the fuels are light, such as leaf litter or grass.

Tree Removal
It may be necessary to remove some trees in or immediately adjacent to locations that would be suitable for fireline construction. Generally, live trees removed would be small, often less than 5 inches diameter at breast height (5 inches in diameter at 4.5 feet above ground level).

Snags (dead trees) may need to be removed either in or immediately adjacent to the fireline. We would take reasonable precautions to avoid impacts to standing dead trees and the wildlife that uses them. These might include actions such as excluding snags from the areas to be burned when constructing firelines, or raking around the base of the snag if the snags are inside a burn unit but close to the edge.
Snags would only be removed if they impede fire containment efforts and/or threaten public or firefighter safety.

To ensure consistency with the Forest Plan and corresponding biological opinion (pg. 64-67), project design features in appendix D and in the project biological assessment will apply to removal of all trees (live or dead) that may provide suitable roosting cover for the Indiana, northern long-eared, or gray bats.

Environmental Considerations

Succession without fire has resulted in a different structure and composition of oak forests, altering both fuels and fuel moisture levels. Species normally considered intolerant of fire have reached size classes large enough that they tolerate cool to moderate burns (Franklin et al. 2003). We would implement a series of prescribed fires over the next 3 to 15 years to restore native, fire-dependent ecosystems and to control invasives. Treatment units (burn blocks) could be burned as frequently as every one to three years, depending on:

- Fuel availability,
- Need to use fire to restore native vegetation, and
- Need to inhibit invasive species.

The use of prescribed fire is proposed on a landscape scale to:

- Promote native, fire-dependent ecosystems;
- Reduce the number of shade-tolerant tree species and invasives in the understory;
- Regenerate and favor shade-intolerant tree species, especially oak and hickory;
- Treat hazardous fuels associated with the recent ice storms; and
- Reduce non-native species.

The initial implementation of this project would include approximately 15,126 acres of landscape-level prescribed burning.

Activity fuel is defined as fuel loading left on site following harvesting or other mechanical treatments (or other activities).

As part of the 15,126 acres of landscape burning, we propose using prescribed fire on approximately 3,171 acres for activity fuel (slash or tree tops) reduction following pine harvesting. These fuels typically remain after the merchantable material is removed during harvesting. These areas may be burned separately or along with the other landscape-level prescribed burning units. Several burn entries may be needed to consume a majority of the activity fuels associated with harvest, depending on the intensity or severity of the initial burn. Once the activity fuels have been consumed, several subsequent burns on these acres would likely be needed to promote the ecological benefits stated above for landscape burning.

Prescribed burning opportunities (windows) are limited by leaf litter (fuels) accumulation and distribution, weather, predicted fire behavior, air quality, and operational constraints (i.e., availability of personnel and funding), as well as environmental constraints (e.g., protection measures for the Indiana bat). To maximize benefits across the project area, we would implement prescribed burns at a landscape scale when feasible within these constraints.
We will consider the following when setting priorities for implementing prescribed burning. It should be noted this list is neither complete nor necessarily in order of importance.

- Benefits to special habitats/rare plants/natural areas
- Areas with the greatest departure from historic conditions
- Opportunities to reduce fuel hazard and fire risk
- Ability to maintain and develop relationships with cooperators
- Efficient return of fire to its natural role in the ecosystem with consideration for risks
- Coordination with silvicultural and/or noxious weeds treatments
- Ability of the burn unit to meet multiple objectives as outlined in the environmental documentation and as identified by agency direction

Proposed fireline locations displayed on the maps are based on our most current information. Before implementation, these control lines will be field verified to ensure that they are located in the appropriate location, and that the appropriate control line will be used (hand line, bulldozer, etc.), depending on circumstances at the time of implementation.

Burn units may be dropped or combined, or divided as appropriate at the time of implementation. Such changes would be compared to the analysis of effects prepared for this project before implementation would begin. As a result of combining burn units, some interior control lines would not be needed. This would typically result in less impact than analyzed for some resources.

Prescribed fire would help reduce and control shade-tolerant hardwood species (Brose and Van Lear 1998; Abrams 1992; and Barnes and Van Lear 1998). In pine stands, removing overstory pine trees through harvesting activity would release the hardwood understory. The current composition of the hardwood understory reflects the pine overstory’s heavy shading effect. Less fire-resistant, shade-tolerant oak-competitor species (such as tulip poplar, sugar maple, American beech, and American elm) dominate this understory.

Tree species that have adapted to frequent fire, such as oak and hickory, would have their above-ground vegetation set back as a result of using prescribed fire, but would vigorously re-sprout. Those understory trees not adapted to frequent fire would have their above-ground vegetation set back, but have a greatly reduced chance of re-sprouting. Repeated application of prescribed fire over time would lead to a fire-dependent ecosystem increasingly dominated by oak and hickory, reducing but not eliminating shade-tolerant tree species. Prescribed fire would have the greatest immediate effects on stems less than 5 inches in diameter at ground surface (3 inches diameter at breast height) (Elliot et al. 2004).

Fire would have less immediate effects on the larger-diameter shade-tolerant tree species in the midstory and overstory. We may need to repeatedly apply prescribed fire to effectively reduce fire-intolerant species, such as red maple, in the overstory (Elliot et al. 2004, and Hutchinson 2004). Repeated burning should increase large, shade-tolerant tree species’ susceptibility to insects, disease, and windthrow. Associated mortality in these large shade-tolerant tree species would be expected 10 to 30 years after the initiation of burning, although we start to see the first effects only 2 to 3 years after burning.

Recurrent fire favors oaks at the expense of competing shade-tolerant hardwoods. Three or more prescribed burns may be required over 3 to 15 years to stimulate oak sprouting, control less fire-resistant species, and reduce invasives. A single prescribed burn can significantly reduce fuel loading, depending on fuel conditions at the time of burning. In contrast, repeated prescribed fires are usually necessary to fully realize ecological benefits, such as changes in species composition. Just as the shift toward shade-
tolerant tree species has taken decades to unfold as a result of wildfire suppression, the ecological shift toward ecosystems with a greater oak and hickory component would be subtle and could take several decades.

This ecological shift would first appear in smaller trees and shrubs in the understory. With repeated application of prescribed fire, the proportion of oak and hickory is expected to increase over time, especially as these trees age and become part of the midstory. Finally, as some older shade-tolerant trees succumb to the repeated application of prescribed fire and increasing light to the forest floor, oak and hickory should increase in abundance and dominance. This entire process could easily take 50 to 75 years. However, we expect measurable results in the understory that demonstrate movement toward Forest Plan desired conditions in less than a decade.

References Cited in Appendix C


