UNITED STATES FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ACTION STATEMENT

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the action of (describe action): Restoration of Native Forest and Grassland Habitat at Little White Salmon National Fish Hatchery, Cook, Washington

Check One:

_____ is a categorical exclusion as provided by 51 6 DM 2, Appendix I and 516 DM 6, Appendix 1. No further NEPA documentation will therefore be made.

__X__ is found not to have significant environmental effects as determined by the attached environmental assessment and finding of no significant impact.

_____ is found to have significant effects and, therefore, further consideration of this action will require a notice of intent to be published in the Federal Register announcing the decision to prepare an EIS.

_____ is not approved because of unacceptable environmental damage, or violation of Fish and Wildlife Service mandates, policy, regulations, or procedures.

_____ is an emergency action within the context of 40 CFR 1506.11. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents (list):

Signature Approval:

(1) Originator	Date	(2) WO/RO Environmental Coordinator	Date
	4/14/2010		

(3) AD/ARD	Date	(4) Director/Regional Director	Date
ACTING	4/21/10		4/28/10

FINDING OF NO SIGNIFICANT IMPACT

2010 Environmental Assessment for Restoration of Native Forest And Grassland Habitat at Little White Salmon National Fish Hatchery

The U.S. Fish and Wildlife Service (USFWS) will initiate native forest and grassland habitat restoration work on more than 400 acres of land that comprise the Little White Salmon National Fish Hatchery. Though protected from development, these lands remain threatened by a combination of past practices and lack of active stewardship. The current body of science and consensus of restoration ecologists indicates that active management is warranted if desired function is to be restored. With regard to USFWS land at Little White Salmon National Fish Hatchery, desired function is defined to include the restoration of native forest and grassland habitat to benefit fish and wildlife species. Management of a large tract of land within the National Fish Hatchery System mirrors the Service goal for managing lands within the National Wildlife Refuge System: conserving and restoring the nation's fish and wildlife habitat. This is also consistent with the USFWS 2009-2013 Pacific Region Fisheries Program Strategic Plan Focus Area for Aquatic Habitat Conservation and Management.

The hatchery property, though limited in size, is important in the context of landscape level conservation of at-risk vegetation communities and associated wildlife populations. The key conservation functions of this ownership include:

1. Protecting the water supply of the Little White Salmon National Fish Hatchery. Restoration of native forest and grassland habitat on USFWS-owned and adjacent lands leads to significant improvements in forest and watershed health. This benefits the hatchery fish production program, sensitive species found on the hatchery property, and aquatic and riparian habitat along the Little White Salmon River.
2. Linking of Oregon white oak (*Quercus garryana*) and ponderosa pine (*Pinus ponderosa*) habitats in the eastern Columbia Gorge with those remnant similar habitats occurring in the inner gorge and the west side of Cascade Mountains.
3. Providing anchor habitat for oak, prairie and mature conifer dependant species.
4. Providing examples of remnant oak, cliff, and prairie plant communities to guide restoration efforts on other lands, and native plant seed collection sources.
5. Enhancing the quality of habitats on the adjacent Little White Salmon Biodiversity Reserve. This 200-acre ownership combined with hatchery lands forms a block of protected oak and conifer habitats. These lands have high conservation value because they contain a river confluence and plant community /Ecoregional interfaces in a concentrated area.

The restoration of desired function to the upland habitat and associated riparian areas at Little White Salmon National Fish Hatchery is critical to maintaining watershed health and aligned with the overall USFWS mission and Pacific Region Fisheries Program Strategic Plan directive. As a result, a planning effort was initiated in response to the need to assess and actively restore these important habitats (Stringer 2009). The resulting plan described a framework for stewardship and a basis for recommended treatments, which will help managers focus limited resources on priority areas, and build support for upland habitat management on USFWS lands.

The need for this restoration effort is also driven by a desire to coordinate management efforts with the Columbia Land Trust, whose adjacent lands have similar goals.

Three alternatives were considered and environmental consequences analyzed in an Environmental Assessment (EA) for the Restoration of Native Forest and Grassland Habitat (USFWS 2010). In addition to the preferred alternative (Alternative B) outlined above, Alternative A includes a no-action scenario where habitats on the property would remain unmanaged. As a result, natural processes already influenced by a human altered environment would continue. There would be no effort to address priority stewardship actions. Alternative C described habitat restoration activities without the use of herbicides. Ironically, many of the recommended forest restoration treatments necessary to achieve desired future condition (e.g. tree thinning and removal of encroaching conifer in oak habitats) create favorable conditions for the spread of noxious weed species. The use of herbicides will be most useful in the early implementation of habitat restoration activities and most likely used infrequently in the future once initial control of noxious weeds is achieved. The tenacity associated with non-native noxious weeds makes the achievement of desired future conditions very difficult, if not impossible without the use of herbicides. As a result, the effective control of noxious weeds is a critical component of the overall habitat restoration plan for the ownership.

Alternative B was selected for implementation because it is most likely to meet the goals and objectives identified in the Little White Salmon National Fish Hatchery Habitat Stewardship Plan as well as those mission-defined goals of the Service, and specifically the Fisheries Program. It has the most potential for achieving desired future conditions that will benefit a variety of species. An estimated 111 bird species, 14 amphibian species, 12 reptiles, and 44 mammal species may occur on the hatchery property (Rombough 2006, Stringer 2009). Included in this total are 11-Federal and 16-State listed or candidate species.

As described in detail in the EA, Alternative B recognizes that habitats on the hatchery property have significant conservation value, though are degraded and require active management to achieve several priority management goals. Upland habitats will be managed to provide clean, cold water for hatchery operations and maintain the current high standard of water quality. Restoration activities will focus on the achievement of Desired Future Conditions, a balance of habitat needs of focal and other rare, declining, and threatened/endangered wildlife species using pre-European settlement conditions as a template for restoration. Restoration of desired function also includes the reduction of accumulated fuels and associated risk for catastrophic fire. Fragile and rare habitats such as talus, riparian areas, and remnant bunchgrass and moss/lichen communities on rock outcrops and springs will be maintained and enhanced as necessary. Habitat restoration offers an excellent opportunity to partner with the Columbia Land Trust and other neighboring private landowners to conserve, restore, and monitor lands in the vicinity on a landscape level. Hatchery owned roads on the property will be managed to reduce adverse impacts to fish and wildlife populations and to enhance public safety. The hatchery habitat project also offers the opportunity to use the hatchery property as a model to demonstrate cutting edge restoration strategies and techniques; and as a research site for public and private agencies to evaluate active, passive, and minimal stewardship approaches.

The proposal has been coordinated with interested and affected parties. A public review and comment period for the Draft Environmental Assessment for the Restoration of Native Forest and Grassland Habitat at Little White Salmon National Fish Hatchery, Cook, Washington opened on March 1, 2010 and ended on April 9, 2010. Notifications of the comment period were published in *The Columbian* (Vancouver, WA), *The Enterprise* (White Salmon, WA), and *Skamania County Pioneer* (Stevenson, WA). Letters were emailed to 28 interested parties informing them of the comment period. Copies of the EA were made available for public review at the Hatchery Office/Visitor Center, Underwood (WA) Post Office, and on the Little White Salmon National Fish Hatchery website (www.fws.gov/gorgefish/littlewhite). The EA was sent electronically to the Washington Department of Fish & Wildlife non-game biologist and to the Skamania County Commissioner for District #3. The proposal was also thoroughly discussed and coordinated with the Columbia Land Trust, owners of property adjacent to Little White Salmon National Fish Hatchery. No comments were received during the public comment period. An additional review is being conducted by the U.S. Forest Service, Columbia River Gorge National Scenic Area, to assure consistency with the Management Plan for the Columbia River Gorge National Scenic Area.

Therefore, it is my determination that the proposal does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of section 102(2)(C) of the National Environmental Policy Act of 1969 as amended. Accordingly, preparation of an environmental impact statement is not required. Copies of supporting references are available upon request from U.S. Fish and Wildlife Service, Little White Salmon National Fish Hatchery, 56961 SR14, Cook WA 98605, telephone 509-538-2755.

