CHAPTER VI
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VI. RECOMMENDATIONS

Formulation of recommendations is the final step in the six-step process for ecosystem analysis at the watershed scale. The purpose of step six is to bring the results of the previous five steps to conclusion, focusing on management recommendations that are responsive to ecosystem processes identified by the analysis. In some instances, subwatershed-specific recommendations are included.

Monitoring activities, data gaps and analysis limitations are also documented at this point in the process (Regional Ecosystem Office 1995).

This section provides management recommendations that could facilitate either short-term recovery, or long-term restoration within the Desolation watershed. These recommendations do not explicitly consider project feasibility, but rather represent management opportunities. Recommendations are often based on mid-scale analysis and information (such as photo interpreted data). Whether those opportunities can be realized or not will depend on the detailed project planning that will follow this ecosystem analysis.

A. Management Recommendations

General

1. Most soils recommendations are related to roads, mining, harvest activity, and grazing and prescribed fire, with fire having the potential to affect the most acreage. These recommendations are largely incorporated in discussions of vegetation, fire, hydrology, and fisheries concerns. Additional assessment at ground level will be required to determine specific needs that could be associated with silvicultural treatments.

2. As a general rule, concentrate vegetative manipulation, soil amendments, or physical rehabilitation efforts on the more productive areas of deeper soils and gentler slopes for the most cost-efficient and effective results.

3. Maintain/strengthen erosion control efforts aimed at avoiding management activity related soil losses. Examples include control measures on activities such as timber harvest, mining, road use, and restoration activities including road improvements, meadow restoration/enhancement projects, other watershed improvements. Increased surface erosion resulting from the 1996 wildfires should diminish over the next few years as vegetation reestablishes.

4. Apply Best Management Practices for all land-disturbing activities, including administrative actions, operations, and mitigation for short term disturbances. All management plans should include site-specific BMPs for water quality protection.

5. Further refine management indicators for meeting water quality standards and aquatic habitat needs. These indicators should include criteria for water temperature, sediment, bank stability, pools, and large wood. See Clean Water Act discussion which follows. Standard RHCAs may need to be adjusted to achieve specific goals.

6. Develop and implement road system upgrades ("storm-harden") and decommissioning ("store") projects as part of project level planning.

7. Increase involvement of private landowners in watershed management activities. Continue to communicate with the NFJD Watershed Council to discuss issues, concerns, and opportunities, to share monitoring data and coordinate management activities.

8. Results from the forest vegetation and fire management analyses include recommending treatments such as salvage, thinning, and prescribed fire that have the potential to improve or degrade watershed conditions depending on project scope and implementation. Over the short term, some salvage and thinning treatments could result in minor affects to water quality. Over the long term, improved vegetation stand conditions could result in improved water quality by lowering risk of high-intensity fire.

9. Federal Consistency with the Clean Water Act - The Forest should complete a Water Quality Restoration Plan (WQRP) to improve water quality in the Desolation watershed. This ecosystem analysis document serves as background for a WQRP. The following elements are contained in the Final Ecosystem Analysis report and in the supporting Watershed Hydrology report:

   Water quality standards that apply in the Desolation watershed include temperature, sediment, turbidity, habitat, and flow. Affected beneficial uses are: public and private domestic water supply, livestock watering, anadromous fish passage, salmonid fish rearing and spawning, resident fish and aquatic life, wildlife and hunting, water contact recreation, and aesthetic quality. Watershed conditions contribute to water temperatures exceeding standards, and are affecting anadromous fish passage, salmonid fish rearing and spawning, and resident fish and aquatic life. Other beneficial uses are not likely to be directly impacted by water temperature.

   The WQRP will include water quality objectives. For example, water temperatures in the South Fork Desolation and Junkens Creek subwatersheds are generally representative of tributary potential (maximum 55-60 degrees F). Mainstem Desolation Creek potential may be in the 60° F to 65° F range. Surrogate objectives should also be considered, for example, bank instability is a factor influencing water temperature. Other factors contributing to water temperature potential, for example, groundwater influences and effective shade, have not been quantified.

How to Know When Progress is Being Made in Water Quality Improvement

Demonstrated improving trends in water temperatures by measured reduced summer maximum temperatures in tributaries and mainstem of Desolation Creek.

Added surrogates for water quality improvements include:

- Properly functioning riparian areas. For example, Kelsay currently "functioning at risk" rating moved to proper functioning condition.
- Reduced sediment delivery to streams from roads and other disturbed sites.
- Overall stream channel processes are not impaired by excess sedimentation, loss of stream bank vegetation and road-stream crossings.

10. Bull and Summit Fire Areas - Differing Management Strategies, resource concerns and fire effects contributed to a unique set of recommendations for the portions of the Bull and Summit burns located within the Desolation drainage.

    While the Bull fire burned primarily in actively managed portions of the drainage (including Management Areas A4, C7, and C2, with a small area of "unmanaged" C1) most of the area burned in the Summit fire (within the drainage) occurred in "unmanaged" areas, primarily the Greenhorn Mountain Roadless Area –Management Area A8.

    Salvage harvest in the Bull wildfire, based on a North Fork District NEPA analysis, is in the final planning stages. Based on results of this Ecosystem Analysis, the following recommendations are made:

    a. Salvage treatments should be designed to address the following concerns:

        1) Emphasize salvage in dry-forest areas (Figure 12) that have the capability to support a high proportion of ponderosa pine (Douglas-fir and warm grand fir plant associations). [Sites meeting this criterion would address changes in species composition on warm dry sites.]

        2) Consider salvage where timber volume, tree size, and species characteristics would generate sufficient revenue to fund tree planting and other restoration treatments. [This concern addresses the fact that tree planting is expensive, and that Congress may not fund all of it.]

        3) Consider salvage for sites where the existing density of dead trees is great enough that a future reburn would probably destroy newly-established tree regeneration, especially if it occurred shortly after the dead trees had fallen over and increased fuel continuity.

        4) Consider salvage of live, damaged trees that are unlikely to survive more than a year or two:

            a) Ponderosa pines and western larches that have less than 20 percent green, healthy-appearing crown (by crown volume), regardless of bole scorch, scorch height, or duff consumption.

            b) Douglas-firs having less than 40 percent green, healthy-appearing crown (by volume) AND scorch height greater than 16 feet AND more than 50% of the preburn duff around the base of the tree was consumed by the fire.

            c) Subalpine firs, lodgepole pines, and Engelmann spruces with less than 60 percent green, healthy-appearing crowns (by volume) AND bole scorch on greater than

50% of the tree's circumference AND scorch height greater than 4 feet AND more than 25% of the preburn duff around the base of the tree was consumed by the fire.

d) Guidelines for Post-fire Restoration Projects were developed as part of the Tower Fire Ecosystem Analysis (1997), addressing snags, dead and down coarse woody debris, soils, and riparian buffers. As stated in the Acting Forest Supervisor's letter of March 17, 1997, if, during NEPA analysis for project level planning, it is found that certain guidelines cannot be implemented (because of new information, etc.), that outcome should be documented in the analysis file.

b. It is recommended that upland plantings in burn areas emphasize early-seral species such as western larch and ponderosa pine to a greater degree than lodgepole pine, where ecologically appropriate, since lodgepole pine is expected to regenerate naturally on all but the highest intensity burns.

