Strategic Fuel Treatment Placement Plan
Mt. Hood National Forest
July 2012

OVERVIEW

The Mt. Hood National Forest Strategic Fuel Treatment Placement Plan (hereafter Strategic Fuel Treatment Plan, 2012), aims to meet the following objectives:

1. Establish a strategy for the fuels program that will be useful in out-year planning and help guide the purpose and need for interdisciplinary projects.
2. Develop a plan for creating a forest landscape with a network of fuel breaks and natural openings that, in the event of a wildfire, will promote
    a. Increased public and firefighter safety.
    b. Decreased management costs.
    c. Increased suppression effectiveness in protecting private and federal improvements, timber, and sensitive natural resources.
    d. The use of unplanned ignitions to restore forest health, resilience, and condition class.
    e. Disturbances in block sizes representative of the natural disturbance regime.
3. Provide a framework for integrated fuels and vegetation management projects that reduce landscape level fire hazard while achieving multiple resource objectives.

Landscape-level fuels management relies on strategically placed fuel treatments over a fraction of the landscape to effectively modify wildland fire behavior. This Strategic Fuel Treatment Plan spatially identifies potentially advantageous sites for fuel treatment on the Mt. Hood National Forest. These identified locations can be incorporated into future interdisciplinary vegetation management planning areas and serve as pre-established treatment sites to facilitate indirect suppression efforts during a wildfire. The Strategic Fuel Treatment Plan aligns with the Mt. Hood National Forest Land and Resource Management Plan (hereafter LRMP; 1990), the Mt. Hood National Forest Strategic Stewardship Plan (hereafter Strategic Stewardship Plan; 2009), and the Mt. Hood National Forest Vegetation Management Strategy (hereafter Vegetation Management Strategy; 2009).

The Strategic Stewardship Plan and the Vegetation Management Strategy address **vegetation management goals** that prioritize community protection from wildfire and restoration and maintenance of ecosystem resilience. The Plans support management activities that work toward the desired future condition of the Mt. Hood National Forest: a healthy, diverse, and resilient landscape that can adapt to future disturbances with minimal negative effects to ecosystems. These Plans recognize the need to address disturbances that occur across land management allocations and are part of dynamic ecosystem processes including fire, insects and disease, climate change, and changing demands on the transportation system. Changes in the frequency, intensity, or size of disturbance from historic conditions can threaten the sustainability of a given ecosystem including watersheds, ecologically sensitive areas, endangered species habitat, and communities. The Strategic Fuel Treatment Plan builds upon the goals of the Strategic Stewardship Plan and the Vegetation Management Strategy and outlines a framework to work toward the desired future condition.

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The Vegetation Management Strategy lists two compelling factors that trigger vegetation management with respect to fuels in the section titled "Identifying Ecological/Environmental Need":

1. **Fuel build-up/fire hazard:** Objectives of vegetation management triggered by fuel build-up/fire hazard are
    a. To reduce the extent and impact of wildfires by reducing fuels in focus areas including the wildland-urban interface (WUI), municipal watersheds, and priority areas identified in Community Wildfire Protection Plans (CWPPs), and
    b. To create opportunities for tactical response to wildfires.
2. **Departure of vegetation condition class:** The objective of vegetation management triggered by a departure of vegetation condition class is to restore conditions indicative of the natural fire regime and, thereby, improve habitat, maintain biodiversity, reduce fire danger, and restore forest health, diversity, and resilience.

The Strategic Fuel Treatment Plan supports the Vegetation Management Strategy and spatially identifies fuel treatments in two major areas:

1. **Buffers** to private lands and high value resources including timber, infrastructure, critical habitat, and municipal watersheds that
    a. Create opportunities for safe and effective fire suppression.
    b. Add depth to private land boundaries.
2. **Fuelbreaks** on roads and ridges and around wilderness areas that
    a. Compartmentalize the landscape into blocks that are spatially representative of natural disturbances.
    b. Facilitate indirect fire suppression and reduce wildfire costs.
    c. Facilitate landscape restoration that adds depth to fuelbreaks by using fire and other vegetative treatments.