Supporting documents for this decision include relevant office file material and the following references:

Larsen, E.M., and J.T. Morgan. 1998. Management recommendations for Washington's priority habitats: Oregon white oak woodlands. Washington Department of Fish and Wildlife, Olympia, WA. 37 pp.

Rombough, C. 2006. The amphibians and reptiles of the Little White Salmon National Fish Hatchery. Report to the U.S. Fish and Wildlife Service. 32 pp + appendices.

Stringer, D. 2009. Little White Salmon Fish Hatchery Habitat Stewardship Plan. Report to the U.S. Fish and Wildlife Service. 132 pp.

USFWS. 2010. Environmental Assessment for Restoration of Native Forest and Grassland Habitat at Little White Salmon National Fish Hatchery. 23 pp.

ACTING Scott B. Kahn

Assistant Regional Director-Fisheries
U.S. Fish and Wildlife Service
Pacific Region

4/21/2010
Date

[redacted]

ENVIRONMENTAL ASSESSMENT

Restoration of Native Forest and Grassland Habitat

at

Little White Salmon National Fish Hatchery
Cook, Washington

Prepared by:

U.S. Fish and Wildlife Service
Little White Salmon/Willard National Fish Hatchery Complex
56961 SR 14
Cook, Washington 98605

Chapter 1. Purpose of and Need for Action

The Little White Salmon National Fish Hatchery (NFH) is a 417 acre ownership at the confluence of the Little White Salmon and Columbia Rivers. These lands are administered by the United States Fish and Wildlife Service (USFWS). The ownership is approximately 12 miles east of Stevenson in Skamania County, Washington and falls within the General and Special Management Areas of the Columbia River Gorge National Scenic Area. These lands are located within the Little White Salmon Watershed of the Columbia River Basin. Vegetation cover is dominated by forest and woodlands, which combined cover approximately 86% of the ownership. The remaining acreage includes steep, rocky sparsely treed terrain, fields, water and hatchery facilities.

The hatchery property, though limited in size, is important in the context of landscape level conservation of at-risk vegetation communities and associated wildlife populations. The key conservation functions of this ownership include:

1. Protecting the water supply of the Little White Salmon National Fish Hatchery. Restoration of native forest and grassland habitat on USFWS-owned and adjacent lands leads to significant improvements in forest and watershed health. This benefits the hatchery fish production program, sensitive species found on the hatchery property, and aquatic and riparian habitat along the Little White Salmon River.

2. Linking of Oregon white oak (*Quercus garryana*) and ponderosa pine (*Pinus ponderosa*) habitats in the eastern Columbia Gorge with those remnant similar habitats occurring in the inner gorge and the west side of Cascade Mountains.

3. Providing anchor habitat for oak, prairie and mature conifer dependant species.

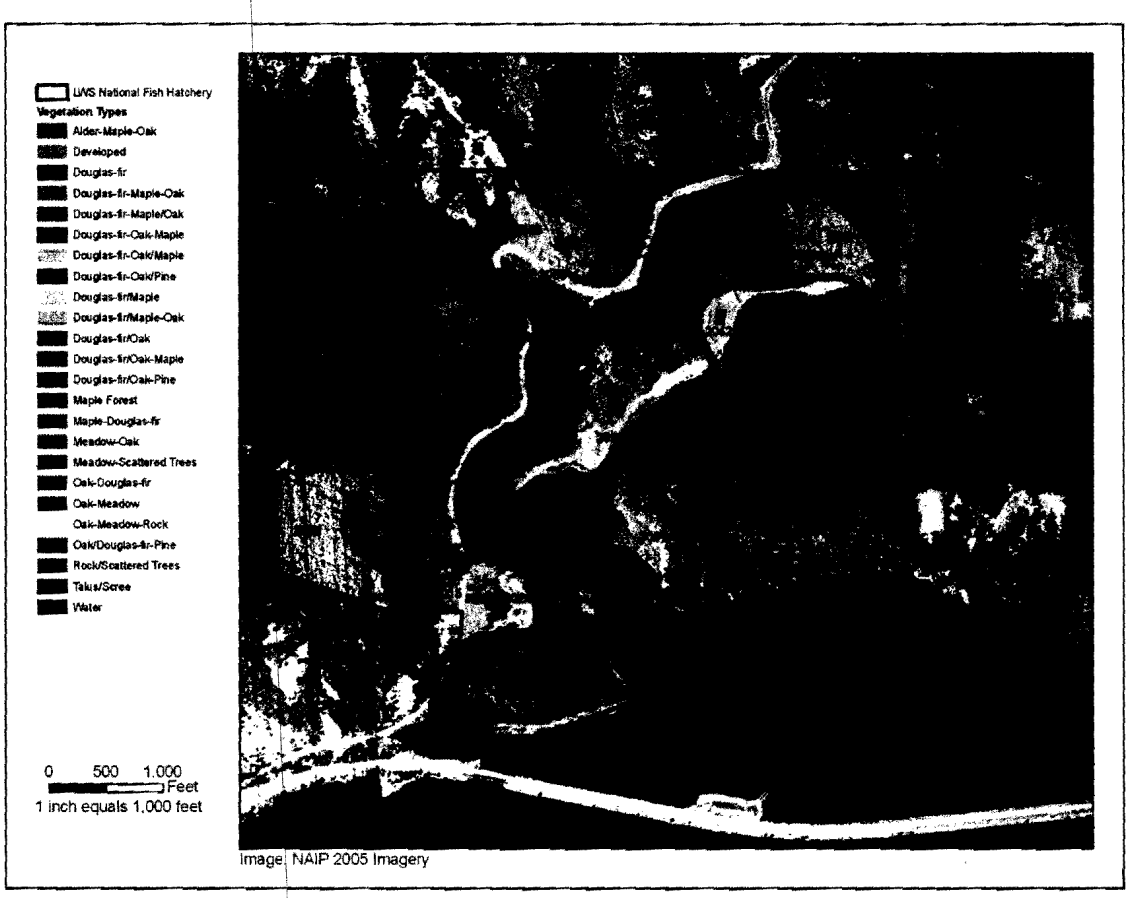
4. Providing examples of remnant oak, cliff, and prairie plant communities to guide restoration efforts on other lands, and native plant seed collection sources.

5. Enhancing the quality of habitats on the adjacent Little White Salmon Biodiversity Reserve. This 200-acre ownership combined with hatchery lands forms a block of protected oak and conifer habitats. These lands have high conservation value because they contain a river confluence and plant community /Ecoregional interfaces in a concentrated area.

Project Area

Habitats on the ownership are clearly important both in local and landscape contexts. Though protected from development, these lands remain threatened by a combination of past practices and lack of active stewardship. The primary vegetation type of concern on the ownership is Oregon white oak woodland. Though often overshadowed by the more dominant Douglas-fir (*Pseudotsuga menziesii)*, Oregon white oak are common throughout portions of the ownership, and were historically much more prevalent. The ownership provides one of a few protected examples of oak habitat occurring at the western edge of Oak/Conifer Foothills Ecoregions.

These remnant trees and communities are host to many species, have a limited distribution, and are declining and priority habitats in Washington State (Larsen and Morgan 1998). Approximately 200 species of birds, mammals, reptiles, and amphibians use oak habitats in Washington. These trees are host to a rich assemblage of invertebrates including moths, wasps, spiders, and butterflies, some of which are obligate on oaks. Unlike many forest types in the state, oak habitats require active stewardship on most sites to maintain species composition and desired structure. Another declining plant community, bunchgrass prairies, are scattered throughout on the ownership. Remnant prairies and open oak habitats have been severely degraded in places by invasive annual grasses. On more productive soils on the ownership, Douglas-fir trees and stands contribute to forest biodiversity by providing examples of low-elevation Westside coniferous forest, which are relatively poorly protected regionally. While components of mature forest structure are found in some of these stands, past logging has reduced habitat quality and forest function.