Tree planting in burned areas should occur quickly, to give seedlings a chance to establish before allelopathic plants and other competitors have fully recovered from the fire. Of particular concern is the potential for pinegrass, smooth brome, red top, Kentucky bluegrass, bracken fern, elk sedge, red fescue, snowbrush ceanothus and other competing vegetation to affect the survival of planted or naturally-regenerated tree seedlings. If reforestation does not occur before competing vegetation threatens tree survival, consider treatment of competing vegetation, taking into account concerns relative to water quality, fisheries and wildlife.

11. Tree plantings should emphasize establishment of early-seral conifers on upland sites, where appropriate, based on the ecological potential of the site.

12. Thinning treatments should address the overstocked areas (approximately 3,000 acres) described in Table 53. The tables in the Upland Forest Vegetation Analysis in the Appendices provide tree density recommendations by species and by plant association (or an average for an entire PAG). The tables include a "management zone" in which stand densities are presumed to be ecologically sustainable and resistant to insect and disease problems.

13. Thinnings or understory removals should be considered for warm dry sites that have two or more tree canopy layers and a canopy cover of 40 percent or more, since they would be considered marginally overstocked and currently have a vertical structure that would inhibit reintroduction of landscape-scale fire. Careful interdisciplinary coordination is needed when planning thinning activities in the area, since big game cover is already deficient, and these forest types support large numbers of wintering elk and deer.

14. Understory removal of fir species on warm dry sites are the highest priority for vegetation treatments in the watershed. The treatment is most effective with remnant pine/larch components. Understory removals are appropriate in area supporting multi-storied mixed species stands on the hot and warm dry plant association groups. The intent is to reduce densities and obtaain more open and vigorous stands to ensure future vegetation sustainability and resliency on these sites. Associated recommendations are to retain large trees and follow up with low intensity prescribed fire. Interdisciplinary review of the specific proposals is needed to ensure appropriante retention of habitat for current wildlife. About 4,000 acres of

national forest have been identified as potential candidates for understory removal. The proposals are a first approximation and need to be ground verified.

15. Understory removals may be appropriate for removing firs that have encroached on warm dry sites. They may also be effective on other sites with a remnant pine/larch component, especially if thinnings reduce stand densities to more sustainable levels and improve the vigor and survivability of pine and larch. Understory removals may also be appropriate in areas supporting multi-storied, mixed-species stands, especially if they occur on the hot dry or warm dry plant association groups. Watershed specific recommendations regarding potential stand treatments follow.

16. To offset nutrient losses as a result of recent fires, and with the objective of reducing susceptibility to future insect and disease outbreaks, fertilization should be considered as a future treatment for young stands growing on the hot dry or warm dry plant association groups. Fertilization would probably not be needed until 20 to 30 years after plantations have been established, and could then be coordinated with other cultural treatments such as precommercial thinning.

17. Pruning may be appropriate as a future treatment for young stands on the hot dry and warm dry plant association groups. Pruning may not be needed until at least 30 years after plantations have been established, when it could then be coordinated with prescribed burning treatments as a way to lower the risk of pole-sized trees being killed by a fire (torching), and could also play a role in the future management of budworm-susceptible forests by removing food for the survival and growth of budworm larvae. Coordinate pruning proposals with physical and biological resource staff, visual and recreation specialists to minimize potential impacts.

18. After completing salvage harvests, understory removals, thinnings and other treatments recommended in this section, managers should strongly consider implementing a prescribed burning program (see general recommendations for different fire severity regimes, below). Once ponderosa pines and larches are 10 to 12 feet tall, a prescribed burn could be completed, although a low-intensity fire would leave most of the 6- to 8-foot trees undamaged as well (Wright 1978). From that point on, surface fires could be used regularly, usually at intervals of 15 to 25 years. Fall burns, which are desirable from an ecological standpoint because they replicate the natural fire regime, result in fewer losses of large ponderosa pines to fire damage or western pine beetle attack (Swezy and Agee 1991).

19. Periodic burning can also be used to manipulate the nutrient capital of a site by maintaining sparse stands of snowbrush ceanothus, lupines, peavines, vetch, buffaloberry, and other nitrogen-fixing plants.

20. See the Upland Forest Vegetation Analysis for precautions in the use of fire on moist sites, droughty sites, and dry areas with coarse or shallow soils and thin forest floors. Prescribed burning will be most effective when used in existing dry-forest types (ponderosa pine and Douglas-fir) that have already undergone understory removal treatment. Prescribed burning should also be considered as a future treatment for plantations established on hot dry and warm dry PAGs. Future prescribed burns would probably not occur until at least 30 years after plantations establishment, and could then be coordinated with pruning treatments to lower the risk of pole-sized trees being killed by a fire (torching) (where understory cover is not lacking).

21. **General Recommendations For The Use Of Prescribed Fire:**

a. Low Severity Natural Fire Regime Areas (i.e. : Dry Forest PVG):

1) Manage to maintain stand densities on at least 50 percent of the area to be 100 trees per acre or less by the time stands reach maturity (=>20" DBH), with the remaining 50 percent of the area having a range of stand densities. Stand composition should be dominated (=>80%) by single storied stands of ponderosa pine. Proposals for stand density manipulation should be reviewed by an interdisciplinary team at the District level to assure the most benefits and least impacts to all resources.

2) Manage for diversity of age class, species composition and patch size across the landscape, with the intent that areas of stand replacement fire will create openings within the historic range of disturbance patterns. To effectively modify the characteristics of wildfire, patches should be several hundred acres in size. Fuels treatments should be implemented in conjunction with other vegetation management practices, with full consideration of all resource concerns at the stand, subwatershed and watershed levels.

3) Identify a fuels profile (a combination of fuel load by size classes and physical arrangement) that would keep wildfires primarily as surface fires. Natural fuels management should include a program of management-ignited fire on a 15-25 years rotation.

4) Because such a large proportion of this area is in private ownership, cooperative agreements should be pursued to facilitate prescribed fire treatments (underburning) across ownership boundaries. This would result in a more effective and efficient burning program utilizing roads and/or topographic features to define unit's boundaries rather than ownership boundaries.

b. Moderate Severity Natural Fire Regime Areas, i.e. : Moist Forest PVG:

Manage for diversity of age class, species composition and patch size across the landscape, with the intent that areas of stand replacement fire will create openings within the historic range of disturbance patterns. To effectively modify the characteristics of wildfire, patches should be several hundred acres in size. Fuels treatments should be implemented in conjunction with other vegetation management practices (commercial harvest, thinning, etc.).

c. High Severity Natural Fire Regime Areas, i.e. Cold Forest PVG:

Maintain fuel break buffers around improvements (Desolation Lookout, electronic site). Beyond site protection, this type is a low priority for any treatments for several reasons:

1) Much of the high severity type is in wilderness or roadless areas,
2) These stands are of lower commercial value, and
3) Stand-replacement fires in this type are inevitable, and difficult to control either through fuels management or fire breaks

A long-term plan for management ignited fire, and/or mechanical treatments to reduce fuel loading near improvements and private boundaries should be developed.