Establishment of buffers and fuelbreaks might include a variety of treatments and intensities depending on vegetation and fuel types, landforms and topography, and specific treatment objectives. General objectives would likely include a reduction to horizontal continuity of surface fuels and canopy fuels and a reduction to vertical continuity associated with ladder fuels. Treatments to achieve the aforementioned objectives would likely include the removal or alteration of canopy and surface fuels through a combination of thinning, pruning, chipping, mastication, and prescribed fire. Thinning and pruning can create space between tree crowns, which limits the ability of fire to move from crown to crown; increase mean stand diameter and reduce undesirable species, which restores or increases fire resilience of a stand; and increase canopy base height, which limits the ability of a surface fire to transition to a crown fire. Chipping and mastication can alter the arrangement of fuels on site. Prescribed fire can consume fine fuels, herbaceous vegetation, understory trees and shrubs, and residual slash from thinning. Prescribed fire can also kill overstory trees and create snags. Prescriptions for buffers and fuelbreaks must consider land management objectives, initial stand conditions, characteristics of extreme weather and fire behavior scenarios, potential silvicultural and surface fuel treatments, and immediate and long-term effects of fuel treatments on fuels, fire, fire effects, and forest stand attributes (Johnson et al. 2007). Projects that

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include landscape restoration objectives might increase the depth of fuelbreaks and buffers to meet long-term habitat, watershed, and forest health goals.

Local fire management personnel and resources specialists were consulted at each district to create a map of suggested treatment areas. Strategic treatment maps are found in Appendix A.

SUPPORT FOR THE STRATEGIC FUEL TREATMENT PLAN

Fuel treatments can be designed to decrease expected fire behavior and fire severity by considering both the treatment prescription and the spatial arrangement of treatments on the landscape. Wind direction and synoptic weather systems contribute to rapid fire growth and often result in large fires that tend to display similar spread patterns across a region (Finney et al. 2007). Therefore, fuel treatments should be oriented perpendicular to the major direction of fire spread, where feasible. Finney et al. (2007) found that optimal patterns of treatment reduced the average fire spread rate in comparison with random patterns for all modeled study areas.

Generally, fuel treatments aim to reduce surface fuels, increase crown base height, and decrease the amount and horizontal continuity of canopy fuels (Stephens 1998, Scott and Reinhardt 2001, Agee and Skinner 2005). Effective fuel treatments mitigate fire severity within treated stands (Pollet and Omi 2002, Graham 2003, Graham et al. 2004, Agee and Skinner 2005, Cram et al. 2006), but widely spaced treatment blocks do no inhibit fire spread because fire can move freely around the treatment units (Finney 2001, Figure 1).

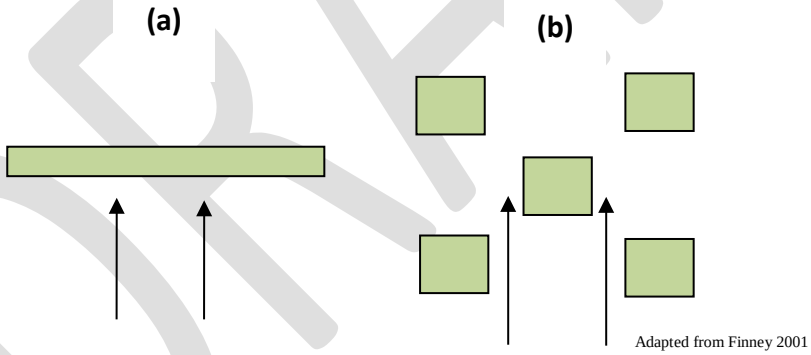

Figure 1. Two basic fuel treatment patterns: (a) fire intersects treatment in the heading direction, thereby slowing fire spread; (b) fire is able to move freely around treatment units and does not inhibit overall fire spread. Note: Finney (2001) suggests multiple treatment areas arranged in an overlapping pattern rather than a single treatment as shown in (a).

LIMITATIONS AND OTHER CONSIDERATIONS

Effects of fuel treatments on wildfire behavior can vary considerably with prescription, landform, vegetation, weather, and fuel moisture scenarios. Location and values at risk determine fire behavior characteristics of concern. Many fire behavior models and case studies are concerned with reducing fire rate of spread, but fire that moves rapidly through light fuels may not be as threatening as fire in heavy fuels that generates higher burn intensities and longer burn duration. Studies across the nation have concluded that treatment of surface fuels mitigates the severity of fire effects (Cram et al. 2006, Martinson and Omi 2006, Raymond and Peterson 2005, Skinner et al. 2005, Pollet and Omi 2002).