Vegetation Types on the Little White Salmon National Fish Hatchery

The current body of science and consensus of restoration ecologists that active management is warranted in the management of most of these plant communities if desired function is to be restored. With regard to USFWS land at Little White Salmon NFH, desired function is defined to include the restoration of native forest and grassland habitat to benefit fish and wildlife species. Management of a large tract of land within the National Fish Hatchery System mirrors

the USFWS goal for managing lands within the National Wildlife Refuge System: conserving and restoring the nation's fish and wildlife habitat. This is also consistent with the USFWS 2009-2013 Pacific Region Fisheries Program Strategic Plan Focus Area for Aquatic Habitat Conservation and Management:

National Goal: ***America's streams, lakes, estuaries, and wetlands are functional ecosystems that support self-sustaining communities of fish and other aquatic resources.***

> ***Regional Objective 2.1.*** ***Facilitate management of aquatic habitats on national and regional scales by working with Tribes, States, partners, and other stakeholders.***
>
> ***Regional Objective 2.2.*** ***Develop and expand the use of its expertise to assist in avoiding, minimizing, or mitigating impacts of habitat alteration on aquatic species and the monitoring and evaluation of completed projects.***
>
> ***Regional Objective 2.3.*** ***Coordinate with Service NWRs and NFHs to identify and implement opportunities for increasing the quantity and improving the quality of aquatic and riparian habitat.***
>
> ***Regional Objective 2.4.*** ***Expand opportunities to connect people with nature, engage citizen scientists and volunteers, and temporarily employ youth in the aquatic habitat conservation and monitoring programs and activities we lead or support.***

The steep topography of the Columbia River Gorge and characteristic strong wind heightens concern for potential catastrophic wildfire. The most popular element of fire management is fighting wildfire that threatens wildlife and people. Decades of control activities have led to an accumulation of fuels that makes the potential for catastrophic fire very real. This includes USFWS land at Little White Salmon NFH. While fire is traditionally perceived as a threat, the use of prescribed burning has a significant role in fuel reduction and in the restoration of important habitats. Restoration of desired function also includes the reduction of accumulated fuels and associated risk for catastrophic fire.

The restoration of desired function to the upland habitat and associated riparian areas at Little White Salmon NFH is critical to maintaining watershed health and aligned with the overall USFWS mission and Pacific Region Fisheries Program Strategic Plan directive. As a result, a planning effort was initiated in response to the need to assess and actively restore these important habitats (Stringer 2009). The resulting plan described a framework for stewardship and a basis for recommended treatments, which will help managers focus limited resources on priority areas, and build support for upland habitat management on USFWS lands. The need for this restoration effort is also driven by a desire to coordinate management efforts with the Columbia Land Trust, whose adjacent lands have similar goals.

Chapter 2. Background

The Little White Salmon NFH, in the Eastern Columbia Gorge in Washington State, contains 417 acres owned and managed by the USFWS. The ownership is comprised mostly of moderate

to steep canyon slopes and scattered benches above the confluence of the Little White Salmon and Columbia Rivers. Vegetation cover is dominated by Douglas-fir and bigleaf maple forest, oak and Douglas-fir woodlands and scattered remnant prairies. Remaining lands are rocky slopes, fields, water, and hatchery facilities. An estimated 111 bird species, 14 amphibian species, 12 reptiles, and 44 mammal species may occur on the ownership (Rombough 2006, Stringer 2009). Included in this total are 11 Federal and 16 State listed or candidate species. These lands are being managed primarily to protect water quality to support hatchery operations. Secondary goals are to provide quality habitat for at-risk wildlife species and plant communities. A restoration planning effort was initiated to assess habitat conditions, determine future desired conditions, identify restoration priorities and design a stewardship strategy.

The ownership contains predominantly forest and woodland cover types, covering 61 and 19% of total acreage, respectively. These plant communities have been altered since the contact period and Euro-settlement of the Columbia Gorge. A mixed-fire regime featured both high frequency fires which shaped and maintained open vegetation featuring oak, Douglas-fir, ponderosa pine and bunchgrass prairie, and more infrequent and higher severity fires on moister sites, which supported more dense conifer stands. The resulting landscape contained many patches of various sizes with varying vegetation structure and composition. With the cessation of fires, trees have encroached all vegetation communities, resulting in changes in species composition and structure most prominent in the oak and prairie types. This conversion has included the replacement of oak and pine dominated savanna and woodlands to Douglas-fir woodlands and forests. Dense oak woodlands have replaced savannas on poorer soils. With increasing canopy cover, plant understories have shifted to more shade tolerant species. Native bunchgrass and forb communities on remnant prairies and rocky terrain have been replaced largely with Eurasian grasses. Logging in the early to mid 1900s removed many large Douglas fir, reducing structural diversity in conifer forest types on the most productive sites, with younger second growth stands now occurring. With the above vegetation changes, the risk of more extreme fire behavior and undesirable effects has increased.

Desired future conditions (DFC) for the ownership include a mosaic of native vegetation communities, using reference era conditions as a general template. Some former oak sites, now conifer dominated may remain converted. DFC will feature open oak and pine woodlands on 73 acres and 17% of total land, mature conifer stands with high levels of structural diversity on moist sites on 210 acres (50%), a mix of the above species in edge interface types on 49 acres (12%), and prairies dominated by native perennial bunchgrass and forbs on 22 acres (5%). Remaining acreage includes riparian areas, developed land and water. To achieve this vision, active restoration including thinning, prescribed fire, snag and down wood creation, control of invasive weeds and re-establishment of native vegetation are recommended. Three phases are designed to guide implementation of prescriptions. Phase 1, scheduled for completion in a 10 year management window, includes 113 acres of various restoration treatments. Treatments are prioritized where oaks are most threatened by Douglas-fir and access is least limiting.

Chapter 3. Alternatives Including Proposed Action

Alternative A. No-Action

Under the No-Action alternative, habitats on the ownership would remain unmanaged. As a result, natural processes already influenced by a human altered environment would continue. There would be no effort to address priority stewardship actions.

The decline of oak habitat has been accelerated by human activities including oak removal, urban development, fire suppression, timber conversion, and cattle grazing. Many of these practices result in conifer encroachment that threatens remaining oak habitat. Fire suppression is a major factor contributing to the decline of native oaks. Natural fires and those intentionally set by Native Americans historically played a significant role in oak forest ecology, especially natural oak regeneration. Frequent low-intensity fires curbed conifer encroachment, controlled stand density, and initiated oak sprouting. The No-Action alternative will likely accelerate the decline of native oak habitat.

Native oak habitat requires active management. Adjacent property owners have recognized the need to mitigate for land practices that have left oak habitats in a degraded condition. Lands adjoining USFWS property at Little White Salmon NFH, administered by the Columbia Land Trust, are being actively managed with the goal of restoring and enhancing oak habitat. Recognizing that habitats don't necessarily follow property boundaries, it is imperative that the USFWS become an active partner in the landscape level restoration of native oak habitats in the Little White Salmon River watershed. The No-Action alternative does not take advantage of the partnership potential to work with neighboring landowners to restore valuable oak habitat for the benefit of a variety of native plant, fish, and wildlife species.

Specific to restoration of native oak habitat, the following consequences will result from the No-Action alternative:

1. The effect of eliminating or reducing fire frequency from oak woodlands varies by stand. In open-canopy savanna, the lack of fire leads to increased density of shrubs and oaks and to a denser oak woodland. In denser oak woodlands, the lack of fire leads to increases in shrubs and other tree species at the expense of oak.

2. Failure to thin even-aged oak stands and failure to open the canopy above overshaded oak sprouts may result in dense, even-aged stands of little diversity. These stands typically support fewer kinds of wildlife.

3. Failure to remove encroaching conifers will result in conifer-dominated stands with no oak regeneration. As a result, native oak habitat eventually will be lost.

4. A lack of diverse, larger diameter trees will result in fewer cavities that limit the number of cavity-nesting animals. Stand domination by trees with smaller crowns and less canopy may limit acorn production, ultimately affecting the numbers of individuals and species that use oak woodland.