22. Riparian Areas:

a. Management of fire in riparian areas remains a source of controversy. A suggested approach is to manage some stream reaches as "hardwood-dominated" over the long term (greater than 30 years), where such stands are historically indicated or otherwise ecologically appropriate. The intent of management in these areas would be for the hardwood community to function essentially as a shaded fuel break along the stream.

b. Management of livestock use to reduce the impact on hardwoods during sprouting initiation, and to maintain species composition and stand viability, would be necessary. Thinning and/or the use of prescribed fire in these reaches may be appropriate tools for maintaining conifers as scattered individuals rather than as a continuous canopy capable of supporting a crown fire, as long as serious soil disturbance or compaction does not result (see RHCA guidelines).

Native Understory Plants for Restoration - General Considerations

Successful revegetation projects take into account the physical, biological and management aspects. Restoration situations are varied and complex; physical, biological and management aspects will be unique for each, thus it is inappropriate to put together one "restoration seed mix" for use throughout the entire watershed (or District or Forest) for every possible restoration activity.

Ideally, restoration projects are site specific. On some small projects, there is enough of the native plant community left that the best restoration approach may be to simply allow the natural regeneration process to occur. Site visits and advanced planning can also help maximize effectiveness of the money, materials, and effort expended. It can also allow the use of a plant that is plentiful, well adapted, and easily collected from the vicinity of the project (making it cost-effective).

Existing documentation (such as stream survey data, range allotment notes, etc.) should be reviewed to identify areas that may be degraded. Surveys should be conducted to confirm these areas and identify other areas that are in need of restoration.

Proposed or ongoing projects within the watershed should be reviewed to determine what restoration needs will result, and whether appropriate revegetation plant material is available.

Plants for restoration can be broken down into three broad categories:

- Plants with a very limited "growing niche" (eg. only semi-shaded, semi-moist, serpentine derived soils, etc.), which may be ideal for a particular situation, but will not work outside of that niche. These can be extremely useful in the right circumstances (and in some situations, a "finely tuned" plant to the particular site may be the only thing that will work), but general collection and seed increase (production) isn't cost effective or warranted unless there is a specific project in mind for them.

- Plants having a much broader niche (e.g,. "meadow", "grass steppe", etc.), but inappropriate outside of that broad niche. These can be invaluable within their niche, and would help add biodiversity that wouldn't occur if only one or a few species were used for restoration projects.

- "Workhorse" species - these plants are adapted to a wide range of habitats, establish easily, have desirable characteristics, and can be readily propagated or increased. These plants could (if the genetic guidelines allow) be increased and stockpiled for unforeseen, immediate needs, and for small projects where only a small quantity of seed is needed, and the "workhorse" species would be appropriate.

Developing and increasing "workhorse" species may allow a more customized site-specific blend of native species to be readily available for smaller projects. Since restoration planting and propagation with native species is still a relatively new field, not much is known about the genetics and cultural needs of the hundreds of potentially useful plants.

Some "management-caused" habitats were so uncommon historically, that we have no native species that have adapted to perfectly fill these niches. Major road cuts are a good example. The lack of soil and nutrients make plant establishment difficult. The steepness of the resulting banks usually means the few plants that try to establish are often washed out or knocked off the bank. Until the native species program matures, and has a stable program and stockpile of seed, locally adapted native species seed will be expensive and precious, and should be used where it will do the most good.

23. Locally adapted native plants should be used for restoration activities wherever possible, although sometimes the need exceeds the availability, e.g., catastrophic events such as large fires or major landslides. Alternatives include using a native but not locally adapted seed, using carefully selected non-native seed, not planting, or a combination of these options.

24. Shrubs should be used as often as possible where appropriate in restoration plantings to help counteract their decline. Many of our shrubs, having valuable restoration potential for site stabilization and wildlife habitat, are in decline due to browsing.

25. To ensure successful establishment of shrubs, browsing must be controlled until they are large enough to withstand browsing pressure. While cattle can be excluded from an area, it is more difficult to exclude elk and deer. Various fencing or caging methods are currently being used. More work needs to be done to determine the most cost-effective method(s) for protecting shrubs.

26. Potential "workhorse" forb species should be developed to help increase the biodiversity of planting efforts using a general seed mix. The overwhelming numbers of potentially suitable species, and a lack of information has made using forbs for restoration secondary to other growth forms. Until a comprehensive knowledge base of collection, propagation, and planting methods exist, one or a few species could be tried with each revegetation project where appropriate, and the suitability and methodology of each species determined.

27. Many grasses are potentially "workhorse" species. The use of native species such as native blue wild rye (*Elymus glaucus*), instead of introduced orchardgrass (*Dactylis glomerata*), is an improvement from an ecological perspective, but may not result in long term restoration unless it is part of an overall strategy for a given site.

28. Activities planned in rocky "scab flats", meadows, riparian areas, and shrub thickets should be evaluated for both positive and negative impacts to culturally-significant plants, since most grow in such areas. Using culturally significant plants for revegetation and restoration work would help assure that these plants are present and available.

29. During project level planning, consideration should be made of the proximity to known populations of noxious weeds, the potential for introduction or spread of noxious weeds, and the inclusion of measures to prevent infestation/spread, or including the cost of long-term treatment if weeds are introduced or spread. In addition to the noxious weed species currently being tracked, there are additional species that are either in the early stages of infestation or are widespread and constitute a larger hazard than had been previously assumed. See Botany specialist's report for additional information on noxious weeds.

30. Treating noxious weeds by chemical or manual methods is recommended, knowing that almost none of our native species can out compete noxious weeds. Such treatments could potentially remove intermixed native species. Revegetating noxious weed sites with expensive, locally collected native species makes sense only after the noxious weeds have been completely eliminated, or in an extremely rare instance, where the native happens to be aggressive enough to completely choke out the weed.

31. Because of its apparent abundance and widespread distribution, it has been suggested that the highly variable *Botrychium minganense* be dropped from the Regional Forester's List of Sensitive Plant Species. However, until pending taxonomic work is published, it is recommended that *B. minganense* populations continue to be documented and tracked.

32. *Botrychium fenestratum* and "*B. glaucum* sp. nov" should be treated as sensitive species, pending listing by the Regional Forester or the Oregon Natural Heritage Database. Both have very limited abundance and distribution. Effects from fire, grazing, changes in overstory (if any) composition or changes in the water table are unknown. If new populations of these species are not found, their currently known population numbers are low enough (at least for

"*B. glaucum* sp. nov" if it is a new species) to make them possible candidates for Federal listing as Threatened or Endangered

33. While no recommendations are made specific to insects and disease, several previously listed recommendations on salvage, stand density management, understory removals, pruning and prescribed burning, if implemented, could have beneficial effects in reducing or maintaining insects and diseases to more ecologically balanced levels.

34. RHCA implementation in Desolation Watershed could take one of two paths:

    a. Use the Pacfish RHCAs as they stand, or

    b. Design RHCAs specific to the needs of the aquatic and riparian habitat and the contemplated management in each subwatershed.