Effects of canopy fuel treatments on wildfire behavior are less conclusive, particularly when activity fuels and other surface fuels are not treated. Predictions can be made about the likelihood of crown fire based on canopy fuel characteristics, but crown fire cannot be considered independently of surface fire (Van Wagner, 1977; Alexander, 1988). Silvicultural treatments can reduce the horizontal and vertical continuity of canopy fuels, affecting fire spread through tree crowns, but several studies (Cram et al. 2006, Omi et al. 2006, Raymond and Peterson 2005, Skinner et al. 2005, Omi and Martinson 2002) concluded that altering canopy fuels affects wildfire outcomes only where surface fuels have been abated. Furthermore, fuel treatments that reduce crown fuels can result in higher spread rates by increasing surface wind flow and the amount of available sunlight, water, and nutrients for herb and shrub growth (Agee 1996). Finally, fire behavior model simulations and case studies often do not account for spotting or the influence of control efforts.

Tradeoffs exist between managing landscapes to address long-term restoration goals versus protecting structures and other values at risk, but Ager et al. (2010) suggest that fuel treatment design can address both objectives. Results from Ager et al. (2010) indicate that treatments limited to WUI and point protection fail to address forest health and other resource objectives and restoration opportunities in the surrounding forest. Conversely, fuel treatments well outside of the WUI can reduce wildfire threats to the WUI, facilitate wildfire suppression and control near key resources, provide integrated benefits in other resource areas, and allow natural ignitions to generate beneficial fires.

Many factors can limit opportunities for landscape-scale fuel treatments as proposed in this document. Limitations include relatively small project area sizes, funding shortfalls, funding sources and multiple objectives of integrated treatments, inadequate road access, variable land ownership, and state and federal regulations on timber harvesting and prescribed burning. Nonetheless, smaller project areas combined with other completed fuel treatments, old burns, wet meadows, and other landscape features can have cumulative effects on the landscape. Therefore, specialists should identify potential opportunities for fuel treatments that contribute to the landscape Strategic Fuel Treatment Plan in all suitable interdisciplinary and collaborative projects. Applying science-based approaches that include a consistent decision process, high quality data, and an accountability process will contribute to credible, high-quality resource management plans (Peterson and Johnson 2007). Specialist input will help determine the appropriate site-specific treatment prescriptions based on project scale, resources and values at risk, fire behavior characteristics and fire weather scenarios of concern, and best available science.

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REFERENCES

Agee, J.K., 1993. Fire Ecology of Pacific Northwest Forests. Island Press, Covelo, CA.

Agee, J.K., Skinner, C.N. 2005. Basic principles of forest fuels management. Forest Ecology and Management 211: 83-96.

Ager, A.A., Vaillant, N.M., Finney, M.A. 2010. A comparison of landscape fuel treatment strategies to mitigate wildland fire risk in the urban interface and preserve old forest structure. Forest Ecology and Management 259(8):1556–1570.

Alexander, M.E. 1988. Help with making crown fire hazard assessments. *In*: Protecting people and homes from wildfire in the Interior West: proceedings of the symposium and workshop. 6-8 October 1998. Missoula, MT. *Edited by* W.C. Fischer, S.F. Arno. USDA Forest Service Proceedings. INT-GTR-251.

Cram, D., Baker, T., Boren, J. 2006. Wildland fire effects in silviculturally treated vs. untreated stands of New Mexico and Arizona. USDA Forest Service Research Paper. RMRS-RP-55.

Finney, M.A. 2001. Design of regular landscape fuel treatment patterns for modifying fire growth and behavior. Forest Science 47(2):219-228.

Finney, M.A., Seli, R.C., McHugh, C.W., Ager, A.A., Bahro, B., Agee, J.K. 2007. Simulation of long-term landscape-level fuel treatment effects on large wildfires. International Journal of Wildland Fire 16:712-727.

Graham, R.T. 2003. Hayman Fire Case Study: Summary. USDA Forest Service General Technical Report. RMRS-GTR-115.

Graham, R.T., McCaffrey, S., Jain, T.B. 2004. Science basis for changing forest structure to modify wildfire behavior and severity. USDA Forest Service General Technical Report. RMRS-GTR-120.

Johnson, M.C., Peterson, D.L., Raymond, C.L. 2007. Guide to fuel treatments in dry forests of the western United States: Assessing forest structure and fire hazard. USDA Forest Service General Technical Report PNW-GTR-686.