5. Failure to create snags will result in lost wood and leaf litter that is essential for wildlife nesting, denning, feeding and cover habitat.

6. Failure to retain some oak/conifer associations may limit the number of species of breeding birds present.

Tier 1 actions would not be addressed under the No-Action alternative. The actions address issues that involve safety, protection of hatchery operations and structures. These include treating the laminated root rot area along the Cook-Underwood Road, replacing the culvert on the Old Hatchery Access Road, and evaluating stabilization options to reduce potential slope failure along the Hatchery Road. Failure to address Tier 1 actions resulting from the No-Action alternative increases the likelihood of catastrophic slope failure and subsequent bank erosion. This is of special concern adjacent to aquatic areas, public roadways, hatchery infrastructure, and at the government housing area.

Laminated root rot is the most notable disease on hatchery lands and several pockets have been identified. This disease is killing infected Douglas fir trees in these areas. Spread of this disease is typically slow (1-2' diameter increase/year) and is highly beneficial to some wildlife by creating snags, down wood, while increasing understory plant and bryophyte and lichen diversity. However, one pocket is adjacent to the Cook-Underwood road and utility lines. Weakened and dead trees are likely to fall across this road at some point.

Noxious weed problems are concentrated mainly along roadsides and Drano Lake. Twelve state-listed noxious weeds were identified. Most of these species are associated with disturbed areas with partial to full sunlight. Most noxious weed populations on the ownership are comprised of small and scattered populations (typically less than 10 plants), mostly along roadsides. They do not pose a particularly high risk in dense forests. Control would only be a high priority if forest restoration treatments are implemented, creating favorable environments for some of these species. Giant hogweed (*Heracleum mantegazzianum*), yellow iris (*Iris pseudacorus*) and Eurasian watermilfoil *(Myriophyllum spicatum)* pose a major threat to riparian/aquatic habitats if left uncontrolled. There are other identified invasive plant species on the ownership that are likely to increase with tree thinning proposed in Alternative B below. Many of these are invasive grasses that often dominate vegetation cover in oak and open habitats

Alternative B. Restore Native Forest and Grassland Habitat

The preferred alternative recognizes that habitats on the ownership have significant conservation value, though are degraded and require active management to achieve the management goals described below:

1. **Protect water resources.**
   - Manage upland habitats to provide clean, cold water for hatchery operations and maintain current water quality in terms of temperature, dissolved oxygen and turbidity.

2. **Restore and maintain a mosaic of site appropriate vegetation conditions.** These DFCs should balance habitat needs of focal and other rare, declining, and listed wildlife

species, and use pre-European settlement conditions as a template with modifications that reflect other values.

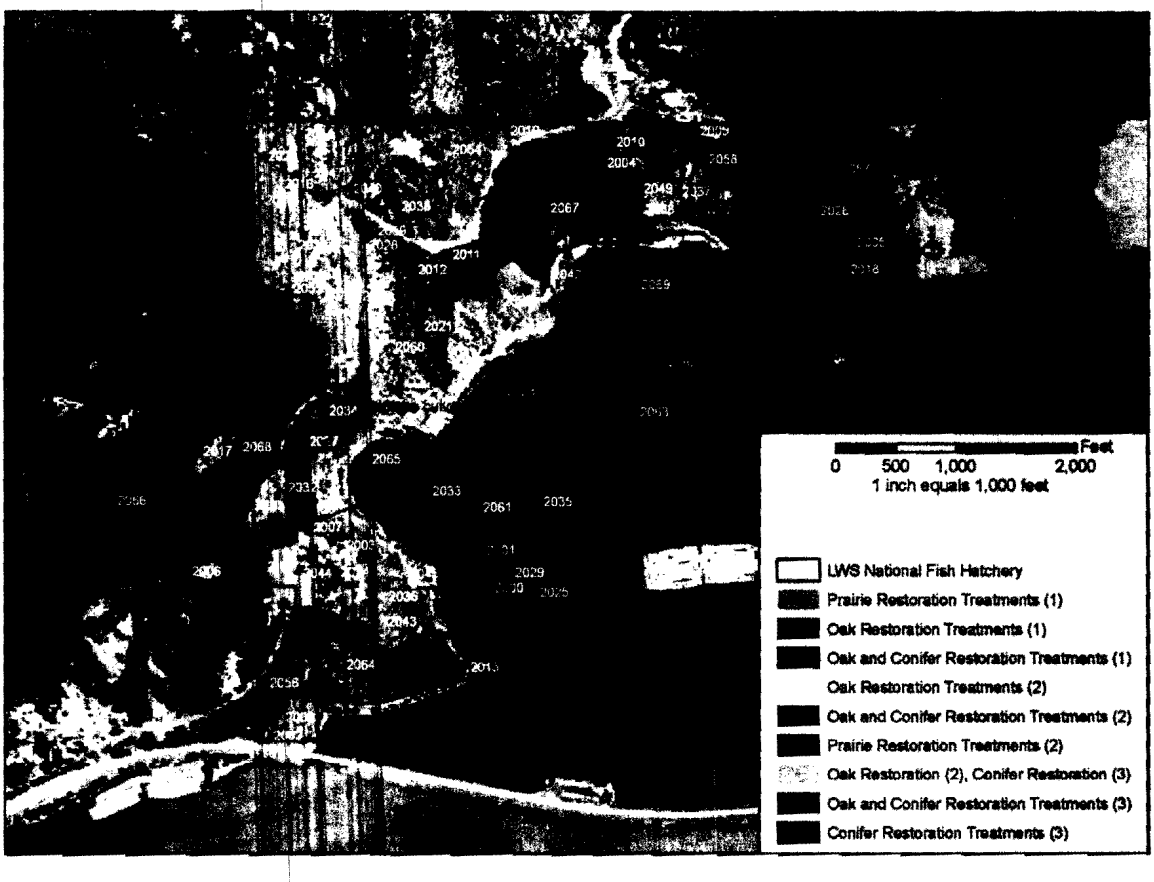
- Enhance and maintain a range of oak habitat types including open to more closed woodlands and edge where Douglas-fir and oak interface, using DFC as guidelines.
- Restore and maintain mature Douglas-fir and mixed hardwood-Douglas fir forest types, using DFC as guidelines.
- Identify and implement stewardship actions to protect old tree structure in all types.
- Restore prairies where operationally feasible, using DFC as guidelines.
- Control noxious weeds with the targeted use of herbicides, and prevent new invasions using a combination of herbicides and mechanical control.

3. **Maintain/Enhance fragile and rare habitat types.**
    - Protect talus, riparian areas, remnant bunchgrass and moss/lichen communities on rock outcrops and springs and design stewardship activities to enhance as necessary.

4. **Collaborate with neighboring landowners to enhance landscape level habitat function.**
    - Seek partnerships with the Columbia Land Trust, and other neighboring private and public landowners to conserve, restore, and monitor lands in the vicinity.
    - Coordinate stewardship actions to better achieve habitat management goals and objectives.

5. **Manage roads to reduce adverse impacts to fish and wildlife populations and protect safety.**
    - Identify and repair/replace damaged or inadequate culverts.
    - Identify and repair roads and uplands as needed to minimize surface erosion and risk of slope failure.
    - Control roadside noxious weeds with the use of herbicides.

6. **Use the ownership as a model to demonstrate cutting edge restoration strategies, and techniques, and as a research site for public and private agencies to evaluate active, passive, and minimal stewardship approaches.**
    - Use permanently located inventory plots to monitor ecosystem change.
    - Encourage research and monitoring to assess a range of innovative habitat restoration strategies.
    - Facilitate tours and other outreach to natural resource professionals working in similar habitat types, to demonstrate a range of stewardship options and promote landscape-conservation of oak and associated communities.



Treatment Phases [(1) = Phase 1]

Alternative C. Native Habitat Restoration Without the Use of Herbicides

Under the No Herbicide alternative only prescribed fire, mechanical, and hand removal methods would be used to treat and remove invasive plant species. Ironically, many of the recommended forest restoration treatments necessary to achieve DFC (e.g. tree thinning and removal of encroaching conifer in oak habitats) create favorable conditions for the spread of noxious weed species. As a result, the effective control of noxious weeds is a critical component of the overall habitat restoration plan for the ownership.