    In order to implement (b), evaluations of habitat quality as presented in other parts of this document (and from other sources as well) could be used to determine the habitat concerns specific to the stream, stream reach, or subwatershed, including downstream reaches. RHCA widths could then be designed to address concerns. The following fundamental observations ought to be incorporated:

    - Temperature is a concern for all streams in this watershed.
    - Woody debris frequencies are below ICBEMP ERU 6 50th percentiles in most of these streams.
    - Although sediment quantities are not yet exceeding levels that would mark degraded systems in most National Forest streams in these watersheds, some subwatersheds are close (36C and 36E) and some stream reaches are at levels that warrant attention (see Table 30).

    Suggested adjustment of Pacfish RHCAs:

    Redesign RHCAs to have an inner zone of 150 feet (or one tree height) in which all trees would normally be left for aquatic and riparian habitat needs, road construction and livestock grazing would be avoided (or minimized if necessary), and in general, active management would be minimal.

    An outer zone of another 150 feet would be utilized, in which management might occur when it would improve, or at least not degrade, the quality of riparian and aquatic habitat. In general, soil disturbing or compacting activities would be avoided in both zones. Retaining near natural vegetation density for at least two tree heights would help maintain the riparian microclimate.

    For reasons given above, these split RHCAs would be applied to class three as well as class one and two streams (Figure 44).

    Pacfish sized RHCAs for class four streams might be adequate for production of in-channel woody debris, but are probably insufficient for protection from erosion and sedimentation, especially for areas burned at high intensity or on steep slopes or granitic soils. Activities

that could expose or compact soil, remove natural obstructions to flow, or initiate channelizing of flow would best be avoided for another 150-200 feet.

To summarize, the following are recommended for modified RHCAs:

a) Apply the same size RHCAs to perennial non-fishbearing streams as to fishbearing streams. The widths of these RHCAs should follow Pacfish standards for fishbearing streams except when site specific analysis determines that different widths would be appropriate. Normally their total width should be 300 feet on each side of the stream.

b) Split the RHCAs for all perennial streams into inner and outer zones to allow for different management objectives (see Figure 19). Each zone should normally be 150 feet wide (or the average of the maximum tree height, reference Northwest Forest Plan for how to determine this).

   Recommendations for the inner zone include:
   - Retaining all trees, snags, and woody debris.
   - Avoiding soil disturbing or compacting activities, and new road construction, except for occasional necessary crossings.
   - Minimizing livestock grazing (livestock access for watering would ordinarily be provided).

   Recommendations for the outer zone include:
   - Maintaining riparian microclimate in the inner zone. (Probably by retaining natural or near natural vegetation density for at least one tree height beyond the true riparian.)
   - Avoiding management activities that displace or compact soil, and new road construction, except for occasional necessary crossings.
   - Protecting or improving aquatic and riparian habitat.
   - Silvicultural activities such as thinning to accelerate tree growth, as long as activities do not lead to additional erosion or sedimentation of the stream channel, nor change the microclimate of the riparian community beyond the natural range for that site.

35. Old forest resources are currently well below historic levels, and are not meeting habitat needs of associated terrestrial species. An Old Forest Management strategy for improving the existing and *future* status of old forests within the drainage is proposed in the Appendices.

36. Maintain snag levels in excess of the minimum requirements, particularly in areas vulnerable to windthrow, to help ensure the retention of viable populations of species dependent on standing and down dead wood. Although snag and down wood habitat are currently in good supply in the drainage, salvage logging in burned areas, and future harvest/stand manipulation in green stands have the potential to substantially reduce these resources in some areas.

37. Restore aspen and cottonwood stands. Comprehensive inventories on the North Fork John Day Ranger District have revealed many aspen clones and cottonwood stands to be in decline and at risk of extirpation unless immediate actions are taken to initiate new stem recruitment and protect regeneration from browsing.

Recommended restoration treatments that mimic natural disturbance and stimulate resprouting include removal of conifer encroachment, underburning, root ripping, and creation of natural refugia with existing slash. Natural regeneration of aspen and cottonwood may be augmented by transplanting root suckers from nearby stands or by outplanting nursery stock. In order to protect regeneration from excessive browsing, planting and/or treatments to induce suckering should coincide with protective measures such as caging or big game exclosures.

To date, the buck and pole exclosures at Howard Creek are the only treatments that have been applied to aspen stands in the Desolation drainage.

38. Grazing of riparian areas by domestic livestock(and probably to some extent by wild ungulates) can contribute to both the degradation of habitats critical to Neotropical migrant songbirds, and to an increase in invasive species such as cowbirds. Future AMPs, and existing management strategies should take these concerns into consideration.

39. The wet grassland habitats provided by Desolation and Kelsay meadows are extremely uncommon in this area of the Blues, and may support uncommon assemblages of terrestrial vertebrates (especially small mammals and amphibians). Removal of "encroaching" young conifers may be warranted, but should be carefully planned, with specific objectives explicitly stated. Avoid removing any large conifers at the meadows' edge. Pre- and post-treatment inventories of birds, mammals and amphibians should be integral to any restoration prescription.

40. Maintain large green conifers and snags along mainstem Desolation Creek and its larger tributaries for use by wintering bald eagles. Osprey will also benefit from maintenance of large steam-side snags for nesting.

41. Maintain South Fork Desolation Creek in its current roadless state in oder tocontinue to protect the undisturbed nature of existing den habitatfor wolverine. Likewise, the small area of rocky outcrops suitable for use by peregrines will be best served by retaining roadless areas.

42. Retain all remaining old forest habitat. Old forest habitats required by Management Indicator Species such as the pileated woodpecker, American marten, and three-toed woodpecker are much reduced from historic levels in the Desolation Watershed. These species will remain as long-term inhabitants of the watershed only if suitable habitat is available.

43. Snag and down wood resources are critical, but are not the only habitat components required by primary cavity nesters. When stand manipulations such as thinning, basal area reduction, etc., are being considered, it is important to review the local area as a whole, to determine how these actions may affect local populations of primary cavity excavators. Salvage logging in burned areas is of special concern, as some species of woodpeckers are closely tied to burned areas.

44. Continue to manage winter range areas for optimal forage conditions on elk/deer winter ranges. Emphasize use of locally-native grass species when seeding is indicated.

45. Conserve and/or restore suitable cover as needed. Subwatersheds most in need of restoration (from a historic perspective) include SWSs 36B, C, D, E, F and G. Include ODFW biologists in discussion of restoration priorities.

46. Potential Recreation Projects - the following list of potential recreation projects, provided by the District, was not reviewed in detail as part of this ecosystem analysis. The watershed team recommends that an integrated recreation plan be developed for the Desolation Watershed, since recreation is such an important component in the watershed.

Figure 44. Diagram of Split RHCAs

Scenic Trails/Trailheads

Jump-Off Joe Peak #3028 (2.5 miles) - needs assessment work and upgrade - log out, brushing, trail tread improvement and signing .

Blue Mtn. #6141 (6.1 miles), Lost Lake #3020 (4.6 miles), Squaw Rock #3039 (1.3 miles), S Fork Desolation #3001 (8.0 miles) - backlog maintenance work needed to be done includes trail tread improvement, waterbarring, stream crossing improvements (bridging, hardening), brushing and signing.

Lost Lake Trailhead (near Desolation Guard Station) - rebuild horse corrals which have fallen into disrepair and harden circular drive-through area with approx. 40 yds. of pit run material to reduce erosion problems. Boulder placement is also recommended to protect adjacent meadow area.