Martinson, E.J., Omi, P.N. 2006. Assessing mitigation of wildfire severity by fuel treatments — An example from the coastal plain of Mississippi. *In:* Fuels management—How to measure success: Conference Proceedings. 28-30 March 2006. Portland, OR. *Compiled by* P.L. Andrews, B.W. Butler. USDA Forest Service Proceedings RMRS-P-41.

Mount Hood National Forest Strategic Stewardship Plan. *Updated* 2009. USDA Forest Service. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_036319.pdf.

Mount Hood National Forest Vegetation Management Strategy. 2009. USDA Forest Service. *Available by request.*

Omi, P.N., Martinson, E.J., Chong, G.W. 2006. Effectiveness of pre-fire fuel treatments. Final report submitted to the Joint Fire Science Program for Project JFSP 03-2-1-07.

Peterson, D.L., Johnson, M.C. 2007. Science-based strategic planning for hazardous fuel treatments. Fire Management Today 67(3):13-18.

Pollet, J., Omi, P.N. 2002. Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. International Journal of Wildland Fire 11:1-10.

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Raymond, C. L., Peterson, D. L., 2005. Fuel treatments alter the effects of wildfire in a mixed-evergreen forest, Oregon, USA. Canadian Journal of Forest Research 35(12): 2981-95.

Scott, J. H., Reinhardt, E. D., 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. USDA For. Serv. Res. Pap. RMRS-RP-29.

Skinner, C.N., Ritchie, M.W., Hamilton, T., Symons, J. 2005. Effects of prescribed fire and thinning on wildfire severity: the Cone Fire, Blacks Mountain Experimental Forest. In: S. Cooper, editor. 25th Annual Forest Vegetation Management Conference, Jan 2004. University of California Cooperative Extension, Redding, CA.

Stephens, S. L., 1998. Evaluation of the effects of silvicultural and fuels treatments on potential fire behaviour in Sierra Nevada mixed-conifer forests. Forest Ecology and Management 105(1-3): 21-35.

Van Wagner, C. E., 1977. Conditions for the start and spread of crown fire. Canadian Journal of Forest Research 7(1): 23-34.