This alternative could be problematic and not achieve the DFC that includes an absence of non-native and invasive weed species. This alternative may also further enhance the establishment of weed populations post treatment due to site disturbance that creates ideal pioneer weed conditions. Specific to the control on non-native and noxious weeds, the following must be considered under the No Herbicide alternative:

1. Pulling and mowing of weed species can be effective to spot reduce annual plant and seed production and control the spread of the invasive plants. Unfortunately soil disturbance, including fire, often creates ideal conditions for weed seed germination. The opening of the forest canopy increases sunlight penetration. Soil disturbance associated

with the mowing, hand pulling and mechanical control of noxious weeds and encroaching conifers will likely lead to a further spread of weed seeds into the soils of the oak woodland and other unique micro habitats on the ownership. Hand pulling annual grasses and forbs, in particular, will heavily disturb the soil and expose new weed seeds.

2. The inoculation of these areas with a new plant species is counter to the intent of recommended habitat restoration treatments. This change in non-native plant species abundance has the potential to increase fire risks due to high flammability and cover of annual grasses, reducing native wildlife species compatibility and utility of these habitats.
3. Invasive and non-native plant species tend to be pioneer species that use disturbed and fire treated soils to germinate. These fire treated sites could become heavily invaded by invasive weed species if their control with the use of herbicides is not achieved prior to prescribed burning. The desired native species include bunchgrasses that require years to become established. These perennial species cannot develop on sites dominated by these more competitive early establishing annuals.
4. Much of the habitat on this project area is not accessible to allow for the mechanical treatment of invasive species. Steep slopes and lack of access for control make prescribed burning for noxious weed management impractical.
5. Use of fire alone to control invasive weeds is likely to be ineffective because the necessary timing to control annual grasses (spring before germination) may create high risk of fire escape, and is not compatible with ecology of native desirable plants and insects.
6. Some accessible habitats contain both native and non-native weed species that have competing restoration needs. As a result, mowing of invasive weed species prior to seed production may negatively impact desirable native species. By contrast, herbicide spot treatment using a back pack sprayer lends itself well for use in inaccessible habitats and to avoid negatively impacting desirable native species.
7. The seed bank created by weed species may be extensive and spread of annual grasses to new areas is rapid. The chronic reoccurrence of these plants requiring additional labor-intensive treatments when using mechanical or hand removal techniques makes a non-herbicide alternative an expensive option. Increased control costs under this alternative would divert funding from future work necessary to achieve DFC. Although more than one herbicide treatment may be necessary to achieve effective control of noxious weeds, the weed seed bank legacy would be greatly reduced leading to a more rapid and effective achievement of DFC.
8. The terrestrial application of herbicides allows for increased control of overspray and drift. This assures that herbicides are not introduced into surface water areas and the water supply of the Little White Salmon NFH.
9. Mechanical methods of control that include hand removal (divers manually pull weeds) to treat aquatic invasive plants have some potential to contain but not control or eliminate these plant species. Fragmentation and re-deposition of individual plants can further spread aquatic invasive species (e.g. Eurasian watermilfoil). Left untreated the aquatic and riparian area non-native weeds are the greatest threat to habitat restoration and achievement of DFC. The use of herbicides to control aquatic noxious weeds would be limited in scope and coordinated with the Washington Department of Ecology and Portland State University Aquatic Bioinvasions Research and Policy Institute.

The use of herbicides will be most useful in the early implementation of habitat restoration activities and most likely used infrequently in the future once initial control of noxious weeds is achieved. The tenacity associated with non-native noxious weeds makes the achievement of DFC very difficult, if not impossible without the use of herbicides.

Chapter 4. Environmental Consequences

This section assesses the environmental impacts expected to occur from implementation of Alternatives A, B, and C as described in Chapter 3.

Alternative A. No-Action

Fire

The complexity of topography, past fire regimes, weather, and vegetation on the ownership influence the potential for serious fire. Moist forest types on the ownership are considered similar to Westside stands in the importance of fuels in fire risk analysis. On these moist sites, significant fires are unlikely except under the most extreme weather conditions. In contrast to moist forest types, woodlands, and open oak and grass dominated sites should be considered more like dry eastside types where fuels more strongly influence fire behavior and effects. Furthermore, dry east winds, and often steep topography combine to increase threats of undesirable fire behavior and effects from fires, while increasing control costs.

Future conditions will increase the risk of more moderate to severe fires which if uncontrolled could reduce conifer forest and oak woodland habitats to early seral stages. Though it is still unclear what changes will occur, warmer and drier conditions are predicted. Drought and increased temperatures would likely increase insect-disease mortality leading to increased fuels and risk of hotter, more intense fires. The above scenario would reduce large tree structure and increase shrub cover and young trees and may lead to increased slope failures, and erosion. Left unaltered, the unmanaged forest and grasslands associated with the ownership have an increased risk for higher intensity and high severity fires.

Invasive Weeds

The invasion of non-native plants that includes noxious and invasive weeds has emerged as one of the greatest threats to biological diversity in Pacific Northwest forests. The biology of non-native plants often allows them to out compete natives. Many of these species have no natural biological controls because they have not evolved in these plant communities. They also have adaptations that often allow them to out compete natives, particularly in disturbed environments. Many of these weeds threaten biological diversity as they replace diverse understory plant communities. Left uncontrolled, both noxious and invasive weeds are a management concern due to their negative economic and environmental impact.

Wildlife Species/Habitat Trends

The following is a summary of noted and suspected wildlife/habitat relationship trends and generalizations on the ownership under the No-Action alternative:

- Species associated with late-successional mixed conifer conditions including interior forest (e.g. Northern spotted owl, northern goshawk (*Accipiter gentilis*) have experienced

a reduction in habitat due to timber harvests on the ownership early in the 20th century. Harvests have continued on adjacent lands and throughout the landscape in more recent times, which has impacted habitat for mature conifer forest species, especially those with large home ranges and requiring large amounts of dead wood. Some older conifer forest structure has developed since initial logging and these small stands are connected with extensive USFS lands to the west and northwest that are being managed for late-successional forest.

- Species requiring open habitats (e.g. bluebirds, nighthawks) are likely to have reduced habitat since Euro-settlement with conditions continuing to decline as open areas close in with tree cover.

- Species requiring large snags (Douglas-fir/pileated woodpecker (*Dryocopus pileatus*), ponderosa pine/Lewis's woodpecker (*Melanerpes lewis*)) and hollow live trees (Vaux's swift (*Chaetura vauxi*), various bats) have experienced reduced habitat, though trends are toward improving habitat as trees mature and snags are naturally created.

- Down wood resources in conifer types are currently below optimal levels for species inhabiting wet conifer forest types.

- Species utilizing open oak and pine habitats (slender-billed white-breasted nuthatch (*Sitta carolinensis aculeate*), Lewis's woodpecker) have experienced reduced habitat since reference conditions

- Species utilizing more closed younger oak woodlands (Nashville warbler (*Vermivora ruficapilla*)), likely have gained habitat.

- Acorn mast production has likely been reduced in areas where Douglas-fir has replaced oaks, to the detriment of species utilizing mast (band-tailed pigeons (*Columba fasciata*), slender-billed white-breasted nuthatch, and deer).

- Species adapted to native bunchgrass and forb communities, including many indigenous invertebrates in addition to mammals, birds and reptiles, have reduced habitat.

Species that prefer oak/conifer ecotones (Western gray squirrel (*Sciurus griseus*)) likely have more suitable habitat with widespread encroachment of Douglas-fir over the last 100+ years, though we suspect some if not many of the large hollow oaks that offer excellent maternity nest habitat this species are more rare. Since much of this habitat is successional, these mixed oak/fir stands are transitional with major reductions predicted as oaks succumb to conifer overtopping.