Motorized Trails

Welch Creek #3030 (3.5 miles), Skinner Diggens #3013 (2 miles), Sharps Ridge #3026 (7 miles), Howard Creek #3005 (2.8 miles), Bull Prairie #3003 (2.5 miles), Beeman Junkins #3015 (8.5 miles), Battle Creek #3004 (3.9 miles) - continued maintenance is needed on these trails which includes: waterbarring, trail tread improvements, waterbarring, minor rerouting, bridge construction and repair and signing.

Skinner Diggens Trailhead - harden camping spots (gravel placement), improve fire rings and install a bulletin board.

Skinner Diggens Trails Tie-in with F.S. Road 1010 - To improve loop riding opportunities in the Desolation area, 1/2 mile of new trail designation to connect Skinner Diggens Trail with Rd 1010, which is an open road designated for OHV (Off Highway Vehicle) use also. 1/4 mile of this route would use an existing closed road and 1/4 mile of trail would be new construction. Trail work would include construction of a 20' bridge over Line Creek.

Note: Several trails/trailheads in the Desolation Planning Area are currently in the Trailhead Fee Demonstration Program, which requires trail users to pay set fees for use of these trailheads and trails. These fees will be used for routine and backlog maintenance and other necessary trail improvements. It is anticipated this program will continue into the future which will help ensure adequate, safe facilities for recreational visitors.

Developed and Dispersed Campsites

Tollbridge Campground - 1) vegetative plantings to provide screening between campsites and between campground and F.S. Road 10, 2) gravel parking spurs and replace decaying parking barriers to protect soils and define parking areas.

Four dispersed campsites near Howard Creek Trailhead - widen approach and gravel entrance way with pit run to reduce existing erosion concerns - approx. 20 yds. material needed

Two dispersed sites adjacent to Road 45 gravel pit - harden entrance way to dispersed sites in order to reduce soil erosion (road rutted) - approx. 20 yds. material needed

Three dispersed sites adjacent to Desolation Guard Station - gravel entrance way to reduce soil erosion - approx. 20 yds. material needed

Rock Springs dispersed camp sites (near Olive Lake) - gravel entrance way to reduce soil erosion - approx. 20 yds. material needed

Routine maintenance, planning, and minor improvements will continue at developed and dispersed campsites in the planning area, as funding and safety priorities are considered. This work includes such items as: hazard tree assessments and removal, firering clearing, toilet cleaning, inventories/GPS work, providing visitor information and receiving public input (bulletin boards, personal contacts, registration forms), trash removal and structure repair. The district also actively seeks and obtains partnerships with volunteers and other agencies to help maintain recreational facilities and services.

Cabin Rental Program: While there currently are no plans at this time to include the Desolation and Battle Creek Cabins into the Cabin Rental program, it is foreseeable these cabins could be in the program within the next five years, as funding becomes available to repair cabins for this type of use.

B. Subwatershed Specific Recommendations

The following recommendations are intended to address a number of concerns/problems related to water quality, aquatic habitat, vegetation sustainability, habitat for terrestrial vertebrate populations, and to build an integrated approach to management of the Desolation Watershed.

Many of the forested vegetation recommendations are aimed at accelerating re-establishment of old forest **(OF)** stands to historic, sustainable levels. Details of this strategy are found in the Appendices.

This following process was used in the old forest restoration strategy for Desolation:

1. Stands currently meeting old forest criteria are identified and recommended for protection under a conserve approach (see below), because of the limited amounts of old forest present in the watershed as compared to historical and HRV levels. These stands will form the core for development of larger patches of old forest (Table 62).

2. Stands nearby those in (1), with the potential to quickly move toward old forest structure, are identified for potential treatments. Stands in late-seral structural stages, understory reinitiation **(UR)** and young forest multi strata **(YFMS)**, probably have the greatest potential to move toward old forest structure. Some of these stands are recommended for field review for treatment, if vegetation data indicates they are in a structural stage that may warrant treatment. Other factors, including elk cover needs, or the presence of suitable habitat for MIS were also reviewed before potential treatment was recommended. Stands recommended for field review for potential treatments are found in the " Subwatershed Habitat Characteristics" Appendix.

Please see the Upland Forest Vegetation Analysis for a detailed discussion on data limitations. Many of the following recommendations are based on landscape level information (much of it photo interpreted data), and specific forest stand information represents a first approximation, a place to start in project level planning. Recommendations need to verified through on-the-ground visits. Recommendations for specific stands may not turn out to be feasible; however, it is hoped that other opportunities may arise in the course of site visits, to complement the overall strategy.

As used in the subsequent recommendations, the following terms mean:

> **Restoration** - Actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume its resiliency to disturbances.
>
> **Conserve** - Management emphasis on protection and maintenance of forest, rangeland , and aquatic conditions, health, and integrity, recognizing that natural processes dominate the landscape and gradual change will occur.
>
> **Evaluate -** Further examination of conclusions; continue current surveys and monitoring, and expand as needed, develop management plans.

Lower Desolation (36A)

Pursue partnerships: coordinate fuels management and road right-of-way (maintenance), with private land owner**.** ***Evaluate*** condition of acquired lands, and potential for restoration (obliterate roads and plant streamside areas).

About 58 percent of Subwatershed 36A is private land, and little information about past management or aquatic habitat quality in tributary streams is available for this portion of the watershed. No specific recommendations are made regarding aquatic habitat.

Stands 2 (53 ac.) 14 (48 ac.) and 26 (248 ac.) comprise the only remaining old forest (OF) in the subwatershed, with stand 26 providing the only suitable reproductive habitat for the pileated woodpecker in the drainage. As presented in the Old Forest Conservation Strategy proposed for the watershed, these stands would be Priority 1 areas, where the objective would be to protect all remaining old forest patches. These areas are currently serving as "refugia' for old forest species, and will serve as "core" patches for restoration purposes within the 731 acres delineated within the subwatershed (Figure 45, Table 71).

Stand 21, with only 11 acres in National Forest ownership (33 additional acres are privately owned) currently provides the only Satisfactory big game cover in the subwatershed. The stand also provides foraging habitat for pileated woodpeckers (1 of only 3 stands, see above). It is recommended that stand 21 and immediately-adjacent stands 7, 18, and 20, be deferred from silvicultural treatments in the short term, in order to retain and expand this small area of Satisfactory cover.

Adjacent to Stand 26, Stands 35 and 43 (totaling 243 acres), both in the UR structural stage, were identified as candidates for understory removal, since they occur on Warm Dry sites (SWS Habitat Appendix). The location of the stands, adjacent to a large old forest stand, makes them a

high priority for possible treatment to speed up movement toward OF structure. However, these stands also provide "marginal" cover (MC) adjacent to big game winter range. Field review by District wildlife staff is needed to make the final call on which resource is most lacking here, "future" old forest, or existing cover resources.

Stand 10 (87 ac., understory removal, warm dry) is recommended for field review for possible treatment to return the stand to a more appropriate open structure, and to accelerate movement towards mature/old forest conditions.

Figure 45. Old Forest Restoration Strategy (Proposed)

Table 71. Structural stage composition of the proposed Old Forest Conservation Strategy for the Desolation Analysis Area.