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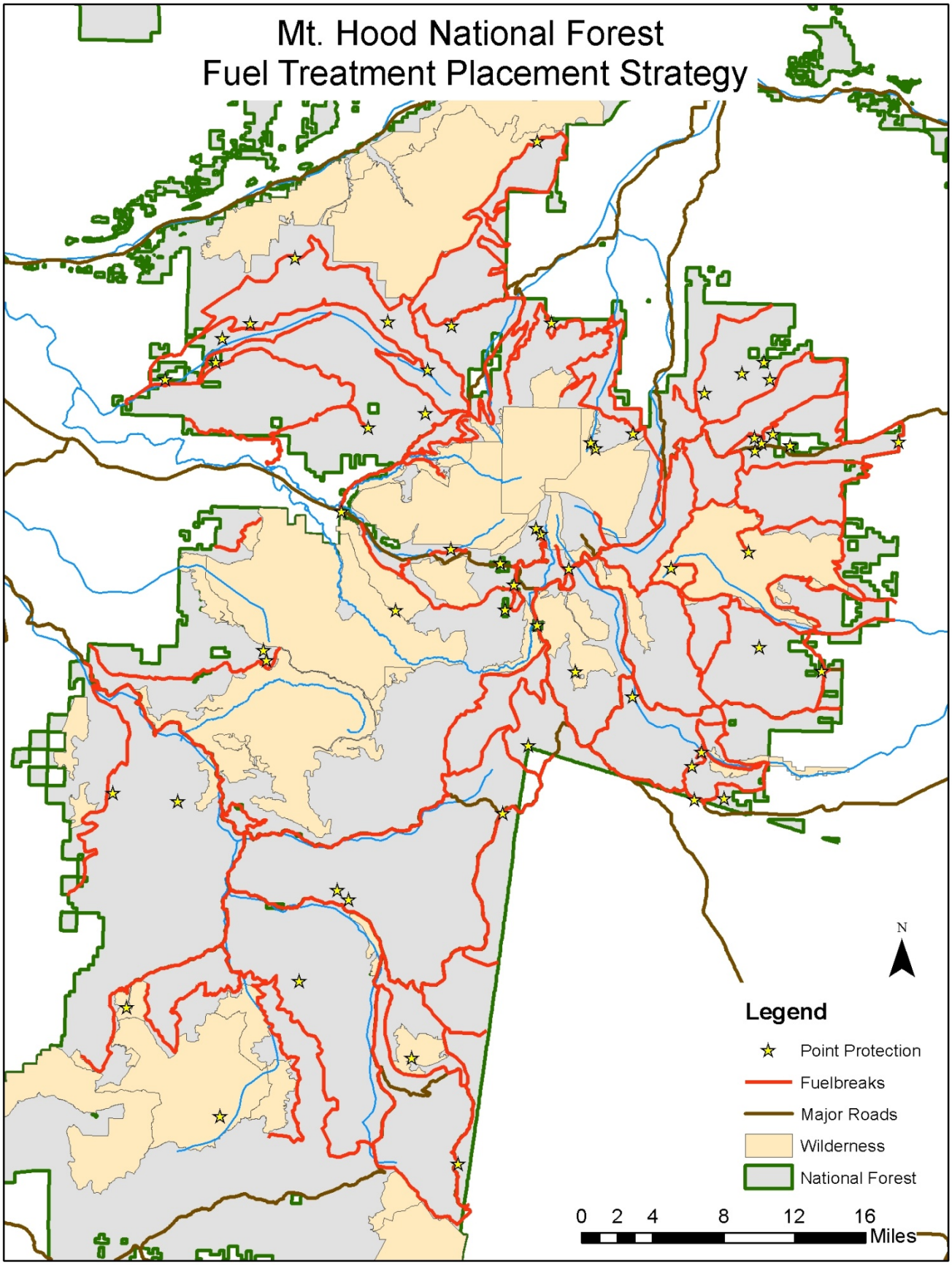
APPENDIX A.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Legend
Point Protection
Fuelbreaks
Major Roads
Wilderness
National Forest
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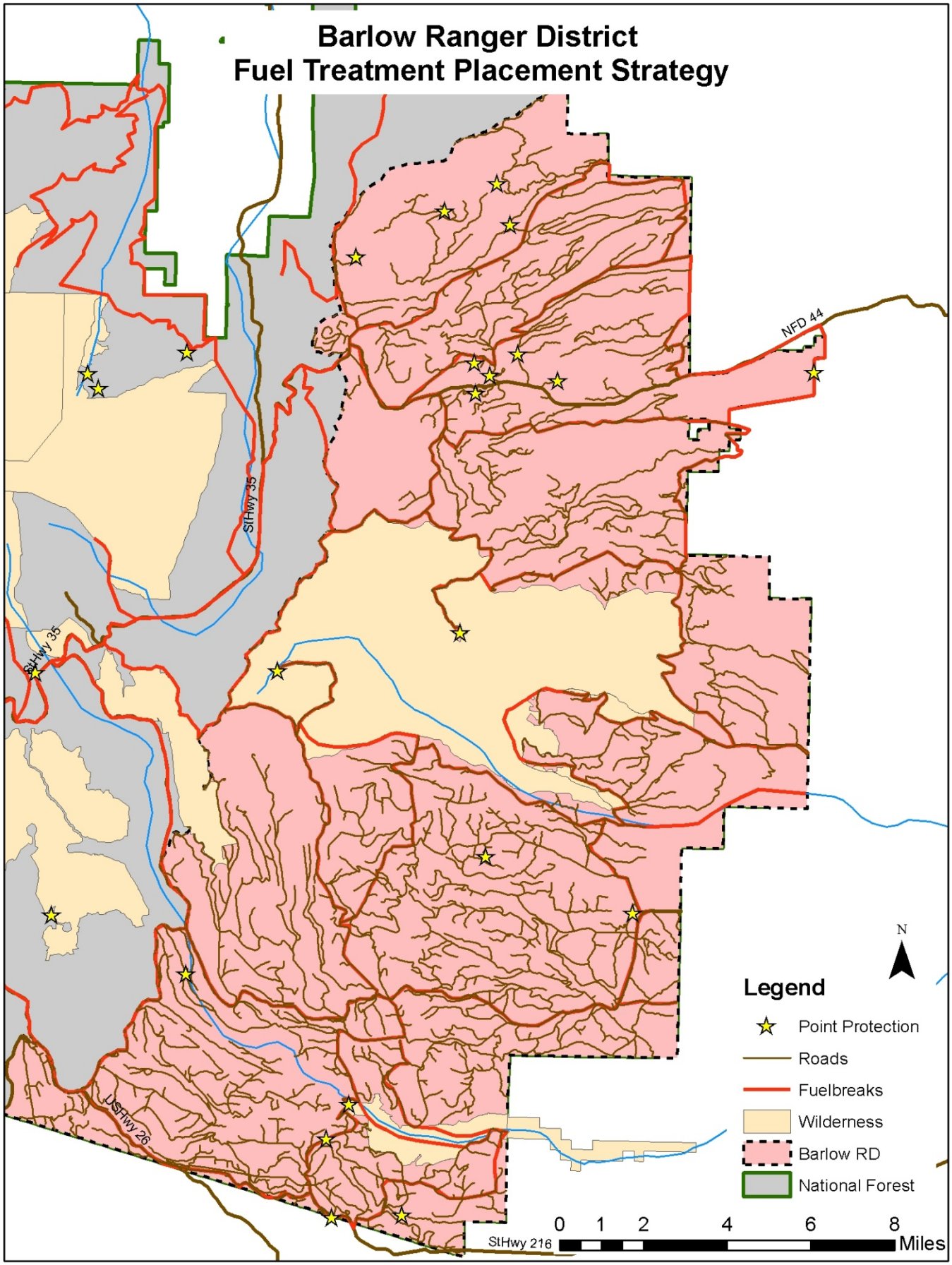