Alternative B. Restore Native Forest and Grassland Habitat

Management pathways and recommended plans and prescriptions to achieve DFC are arranged below with divisions based on fire frequency (*Frequent* vs. *Infrequent Fire*) with prescriptions detailed for specific vegetation communities.

Frequent Fire Vegetation Community DFC for *Bunchgrass Prairie, Oak Mosaic, and Woodland Types* were historically shaped and maintained under the influence of frequent low to moderate intensity fires. Such events favored oak and pine dominance and bunchgrass/forb communities. Future stewardship of these lands will require fire and other treatments to achieve these conditions. This project requires a high degree of active management in these areas to push vegetation structure toward more open conditions and native plant dominance. Such strategies employ thinning, prescribed burning, herbicides and native plant seeding. All prescribed burning activities will be coordinated with the USFWS Division of Refuges, Branch of Fire Management.

Within these types on the ownership, tree densities far exceed desired levels and must be reduced by approximately 20-90%. Across these types, various prescriptions including mechanical and hand cutting of excess trees, pile burning, and machine removal of tree biomass, and a regular schedule of prescribed burning are needed to maintain conditions. Burning alone is not a viable option to reduce tree stocking given smoke management issues, and risk associated with the intensity of fire required to kill and consume this quantity of trees on steep slopes. Thinning provides more control of tree selection and patterns of spacing than fire. Burning alone under prescription windows likely allowed would not result in the levels of mortality to achieve desired tree density. A passive strategy alone will not achieve the desired mosaic of tree structure and will result in higher tree cover, loss of additional remnant open habitat understory species, and increase the risk of out of prescription fires and associated undesirable effects.

To achieve DFC for plant composition, repeat herbicide application, prescribed fire native seeding are recommended actions. There is little evidence that native bunchgrasses can re-establish dominance on invasive grass sites without the above restoration treatments. Because many of the invasive plant species have competitive advantages in disturbed environments and due to restrictions around modern fire use, burning alone is likely to be an ineffective strategy to revert degraded open type plant communities back to desired native composition. For example, fire to control annual grasses must be hot enough to consume seed bed, which limits burn windows to periods where risk of escape is higher. Fire will be used for the following applications: 1- To prepare seed beds in areas to be seeded. 2- To reduce slash from thinning operations, 3- As long-term maintenance tool primarily to control tree stocking.

After primary restoration treatments have been completed, these areas will enter an indefinite maintenance phase, featuring periodic prescribed burning, on a 10-20 year interval to control tree ingrowth and favor bunchgrass communities. Spot herbicide treatments and manual tree cutting may also be employed on an as needed basis, with these treatments used where fire is unfeasible and to deal with noxious weed issues. All herbicide treatments will adhere to label directions and follow protocols established in approved USFWS pesticide use proposals.

Proposed management strategies for each DFC type are described below:

Bunchgrass Prairie- Bunchgrass prairie restoration and enhancement will be completed using a range of treatments which may include manual or mechanical cutting/piling and burning and snagging of excess trees, repeat herbicide application, prescribed burning and seeding treatments. Plant community restoration techniques will vary with initial conditions, slope and accessibility

being determining factors. Bunchgrass prairie DFCs on the ownership vary widely in terms of tree cover and degree of remnant bunchgrass cover and quality.

Treatments to reduce tree cover will vary with accessibility and slope. In accessible areas, harvester/forwarder will be used to remove whole trees. Use of a harvester is an efficient, safe and sensitive approach to tree felling and processing. Use of a forwarder reduces the need for extensive logging roads, allows for removal of slash and greater use of pre-existing impacted areas (e.g. old fields) for landings. On steep slopes trees will be cut, piled and burned. Slash piles are excellent site prepped areas for native plant re-establishment and should be seeded within a few weeks after burning. On excessively steep slopes, treatments may be limited to girdling and lop and scattering or areas will remain untreated. Girdling at least one Douglas-fir >12" DBH/acre is recommended to provide snags for kestrels, bluebirds and other open habitat cavity nesting birds.

Areas dominated by invasive annual grasses will be treated primarily with repeat herbicide application followed by native grass seeding. Broadcast burning, though a desirable treatment will not occur on most of these sites due to steeps slopes and lack of access for control. These highly degraded prairies will require the greatest effort and expense to restore. Some of these annual grass dominated sites on excessively steep slopes may not be treated because of excessive cost and concern for erosion during vegetation control phase. Various combinations of such treatments are highly recommended to test different methods on the range of sites, while limiting potential unintended consequences over large project areas. At least three consecutive herbicide applications will be required before seeding to exhaust the weed seed bank. Failure to complete weed control treatments is a major cause of many failed prairie projects. Following the above treatments, broadcast seeding of a mix of native mostly perennial grasses will occur. Some native forbs can be seeded with grasses, particularly those slow to establish such as arrowleaf balsamroot, lomatium and buckwheat. In areas where forb weeds are likely to need additional control with herbicides after seeding, grasses should be established first to allow use of broad leaf specific herbicide.

Areas still containing strong native bunchgrass and forb cover will not need herbicide treatments. Stewardship in these areas may include tree density reduction and periodic burning (5-20 years) if possible. In many areas, remnant native bunchgrass and forbs are interspersed with invasive grasses. These are difficult sites to fully restore because natives reduce herbicide options. Various methods can be employed based on specific conditions. Burning can be used if timed correctly, to reduce annual grasses around established bunchgrasses, or a very low rate of glyphosate may be applied in the spring to target young germinants. Certain grass specific herbicides can be applied over established bunchgrasses to control invasive annual grass. In most cases, weeds will persist along with natives even under optimal restoration conditions and treatments. Native bunchgrass communities, under most circumstances, are effective at maintaining dominance once well established. The goal of treatments is not to eliminate invasive grasses, but to re-establish native plant community dominance.

Different restoration treatments methods can be utilized in the non-native perennial grass fields along the Cook-Underwood Road due to easy and accessible terrain. Herbicides will be applied these fields. However prescribed burning should follow this treatment to reduce the thick thatch

that will result. Following burning, 1-2 additional years of spray treatments are needed to exhaust weed seed banks. Herbicides such as milestone, that are effective against tough well-established biennial and perennial weedy forbs can be used. Native seeds can be no-till drilled on these fields, resulting in higher germination.

The above management pathway will likely result in a mixed success and a varied timeframe in meeting DFC in Bunchgrass Prairie Types. On most sites, tree cover objectives can be met and maintained with the above treatments within a year. Desired understory composition and cover will require major planning and financial effort if pursued at meaningful scales. Eurasian weeds now dominant much of this these area, are well-entrenched and respond positively to some of the disturbance that also favors natives. At least 10 years are likely required to re-establish bunchgrass/forb dominance on heavily invaded sites. Weeds are likely to always persist on these sites but with maintenance can be kept at background cover levels.

Oak Mosaic- The DFC in this type include creating patchy landscape of open to partially closed oak habitats with tree cover ranging from 10-60%. Both passive and fire only type treatments are not likely to achieve these targets due to the same reasons described above. These areas will be restored by thinning and prescribed burning of piles to control tree density and the techniques outlined for Bunchgrass Prairies above for understory work. Use of prescribed fire beyond winter pile burning will likely be limited to areas where there is good road access for control and natural boundaries to contain fire. These areas may include the slopes just north of Drano Lake, stands along the utility road off Chenowith Road and those areas between the Cook-Underwood Road, Main Hatchery Road and Indian Road.

The Little White Salmon National Fish Hatchery Habitat Stewardship Plan (Plan) details specific treatments planned for each vegetation polygon. The following guidelines for will be used to guide tree selection and layout during thinning:

1. Thinning to very low density (down to 10% canopy cover) will occur in areas with scattered remnant savanna oaks surrounded by dense younger oak cohorts. Old remnant savanna form oaks will the favored. Where highly decadent oaks occur, retain scattered clumps of younger trees as replacement cohorts.

2. Canopy cover will diffuse from upper limit to lower limits along Oak Mosaic type edge with Fir-Hardwood Hardwood Forest and Fir/Oak Woodland type.