	STRUCTURAL STAGE			
SUBWATERSHED	OF	YFMS	UR	TOTAL ACRES
Lower Desolation (A)	353	44	334	731
Wasson (B)	89	100	1412	1601
Kelsay (C)	0	675	429	1104
Bruin (D)	0	1418	777	2195
Junknens-Beeman (E)	290	1008	0	1298
Battle (F)	0	1873	311	2184
Howard (G)	0	1671	25	1696
N.F. Desolation (H)	165	866	50	1031
S. F. Desolation (I)				
TOTAL BY S.S.				

Wasson (36B)

Pursue partnerships: coordinate fuels (and other resource) management with private land owner.

About 55 percent of Subwatershed 36B is private land, and little information about past management or aquatic habitat quality in tributary streams is available for this portion of the watershed. No specific recommendations are made regarding aquatic habitat.

Fencing of the spring and the immediately-adjacent wet meadow in Snapp Springs area is recommended. Cleanup of old camp debris and increased law-enforcement are recommended to discourage future dumping. Surrounded by large old growth ponderosa pine, this large spring with its lush meadow provides extremely valuable habitat for mammals, birds, and particularly amphibians. The area immediately surrounding the spring is trampled and muddy, and generations of camps have resulted in unsightly accumulations of junk.

Stands 140 and 129 (totaling 89 acres) the only remaining old forest stands, are currently in C7 Management Area, and should be protected as core area for expanded old forest as it develops over time.
Approximately 1601 acres were identified for old forest retention and/or restoration (Table 71, Figure 45).

Stand 158 (45 acres) was identified as a candidate for precommercial thinning, but is currently the only satisfactory elk cover in the subwatershed, and is not recommended for thinning at this time.

Kelsay (36C)

Kelsay Subwatershed has one of the highest road densities, and the highest number of road/stream crossings per square mile, in the Desolation watershed. Finding ways to reduce road densities in riparian areas, especially stream crossing density, is the first consideration for watershed and aquatic habitat restoration. Fortunately, this subwatershed also has high potential

for aquatic restoration, with relatively good large wood frequency and depth/width ratios. Evaluation of potential restoration projects should focus on roads and road-related problems within the subwatershed, with the objective of reducing sediment delivery to streams..

Proper Functioning Condition (PFC) assessments indicate the upper reaches of Kelsay Creek are functioning at risk, and are degrading. Grazing, roads, and past harvest were identified as primary impacting factors. Management of livestock to improve riparian function is needed and may include limiting access to riparian areas through fencing or other means. Effectiveness of instream structures needs evaluation - field surveys indicate that some structures need repair.

There is currently no OF habitat in this subwatershed. The single C2 area designated within the drainage appears to be comprised totally of stands in the Stand Initiation structural stage. The area provides no suitable habitat for the target MIS (three-toed woodpecker) at present, nor would it be expected to provide suitable habitat for 75 to 100 years. Given this circumstance, stands in the UR and YFMS stages should be field evaluated for potential replacement of the existing C2 management area.

With no old forest to use as a "core area", stands in the UR and YFMS were identified as high priority for being the base of a new "network". Approximately 1100 acres were included (Table 71, Figure 45).

While foraging habitat for pileated woodpeckers, northern goshawks, marten and wolverine is relatively abundant in the Kelsay subwatershed, the absence of old forest stands precludes the use of this subwatershed for reproduction by any of these species. The northeast and eastern portions of the drainage are especially lacking in older stands, reducing the potential for movement of old-forest dependent species between Desolation and the adjacent watershed. Stand 203 (Understory Reinitiation, warm dry, 185 acres) was identified as a candidate for understory removal. This may be a good stand to nurture toward the OF structural stage, since it could contribute to the expansion of an old forest "core" area (stands 140 and 129 in Wasson Subwatershed). Stand 203 also currently provides marginal cover for elk, so further interdisciplinary assessment may be necessary.

Satisfactory Cover for big game species is limited to a single, small stand (stand 141, 25 ac). No silvicultural treatment was identified for this stand (see SWS Habitat Appendix).

Stands 231, 270 and 203 (see above) were identified as candidates for understory removals, while stands 251 and 305 are overstocked and are candidates for precommercial thinning. There appear to be few conflicts with proposed silvicultural treatments in these stands.

Bruin (36D)

Restore subwatershed; reduce road density[1], upgrade (storm-proof) stream crossings .

About 27 percent of this subwatershed is in private ownership, and like Subwatersheds 36A and 36B, aquatic habitat information is lacking. Tributary streams in the Bruin subwatershed have not been surveyed, so correllations to management activities are not possible, but Bruin does have the second highest road - stream crossings density in the watershed. Thus a first approach to restoration here might well be the reduction of streamside road density.

The Desolation vegetation database indicates that no OF structure stands are present in this subwatershed, including C1/C2 management areas. All of the designated areas contain a relatively high percentage of forests that will not provide suitable habitat for another 50 years or more. Analysis for old forest Management Indicator Species shows no suitable reproductive habitat available for pileated woodpecker, marten or goshawk.

Options for developing OF structure stands of large enough patch size to be functional *do* exist; however, restoration will be a long-term proposition. In the short term, retention of connectivity between existing patches of YFMS and UR stands is critical. In the northeast corner of the subwatershed, stands 233, 285, 302, 337, 360, and 459 provide a potential "core" for development of both old forest structure and connectivity with maturing stands in the Kelsay subwatershed to the north, and SWS 36F to the south. A cluster of YFMS stands at the western subwatershed (and watershed) boundary provides similar opportunities for restoring old forest habitats for and enhancing connectivity between subwatersheds 36D and 36C, and the Indian Creek drainage to the southwest.

Forest stands proposed for old forest conservation/restoration total approximately 2195 acres (Table 71, Figure 45). With the exception of stand 508, none were proposed for silvicultural treatments at this time. Stand 508 (67 acres, UR structural stage) is a Warm Dry stand. It currently provides no habitat for pileated woodpecker, marten or other closed-canopy OF species. This may be an appropriate stand for active management, although there are concerns for elk cover.

Cover for elk and deer is patchy. Five stands provide a total of just 287 acres of Satisfactory Cover. Three of these were identified as candidates for understory removals. Given the scarcity of this habitat, these stands are not recommended for thinning at this time.

Stands 465, 474, 508 and 525, also identified as candidates for thinning, form part of a block of cover that provides connectivity to a large stand of Satisfactory Cover in Junkens Subwatershed (36E). Thinning these stands is not recommended at this time.

Stands 465, 483, 508, 541, and 525 were proposed for understory removal. Portions of these stands are adjacent to Desolation Creek. Any proposed treatments need to be consistent with RHCA guidelines.

Junkens - Beeman (36E)

Conserve as an important cold water source for Desolation Creek.

The headwaters portion (approximately the upper one-third) of the Junkens - Beeman subwatershed is roadless and has not been logged. The lower part is fairly densely roaded and has experienced extensive timber harvest. Junkens Creek, along with South Fork Desolation, are among the coolest in the Desolation watershed. It appears that this subwatershed has excellent potential for restoration. Possible avenues include protection of the upper subwatershed and restoration of the lower reaches (including reduction of road density, ensuring regeneration of harvested areas), and close monitoring of livestock grazing with provision of adjustments to grazing management as necessary.