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Point Protection
Roads
Fuelbreaks
Wilderness
Barlow RD
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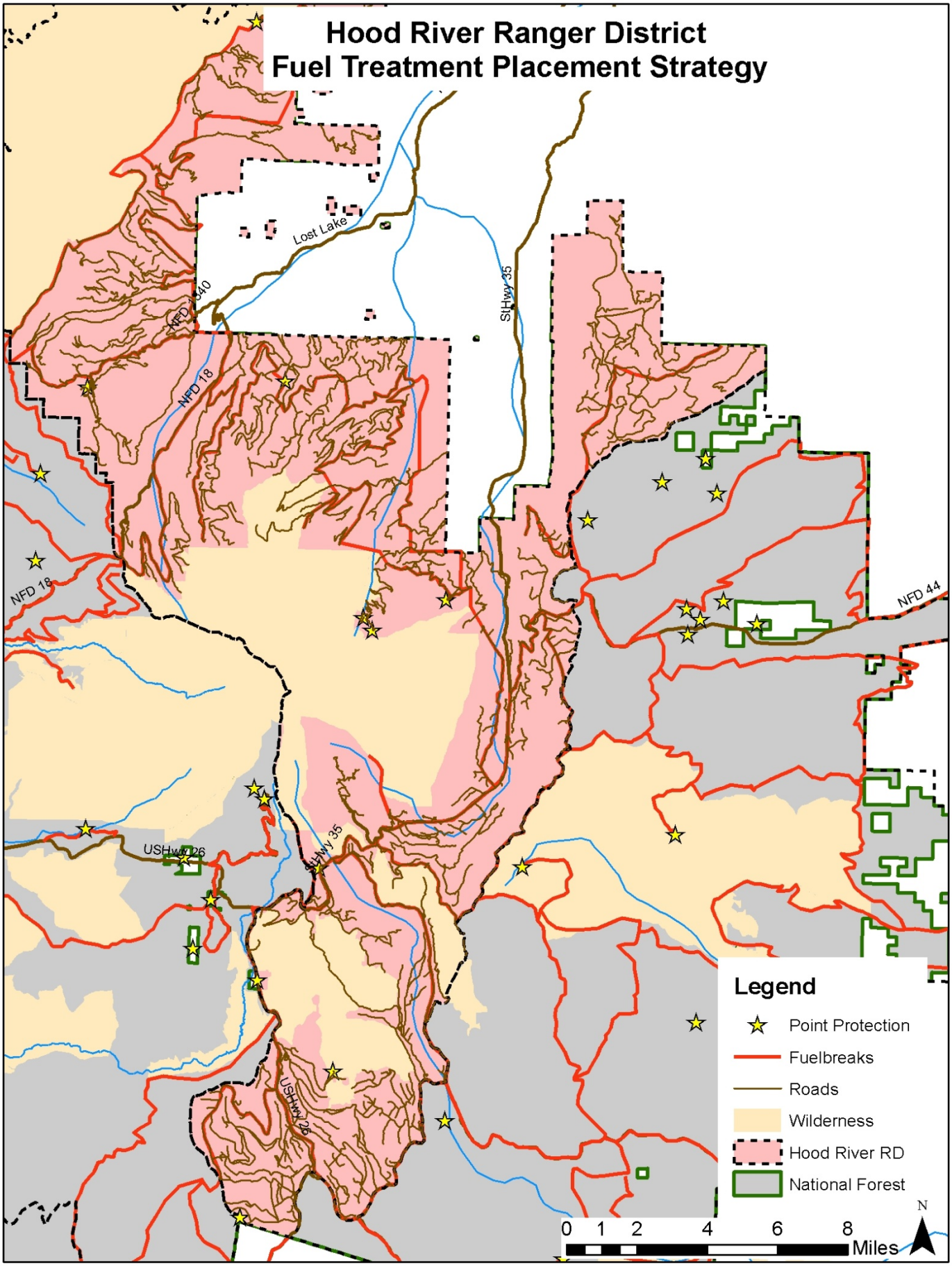
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Fuel Treatment Placement Strategy