3. Retain all old growth trees.

4. Favor oaks over Douglas-fir and ponderosa pine over oak and fir.

5. Oaks will be thinned to retain both clumps and individual trees. Prioritize retention of large full-crowned individual oaks as scattered trees and dense more sparse crowned trees in clumps.

The following operational considerations will guide implementation of thinning and understory restoration:

- Where accessible and on slopes up to 30% thinning will be performed with a harvester-forwarder.

- Designated trees on steeper slopes will be cut/piled and burned.

- 1-2 Douglas-fir snags/acre will be created where available by girdling or topping.

- Minimize equipment traffic and burn piles in areas with remnant bunchgrass/forb populations.

- Retain all snags and down wood. An additional 1-2 wood piles per acre will be retained where down wood falls below DFC.

- Extensive understory restoration similar to that described for degraded bunchgrass prairie areas is planned in portions of vegetation polygons that are currently sparsely treed. In more dense wooded areas, suppressed understories are often more open and weed free. Prescribed fire (where feasible) is high recommended followed by seeding immediately after thinning, to rapidly establish native dominance of more open habitat species.

- In areas where wooded understories contain well-established poison, herbicide treatment followed by native grass seeding should be considered. This species is likely to quickly dominate the understory and while preferable to invasive species, the over expansion of this species might reduce plant diversity. Poison oak can be controlled using glyphosate or successive prescribed burns, but invasion of invasive weeds might preclude such action.

- Cut oaks will stump aggressively re-sprout and this re-growth should be controlled using glyphosate during subsequent understory restoration work. Approximately 5-10% of these sprouting oaks will be retained in both a scattered to clumpy distribution to enhance new cohort development.

Oak Woodland- The Plan details specific treatments planned for each vegetation polygon. These areas will be restored using thinning to control tree density and prescribed burning on some sites to achieve understory plant community objectives. The guidelines described for Oak Mosaic types apply to Oak Woodlands with several modifications. For example, tree cover will be maintained at higher overall levels (40-80%). In addition, understory plant community DFC allow for higher shrub cover and more woodland type species composition.

Fir/Oak Woodland- The Plan details specific treatments planned for each vegetation polygon. Desired future conditions in this type will be achieved with thinning, prescribed fire, herbicide application and native grass and forb seeding. Thinning treatments should reduce tree canopy to within a range of 50-80%. The following guidelines for tree selection will be used:

1. Prescriptions focus on thinning most or all fir in areas where viable oak or pines maintain a 40' or less spacing. Viable oak and pine are defined as those with a minimum of 20%

and 30% live canopy, respectively. Less live crown is acceptable if on hollow remnant savanna form oak. In these areas retain only the largest Douglas-fir, particularly those with high levels of defect. Basal area of retained fir should not exceed 10% of post thinning total stocking in these oak dominated areas.

2. Outside these oak and pine concentrations, thinning should focus on removal of Douglas-fir within the drip line and those shading the live portion of the crown of viable oaks and pines. This distance will vary with fir and tree height ratio of live crown on the oak with a range of 20-60'. Partial shading by fir is acceptable if these trees are desired for retention to meet grey squirrel requirements, or if fir is desirable (>20"DBH and deformed structure) for retention. Where possible, such fir should be concentrated on the north side of oaks to minimize shading.

3. Large trees and "character trees"; those with heartrot and/or deformed bole and crown structure, of all species are highly desirable and should be maintained.

4. Patches of oaks with touching or overlapping crowns should be thinned to 60-80% canopy cover, leaving a clumpy structure and largest, fullest crowned oaks and those with hollow boles.

5. In stands with identified Western grey squirrel nests, canopy connectivity should be maintained between nest trees and large hollow oaks. At least two lines, extending 100-200 feet from nest tree, of trees with crowns touching or overlapping should be maintained (two crown widths wide) to provide escape pathways for squirrels.

6. Canopy cover will diffuse from upper limit to lower limits along edge with more dense Fir-Hardwood.

The following operational considerations will guide implementation:

- Where accessible and on slopes up to 30% thinning will be performed with a harvester-forwarder.

- Designated trees on steeper slopes will be cut/piled and burned.

- Equipment traffic and burn piles will be minimized in areas with remnant bunchgrass/forb and other sensitive and desirable plant populations, and large snags and down wood.

- Douglas-fir snags should be increased where below DFC. A range of 1-5 snags should be created by combination of limbing, and topping and girdling.

- Down wood and small diameter wood piles should be retained where this structural feature falls below 2 tons per acre.

Fire Insulated Vegetation Community on the ownership including *Fir/Hardwood Forest* will likely continue to develop without the strong influence of fire. In contrast to prairie and oak types, DFC for these areas can be achieved and maintained with limited management intervention and a more passive approach.

Fir/Hardwood Forest- A variety of DFC and custom management approaches are suitable for this type given the range of initial conditions. Stand structure dominated by young Douglas-fir dominant forest in the Biomass Accumulation/Competitive Exclusion stage are on a protracted processes toward development of DFC. These stands will progress toward more structurally diverse and mature conditions without management. However, silvicultural treatments can accelerate some of the key desirable features and processes by increasing snags, down wood and large tree development, gaps, stimulating crown complexity, and understory plant diversity. Such activities will benefit at least 16 of the species identified within the Plan as being State, Federal, and priority habitat listed wildlife species, and other wildlife located on the Little White Salmon NFH.

The recommended treatments described below for these young stands address specific limiting habitat factors. Most of the acreage in this condition is inaccessible to machines. Treatments on these slopes in Stands 2030, 2047, 2066, 2067 and parts of 2068 include the following:

1. Creation of small canopy gaps (variable size and up to 1/5 acre, 1-2 gaps / 5 acres) where dense homogenous Douglas-fir prevails. Trees in gaps will be felled, snag topped, and girdled and 1-5 deformed dominant/co-dominant fir left per gap.

2. Thinning by snag topping, girdling and drop/leaving of individual trees within dense homogenous fir areas in groups up to 1/5 acre (5 groups / 10 acre) in size leaving largest trees at 60-100 ft2/acre retention level.

3. Release viable oaks according to fir/oak woodland prescription for widely scattered trees.

4. Follow guidelines in the Plan for creating snags and down wood.

Machine accessible areas young conifer stands of this DFC type are limited to Stands 2005, 2043, 2057, and 2068 and should include the following:

1. Variable density thinning to create areas of varied tree density with reductions of basal area from 10-30% in treatment groups up to 1/5 acre in size. Thinning is primarily from below with retention of small fuller crowned trees to retain vertical structure.

2. Creation of small canopy gaps (variable size and up to 1/5 acre, 1-2 gaps/5 acres) where dense homogenous Douglas-fir prevails. Several dominant sized fir will be retained for snag creation. In some gaps 1-2 deformed dominant/co-dominant fir can be left per gap.

3. Release of viable oaks by removing encroaching fir according to fir/oak woodland prescription for widely scattered trees.

4. Create snags and down wood creation to meet DFC.

Maple dominated areas in this DFC type include Stands 2011, 2027 and 2028. Passive management is recommended in these areas with the exception of release of viable oak by snagging encroaching fir and maple.

Stands containing moderate to older aged Douglas-fir dominant forest in the Maturation Stage have begun to develop some of features associated with late-successional forest. These include Stands 2038, 2054, 2060, 2062, and 2069. Mostly passive restoration of these stands is appropriate. However, a prominent limiting structural feature in most of these stands is the lack of snags and down. While creation of these features will occur over time with root rot, wind and other disturbance, creation of snags and down wood will benefit at least 17 of the State, Federal, and priority habitat listed species in the Plan and many other unlisted dead wood dependent wildlife.

The following recommended treatments in Maturation Stage stands address specific limiting habitat factors outlined in the Plan.

1. Follow guidelines in the Plan for creating snags and down wood.

In all fire insulated vegetation polygons maintenance treatments will be limited to spot herbicide use or hand pulling or cutting to control noxious weeds, and periodic snag creation to move dead wood conditions toward DFC. Monitoring will indicate progress toward these long-term goals.