Table 31 identifies four human-caused barriers to fish passage on Junkens Creek, and one on Beeman Creek. These barriers should be reviewed for restoration opportunities.

This subwatershed contains two OF structure stands (820 and 751), totaling 290 acres. Stand 751 (61 acres) supports suitable *reproductive* habitat for the pileated woodpecker, goshawk and marten, and also provides foraging habitat for lynx, wolverine and three-toed woodpeckers. These stands should be protected as the "core" area for old forest habitat conservation in the

Junkens-Beeman drainage. Approximately 1,298 acres were identified for potential inclusion in the first priority (short term) strategy for old forest conservation (Table 71, Figure 45).

Satisfactory cover for big game is limited to three stands (573, 638 and 831) totaling 452 acres. These stands also provide foraging habitat for one or more MIS. Stands 573 and 638 were initially identified as overstocked; in light of their importance to big game (and several other species), treatment is not recommended until additional cover in the area reaches "Satisfactory".

Battle (36F)

Restore subwatershed; reduce road density[1].

Except for its low wood frequency, the situation in the Battle subwatershed is similar to that of Kelsay. For restoration in this subwatershed, consider adding large wood to the stream in addition to reducing road density. Battle SWS has the third highest road-stream crossing density: focusing on reducing road densities in riparian zones should be first priority. Battle also has the highest Equivalent Clearcut Acreage of the subwatersheds for which data is readily available. Ensuring that regeneration of harvested areas is proceeding apace and that any additional harvest not further stress the aquatic environment are important components of an aquatic habitat management strategy for this subwatershed.

No old forest stands remain in the Battle subwatershed, and there are very few short-term restoration opportunities. Stands in the UR and YFMS structural stages are clustered at the east and southwest SWS boundaries. These stands account for the majority of the 2184 acres identified in the old forest strategy for this SWS (Table 71, Figure 45). Stands 459, 551, and 590 are important for their potential role as northeast-southwest "connectors".

Stand 701 (86 acres) (RHCA concerns) and Stand 519 (54 acres) have potential for understory removal treatments. A total of about 501 acres were identified for potential precommercial thinning, and 3 acres for salvage within the Bull Fire area.

Stands 551, 590, 459, 460, and 626 represent the best opportunities for OF restoration.

Howard (36G)

Evaluate in-stream structure effectiveness in Desolation Creek; maintain Road 10 to reduce ditch erosion.

Judging from surveys of tributary streams, aquatic habitat in the Howard subwatershed is in good condition. Howard has fairly low road density and has had only a small amount of timber harvest. High quality aquatic habitat could probably be maintained in this subwatershed by keeping the road density and equivalent clear-cut acreage low. One barrier to fish passage was identified in stream surveys, and should be field reviewed for repair opportunities.

This subwatershed currently has no OF stands, consequently analysis revealed no reproductive habitat availability for old forest-dependent species. However, several large stands in the YFMS stage currently provide foraging habitat for MIS species (except the three-toed woodpecker). Some of the large stands (679, 711, 764, 776 and 824) may represent opportunities to accelerate movement toward OF structure. However, in a subwatershed where old forest resources are no

longer available, special attention should focus on the needs of the *current* vertebrate community and habitats.

About 327 acres within the Bull Fire perimeter were identified as having salvage potential.

The Howard Creek drainage supports the largest single patch of Satisfactory Cover (stand 764) within the Desolation watershed. The combination of stands 764 and 776 (directly adjacent to the southeast), provides over 1000 acres of contiguous cover in the subwatershed. No silvicultural priorities were identified for this area.

North Fork Desolation (36H)

Restore subwatershed; reduce road densities[1] and road-stream crossings, plant natives and protect meadows. ***Evaluate*** ditching/drainage impacts on meadow, develop a plan for restoring natural flows.

Habitat conditions in North Fork Desolation Creek are similar to those in Battle, excepting that water temperatures are somewhat lower. Road density is similar, but road - stream crossings density is a little lower. An aquatic habitat management strategy similar to that for Battle, but taking into account its status as eligible for Wild and Scenic River designation, would probably be appropriate.

One barrier to fish passage was identified in stream surveys (Table 31) and should be field reviewed for treatment need.

As discussed in Chapter V, a determination of the cause(s) for the apparent dramatic reduction in pool frequency from 1963-64 to 1992-93 is recommended.

One hundred sixty-five acres of old forest are present along the North Fork of Desolation Creek (Stands 801, 805, 815). Stand 815, at approximately 120 acres, supports potential reproductive habitat for three-toed woodpeckers and goshawks. Stands 801 and 805 are very small (16 and 21 acres, respectively), but might still provide "nest groves" for individual pairs. These three stands form a logical core for old forest restoration in SWS 36H. Moving out from the old forest core, stands 780, 783, 821, 852, 869, 871, may have potential as "future" old forest. These stands are recommended for review for treatment to determine if active management practices might accelerate movement toward OF structure. Approximately 1031 acres were included in the conservation strategy for the North Fork SWS (Table 71, Figure 45).

Six hundred seventy-seven acres within the subwatershed were identified for salvage in the Bull Fire area; 151 acres of precommercial thinning were designated (see map).

Approximately _____acres of Marginal Cover were identified in SWS 36H. Analysis results indicated that there is currently no Satisfactory Cover within the subwatershed.

[1] "Target" road densities, for example "x" miles per square mile, are not suggested because of the many factors controlling road impacts, eg., slope position, soil type, slope steepness.

South Fork Desolation (36I)

Conserve cold water source through relocation of trail from riparian areas. ***Evaluate*** potential for shrub planting to accelerate stream bank recovery in fire area (stabilization and shade).

The very good aquatic habitat conditions in South Fork Desolation plus its very low road and road crossings density, its low timber harvest history, its "A8" Forest Plan Management Designation and its eligibility for Wild and Scenic River status would suggest a protect and conserve management strategy, but the recent fire in the subwatershed makes some shrub and tree planting desirable.

Stream survey reports mention several waterfalls downstream (below the meadow in South Fork Desolation). At least one of them, at 13 feet high (between river mile 2.2 and 3.7), is almost certainly a fish passage barrier. This implies:

a) That bull trout in this upstream part of the South Fork are unlikely to cross with the introduced brook trout present downstream in mainstem Desolation and in Howard Creek, and

b) The rainbows reported here by USFS stream surveys may actually be native redbands, although they may have crossed with introduced west-slope cutthroat trout, and

c) Should fish in this upstream section of South Fork Desolation be extirpated, natural recolonization might not be possible.

Taken together these factors suggest a recommendation that South Fork Desolation be accorded special protection for the fisheries values present here.

Special attention to protection of fisheries values in subwatershed 36I (South Fork Desolation)is warranted. The entire subwatershed is presently designated as Management Area A8, Scenic Area. Although the goal for A8 management areas is to "protect or enhance the unique natural characteristics of landscapes noted for their scenic beauty" (Umatilla National Forest, 1990), it appears that the Management Area Standards and Guidelines for A8 are relatively conservative from the perspective of fisheries values protection, and if consistently followed, additional protection may not be necessary. However, cautious implementation of those developments permitted is warranted, particularly ensuring that trails and camping and parking areas are well away from streams and that grazing be indeed maintained at a very light level, and in such a way as to keep livestock from congregating and lingering near streams.