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SHwy 35
NFD 18
NFD 44
USHwy 26
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Legend
Point Protection
Fuelbreaks
Roads
Wilderness
Hood River RD
National Forest
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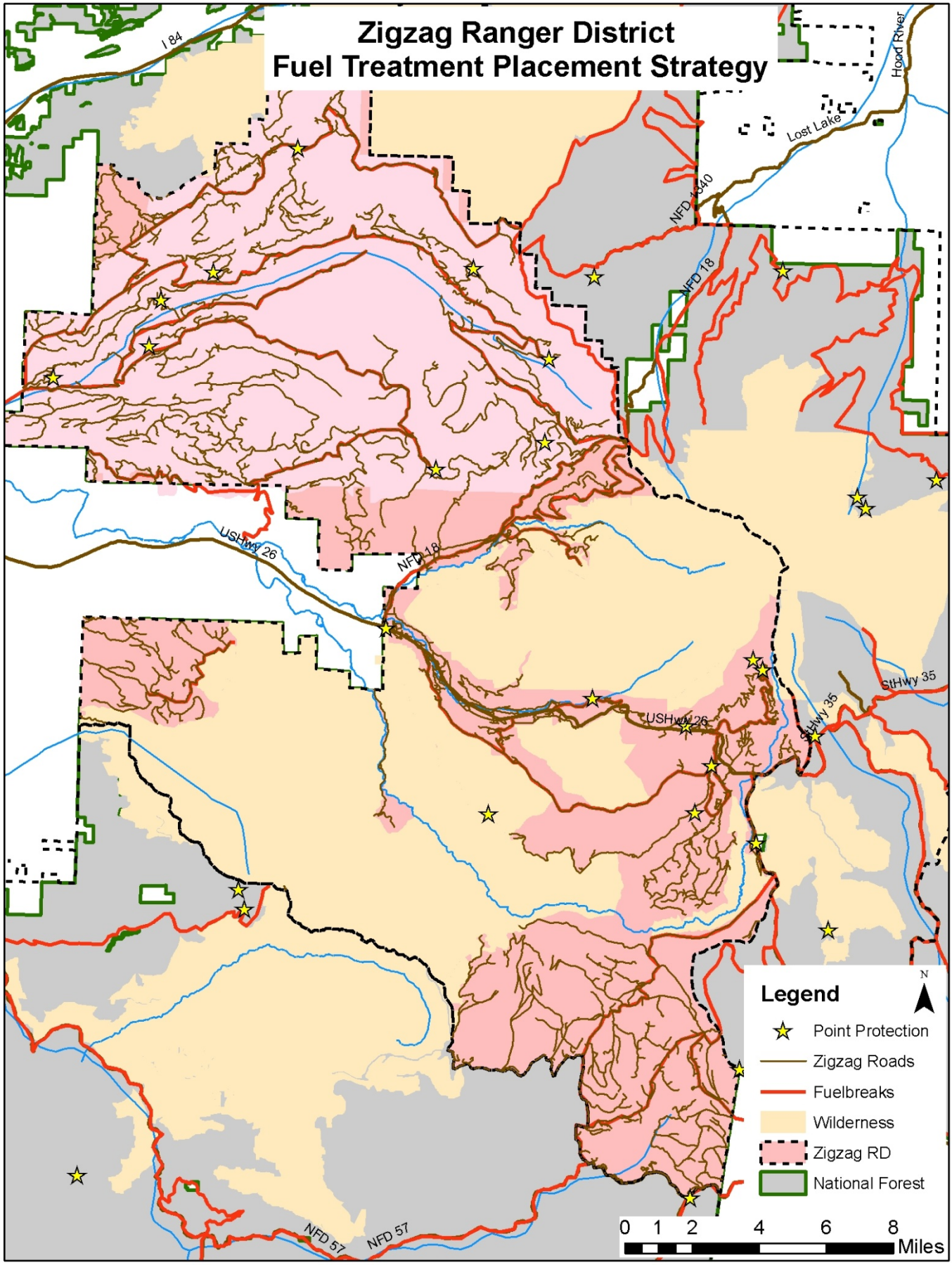
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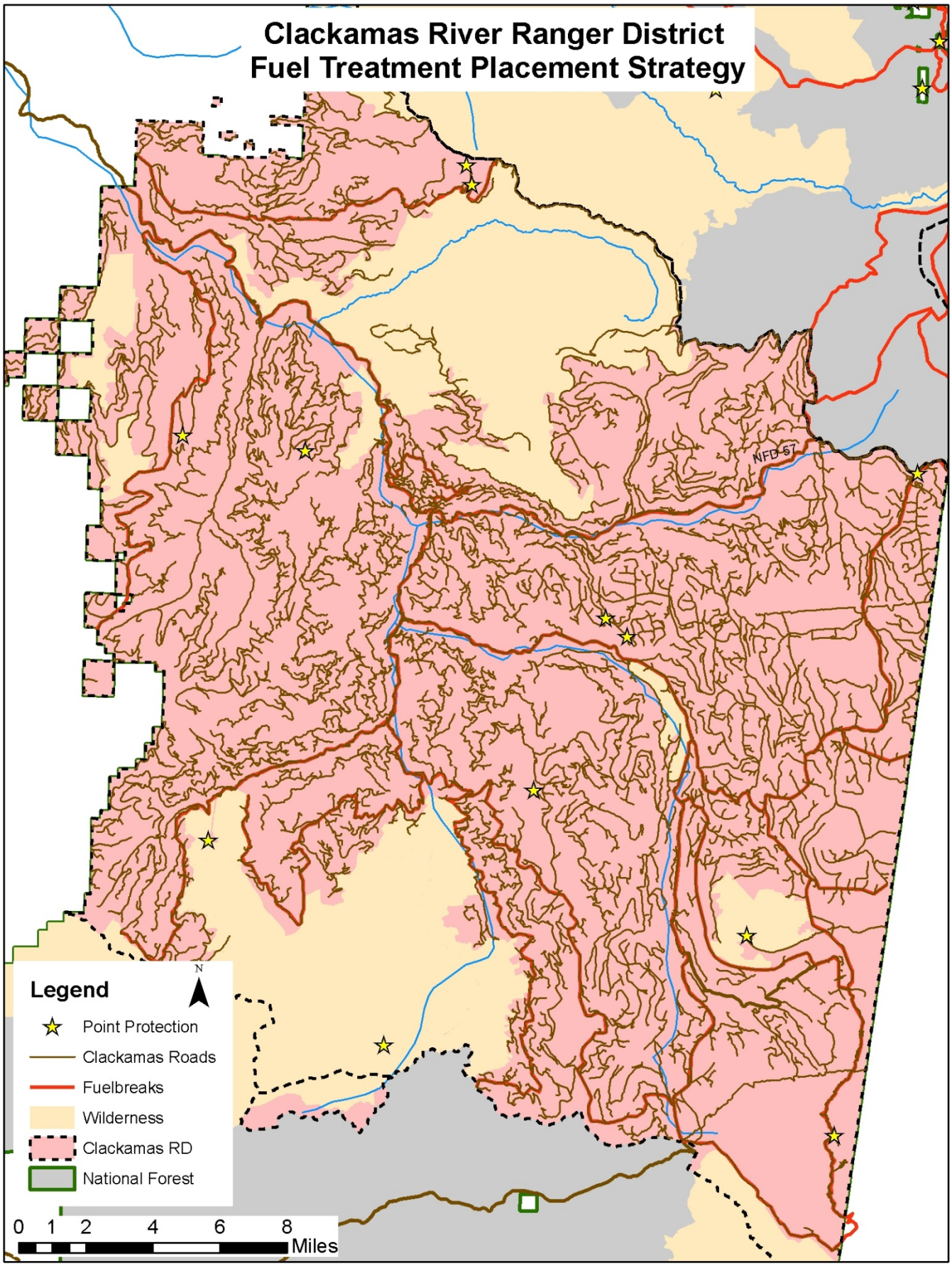
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Fuel Treatment Placement Strategy
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