Alternative C. Native Habitat Restoration Without the Use of Herbicides.

The use of herbicides as a habitat restoration treatment is closely aligned with the control non-native noxious weeds and grasses. Both "noxious" and "invasive" weeds were considered in the initial planning effort, and are of great significance when attempting to restore native grassland habitat. Invasive weeds are a group of non-native plants that have a high propensity to colonize and replace native vegetation. Noxious weeds are "invasive" and have been designated as, "noxious" by law due to their negative economic and environmental impacts, and ability to rapidly spread. Both noxious and invasive weeds are a management concern.

An assessment of both noxious and invasive weeds uses the State of Washington noxious weed list. This list assigns species to one of the following three classes:

Class A Weeds: Non-native plants which occur in the state in small enough infestations to make eradication possible; or is not known to occur, but its presence in neighboring states make future occurrence in Washington imminent. Eradication is required by law.

Class B Weeds: Non-native plants which are regionally abundant, but which may have limited distribution in some counties. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority.

Class C Weeds: Non-native plants that are priority weeds designated by the State Weed Board as a target weed species. Long term programs of suppression and control are a county option, depending on local threats and the feasibility of control.

Forest and rare plant inventories, other site assessment visits, and consultation with hatchery staff lead to the compilation of a list of state-listed noxious weeds on the ownership (*see Table 1*). Noxious weed problems are concentrated mainly along roadsides and Drano Lake. Twelve state-listed noxious weeds were identified. Most of these species are associated with disturbed areas with partial to full sunlight. Most noxious weed populations on the ownership are comprised of small and scattered populations (typically less than 10 plants), mostly along roadsides. They do not pose a particularly high risk in dense forests. Nevertheless, control should be a high priority because forest restoration treatments will create favorable environments for some of these species. Giant hogweed (*Heracleum mantegazzianum*), yellow iris (*Iris pseudacorus*) and Eurasian watermilfoil *(Myriophyllum spicatum)* pose a major threat to riparian/aquatic habitats if left uncontrolled.

Table 1. State Listed Noxious Weeds

Common Name:	Scientific Name:	Weed Class:	Location:	Status:
Scot's broom	*Cytisus scoparius*	State-B	Stand 2019, Roadside Cook-Underwood (2059)	1
Knapweed	*Centaurea Spp.*	State-B	Roadside Cook-Underwood (2059)	1
Oxeye daisy	*Leucanthemum vulgare*	State-B	Roadside Cook-Underwood (2059), 2045, 2052	1
Bull thistle	*Cirsium vulgare*	State-C	Roadside Cook-Underwood	1
Canada thistle	*Cirsium arvense*	State-C	Roadside Cook-Underwood	1
Herb Robert	*Geranium robertianum*	State-C	Roadside Cook-Underwood	1
Common St. Johnswort	*Hypericum perforatum*	State-C	Along Hatchery Road, 2052	1
Sulfur cinquefoil	*Potentilla recta*	State-B	Along Hatchery Road, 2052	1
Evergreen/Armenian blackberry	*Rubus laciniatus /armeniacus*	State-C	Drano Lakeside	1
Eurasian watermilfoil	*Myriophyllum spicatum*	State-B	Drano Lake	2
Yellow Iris	*Iris pseudacorus*	State-C	Drano Lake	2
Giant Hogweed	Heracleum mantegazzianum	State-A	Drano Lake	1

Status: 1 = Very small and localized population, 2 = Moderate populations and spread rate, 3 = Extensive within located areas and rapidly spreading

Though not state-listed, there are several other identified invasive plant species on the ownership worth noting because they are likely to increase with tree thinning. Control of these species may be necessary to achieve restoration objectives. Hedgehog dogtail (*Cynosurus echinatus*) and ripgut brome (*Bromos rigidus*) are annual invasive grasses that are found in open habitats and woodland edges. Dogtail is the most prevalent invasive grass on the ownership and often dominates vegetation cover in open oak habitats. Ripgut brome is more common in open areas with deeper soils and roadsides. Wild oats (*Avena fatua*) is another invasive annual grass scattered throughout the ownership, mostly in the fields along Cook-Underwood Road. The other somewhat common invasive grass in oak and open habitats is bulbous bluegrass (*Poa bulbosa*), a perennial found in slightly better soils than sites dominated by dogtail. Spreading hedgeparsely (*Torilis arvensis*) is commonly found in disturbed woodlands. Wall lettuce (*Lactuca muralis*) is infrequently found in disturbed forest types but has potential to be quite invasive after thinning. Wild carrot (*Daucus carota*) is found in open grassy areas throughout the ownership.

Though not currently found on the ownership, the following species are described because they are extremely invasive and represent future threats to plant community diversity. Garlic mustard (*Alliaria petiolata*), shining geranium (*Geranium lucidum*), false brome (*Brachypodium sylvaticum*) and knotweed (*Polygonum* spp.) are increasingly found in woodland understories and riparian areas. Their invasion in relatively undisturbed and shady forest understories distinguishes them from many other weeds. Common hound's-tongue *Cynoglossum officinale,* a state B-listed species, is found in open to partially shaded habitats. Several of the above species including garlic mustard, false brome, knotweed, and common hound's-tongue have been found in the Columbia Gorge.

The No Herbicide alternative could achieve a mid range of objectives described in previous alternatives. For example, the removal of encroaching conifers in oak woodland habitats reduces the threat of oak forest stand succession to a more closed canopy conifer stand. While conifer thinning acts as a substitute for wild fire and preserves native oak habitat, increased sunlight penetration creates ideal habitat for an expansion of non-native noxious weeds and grasses. The opening up of the canopy and controlled burning can enhance native grasses and forbs in areas where weed seed sources are not heavy. However, in areas where weeds are already present, this increase in non-native plant species composition threatens the achievement of DFC in oak woodland and grassland habitats. The option of using limited herbicide applications to treat these habitat types following thinning and to restore prairie habitats would accelerate the overall restoration to achieve DFCs. As mentioned in the Bunchgrass Prairie management strategy under Alternative B, failure to complete weed control treatments is a major cause of many failed prairie projects. The no-herbicide alternative may lead to the incomplete control of non-native plants during native grassland restoration efforts.

An analysis of Alternative B that includes the use of herbicides for habitat restoration demonstrates the most effective means to achieve DFCs. It is highly unlikely that the no-herbicide alternative would lead to a significant accomplishment of DFC goals. The indirect consequences of employing some restoration techniques (e.g. conifer thinning) along with the use of non-herbicide control methods has the potential to produce an explosive spread of non-

native and invasive plants. The value of restoration and function of these of these native habitats with only minor invasive plants outweigh any risk involved with the limited and intelligent use of approved herbicides. As a result, the No Herbicide alternative is not recognized as the preferred alternative for achieving the habitat restoration goals of this project.

List of Preparers

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References

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Rombough, C. 2006. The amphibians and reptiles of the Little White Salmon National Fish Hatchery. Report to the U.S. Fish and Wildlife Service. 32 pp + appendices.

Stringer, D. 2009. Little White Salmon Fish Hatchery Habitat Stewardship Plan. Report to the U.S. Fish and Wildlife Service. 132 pp.

Appendix A. Mailing List

Elected Officials
Skamania County Commissioner, District 3

Federal Agencies
USFWS, Ecological Services, Western Washington Fish & Wildlife Office
USFWS, Ecological Services, Oregon State Office
USFWS, National Wildlife Refuge System, Branch of Refuge Biology
USFWS, Fisheries, Columbia River Fisheries Program Office
USFWS, Fisheries, Regional Office
US Forest Service, Columbia River Gorge National Scenic Area

State Agencies
Washington Department of Fish & Wildlife

Groups
Columbia Land Trust
Integrated Resources Management

Public Notices
Skamania County Pioneer, Stevenson, WA
The Enterprise, White Salmon, WA
The Columbian, Vancouver, WA
Underwood, WA Post Office
Little White Salmon NFH Website
Little White Salmon NFH Visitor Center