Since much shade and future large woody debris was lost in Subwatershed 36I as a result of the Summit fire, accelerated recovery of streamside vegetation, shade and large wood through conifer and shrub planting is especially important in riparian areas burned at moderate and high intensities.

Once again, all stands currently in OF structure are recommended for protection. No vegetation treatments are recommended within the XXXX acres identified as part of the conservation strategy.

C. Inventory and Monitoring Needs

1. Bring current the backlog of water data collected at Forest Service gage at Forest Service Road 10 crossing. Maintain core set of monitoring stations; stream temperature, flow, sediment, channel morphology (establish permanent reference reaches on key streams, revisit sites established on NF Desolation and Kelsay Creek).

2. Monitoring of revegetation efforts using native seed is needed to determine in what habitats and conditions the particular native species will establish.

3. Establish permanent monitoring plots of *Botrychium* spp. populations to provide much needed baseline and management effects data.

4. Complete inventory of abandoned mines, identify reclamation needs. Prioritize and request funds for reclamation.

5. Inventory mine shafts, **attits**, etc., for presence of bats prior to reclamation activities.

6. Complete inventory of trails and dispersed recreation sites. Identify segments and sites for modification. Prioritize and request funds for rehabilitation.

7. Update/validate stream classification databases during stream inventories and project-level planning.

8. Monitor recent wildfire effects; including channel recovery, in Subwatershed 36I (South Fork Desolation).

9. Conduct field inventory for fish passage barrier culvert conditions to verify and update the information reported in the 1992 and 1993 stream survey reports. This will be especially useful for future consultations for listed aquatic species.

10. Conduct bull trout redd inventory on Mainstem, North, and South Forks of Desolation Creek to help quantify the population status and better inform management.

11. Conduct snorkeling survey for presence of large migratory bull trout to help determine the migratory/resident status of the local population.

12. Surveys for sensitive amphibian species are warranted, given the unique complex of wetland and riparian habitats in the drainage.

13. Review/monitor the potential effects of OHV and snowmobile use on Rocky Mountain Elk on the Sharp's Ridge Trail during fall hunting seasons. ODFW has expressed concern that some road "closures" that permit OHV use are not compatible with the stated intent of wildlife "protection".

14. Continue to collect data relating to all mining activity and continue to monitor mining activities on the District.

15. It is recommended that whitebark pine surveys be completed as soon as possible, as this species' occurrence on the Umatilla is limited to Desolation Watershed, and some adjacent areas, and the presence of white pine blister rust is unknown.

16. *Botrychium* species surveys need to be periodically repeated, as numerous factors can make a difference on whether or not a plant is found. Whether "*Botrychium glaucum* sp. nov." is indeed a new species, or a form of *B. pedunculosum,* its currently known worldwide distribution (with one unvouchered exception of 6 plants) is found within one subwatershed of the Desolation watershed.

D. Data Management, Analysis Limitations, Research Needs

1. Data from private lands were not available for this assessment which limited the evaluation of watershed condition. Forest databases are not up to date, or are incomplete, for example stream classes and riparian inventories. Overall findings are based on limited data, with interpretation relying on published research and data from other similar watersheds. Further work at the project-level will require field investigation to validate or adjust general recommendations.

2. Review stream survey data in the SMART database and restructure the data to allow separate calculation of values for habitat parameters in the meadow portion of South Fork Desolation Creek.

1. Add missing data to SMART database. (e. g. comments and fish species encountered in South Fork Desolation narrative report, but which is missing from the database.)

2. Conduct genetic testing of bull trout in South Fork Desolation above the waterfall to establish whether they are isolated or genetically distinct populations.

3. Adjust the SMART database for reach five of South Fork Desolation Creek.

4. Reach five of South Fork Desolation includes the meadow plus some very steep channel upstream. The Survey team originally intended to make that part of the stream upstream of the meadow a separate reach, but it turned out to be too short, so they added it to reach 5, the South Fork Desolation Meadow reach. This explains the high gradient (5%) given for the meadow reach. This clearly is not representative of the meadow. It would be helpful to split reach five into a meadow and upstream section. Even if the upstream reach were not long enough to meet SMART database reporting requirements, the meadow portion is, and its characteristics would be reflected more accurately if the data for the much steeper gradient upstream section were not included.

5. Check and correct the GIS stream class database regarding miles of class III and IV streams in Subwatershed 36D.

6. Complete and refine the STR_STREAM tables in the Forests Geographic Information System (GIS). These tables are already set up as part of the Forest's GIS, but have been empty of data untill very recently. An effort, spearheaded by the Pomeroy Ranger District, is presently underway to establish the inital presence/absence records for fish species of especial interest, and to link the GIS Stream Layer to the SMART database.

   This information will be a powerful analysis and management tool, and it is important to follow this project through to completion, and then to refine it beyond simple presence/absence information by following the fish distribution codes in the STR_DATA table (GIS Data Dictionary).

7. While there are some upland "grasslike" species which could be invaluable in the appropriate locations, most of these species are riparian plants. Many of them start readily from seed or vegetatively, and could become the "workhorse" species for riparian areas. There are so

many of them that it will take additional work to determine the ecological needs and amplitudes of each species, and which ones would be most appropriate for further development as a “workhorse”.

8. While very little work has been done on using bryophytes and lichens for restoration work, they could be extremely useful in some situations. These organisms are primary colonizers of new habitats, are often the first "plants" growing on exposed rock and subsoil after severe fires, and initiate the soil formation process. Some of the lichens shelter blue-green algae that fix a considerable quantity of nitrogen and release it into the otherwise relatively sterile substrate. While methodology and suitable species would have to be worked out, propagation could be by spores or by vegetative pieces. A piece of moss consisting of at least 5 cells will usually start growing as soon as it is moistened and placed in the appropriate conditions, even if it had just spent the previous 100 years in a herbarium packet.

   While they don't have roots and therefore can't hold hillsides in place, they can inhibit or stop surface erosion, and create a moister microsite for establishment of vascular plants. With the appropriate methodology and species, these could become one of the "workhorses" for revegetation of large-scale catastrophic events. If they could be sustainably collected, they could be stored almost indefinitely, would be inexpensive, easily applied, and on some of the harshest sites, may be the only vegetative organisms likely to thrive.

   A separate paper listing potential revegetation species will be developed as time and funding allow.

9. Research is needed the effects of harvesting special forest products, on what levels are critical to given species. Over-harvesting a plant species as a special forest product could affect a seemingly unconnected part of the ecosystem. Currently on the Umatilla, the demand for everything except morel mushrooms is quite low. As markets are developed for special forest products and/or the forests on the west side are exhausted, harvesters may migrate to the Umatilla.

   Please see full discussion of special forest products in the botanical specialist's report for background, potential species of concern, management implications, and suggestions on policy formulation.

10. Until the effects of the burning on *Botrychium* species can be assessed, fire prescribed for Desolation Meadows should be on an experimental basis, and only a portion of the meadows should be burned. Adequate information is simply not available to be able to assess the implications of management activities on *Botrychium* species.