WATERSHED ANALYSIS RECOMMENDATIONS

Introduction

If a recommendation in this document conflicts with a decision document, or another current analysis document prepared by the BLM alone or in cooperation with the USFS, then the reader should give priority and use these documents in the following order:

1. The Forest Plan ROD/ Standards and Guides
2. The District ROD/RMP
3. Other NEPA decision documents. These NEPA decisions must be consistent with the Forest Plan and the District RMP. However, site specific conditions may necessitate management actions other that those included among the watershed analysis recommendations.
4. Recommendations in the South Coast - North Klamath LSR Assessment generally will take precedence over the recommendations in this Watershed Analysis on those LSR lands outside the Riparian Reserve. The LSR Assessment recommendations do not apply to lands outside the LSR.
5. For lands that are both inside an LSR and a Riparian Reserve, the project ID teams should reconcile any conflicts that may arise between the Watershed Analysis recommendations and the LSR Assessment recommendations based on the site specific conditions in the proposed project area. The LSR Assessment and Watershed Analysis provide a landscape/ watershed scale context whereas the site specific analysis, completed as part of the NEPA process, takes into account the conditions on the project site. Since the LSR Assessment was reviewed and accepted by REO, recommendations in that document can be implemented without additional REO review. Proposed treatments on LSR land, not covered by the LSR Assessment or not previously exempted by REO, may require REO review.

The Records of Decision for the Forest Plan and the District RMP are decision documents. These documents define the decision space for management actions. The Watershed Analysis recommendations are advisory. These recommendations are based on a watershed perspective. Consequently, watershed analysis recommendations cannot address all the issues and problems that project ID teams find at the site scale. Based on a site specific analysis that considers the watershed context, a project ID team may find the best management action may be an activity other than those recommended in the Watershed Analysis.

Erosion Processes

Follow Best Management Practices (BMP). The BMPs are listed in the RMP/ROD Appendix D (USDI 1995) with additional erosion control practices listed in RMP/ROD Appendix E.

Vegetation

Note: See also the Density Management and Conversion Treatments and attaining Riparian Reserve Function recommendations.

Hardwood Management - species other than alder: Insure the continued presence of Oregon ash and willows in this Watershed. Improve the potential for dispersal of those species to suitable sites. Specific recommendations for the willow and Oregon ash patch near the Tioga stream gauge station:

- Use one or more release treatments to protect the willow and ash from encroachment by alder, and small conifer, and provide growing space favorable for seed production.
- Use barriers or other methods reduce mechanical damage to willow and Oregon ash seedlings caused by vehicles and big game browsing.
- The ash trees and the willows on this site are readily accessible. This makes them good candidates

for seed collection and for taking cuttings to aid regeneration of those species on other sites.

Oregon ash, the willows, and crab apple, are suitable trees for planting on active flood plains where conifers, myrtles and bigleaf maple are unlikely to form a closed canopy. Release treatments to control red alder, and protection treatments to reduce browse damage may be needed on some sites. Refer to *Hardwoods of the Pacific Northwest* by Niemiec *et al.* (1995), and to the plant section of the Fire Effects Information System (http://www.fs.fed.us/database/feis/plants/) for additional information on site selection and stand management.

Alder Stand Conversion to Conifer or Mixed Stands: FOI units with a recommended treatment to "convert", and hardwood stands classified as "medium" and "high" on the CWD Recruitment Potential Map in this document indicate potential areas for alder conversion pending site specific examination.

- On appropriate sites, manage for durable large woody material that can be recruited as instream structure for both hydrologic function purposes and to provide complex aquatic habitats. This includes both streamside sites suitable for growing trees that can fall directly into a stream, and headwall areas, which through headwall failure resulting in a debris avalanche/ debris torrent, could contribute CWD to low gradient streams.
- Use early aerial photos that show the premanagement condition, and intact riparian zones as reference stands when developing riparian regeneration and conifer release projects. Because more than one stand succession trajectory is possible on most sites, there is no one correct species mix. Manage for a species mix that is plausible, under wild conditions, as determined by species already on the site, observations on comparable sites, and site indicators. Retain all bigleaf maple, myrtle, Oregon ash, crab apple, willow, and existing vigorous conifers unless there is a compelling reason to do otherwise.
- Give priority to providing growing space for releasable existing conifers in mixed and hardwood dominated riparian stands.
- When evaluating a riparian hardwood stand for possible replacement with conifers, check for evidence of past debris avalanches, and consider the potential for future debris avalanches. For example, a third order or larger stream may have historically had an alder-dominated terrace because both the terrace and the alders are a direct result of past debris avalanches. When considering converting an alder stand to conifer on such a site, check aerial photos to see if alders were on the site before it was first logged. Also, consider the branching angles and gradients of the up stream tributaries. If the example site was likely subject to frequent[1] debris avalanches, the best course of action may be to leave the alders on the terrace and reestablish conifers on the adjacent slopes.
- On unstable lower slope locations, release of bigleaf maples, and conifers, particularly western redcedars, is desirable. Small scale planting of western redcedar or bigleaf maple on unstable lower slope locations may be worthwhile where there are few other options for obtaining coarse woody debris over very long reaches. Planting should be considered experimental for now. The probability of converting these sites to conifer by planting is low on sites with active soil movement. Leaving these sites in native shrub, and/or alder will retain shrub and hardwood habitats on appropriate sites.

Data Management: Review and update the FOI data base using Landsat imagery and aerial photos so it more accurately reflects the number and distribution of hardwood stands.

Review FOI units with a recommended treatment of "hardwood stands do not convert". Correct, as needed, the polygon mapping, and timber type. Make preliminary recommended treatment and schedule field review to verify and refine treatment recommendations and timber type.

[1] For planning purposes, "frequent" is a repeating return period shorter than 80 to 100 years. This is based on both the amount of time needed to grow 20-inch and larger conifer, and life expectancy of red alder.

Port-Orford-Cedar: Use an adaptive management approach to POC root disease control that incorporates the recommendations in the Port-Orford Cedar Management Guidelines (Betlejewski 1994), or subsequence BLM POC root disease management guides that are appropriate to each site.

Swiss Needle Cast: In areas where the disease is causing discoloration of the Douglas-fir, follow the follow interim recommendations. Deviate from this recommendations to incorporate new strategies for managing coastal fog zone sites as supporting research is published and as necessary to address site specific needs:

- Use local seed source - do not deviate more than 500-feet elevation or 1 mile latitude
- If species other than Douglas-fire are present, favor those other species when thinning. If the stand is predominantly Douglas-fir and the disease is not severe, a thinning prescription that favors the most vigorous disease tolerant individual trees may prove some benefit. However, thinning is not a tested treatment for managing Swiss needle cast in Oregon. Thinning is not recommended for severely infected pure Douglas-fir stands.
- Pruning infected Douglas-fir stands is not advised because the loss of leaf through pruning combined with the loss of foliar mass to the disease can have a detrimental affect on tree growth.
- If site prep costs are not prohibitive, interplant young (less than 5 to 10 years old) at risk Douglas-fir with resistant native species.
- Under plant older Douglas-fir stands with shade-tolerant resistant species. Thinning the overstory Douglas-fir may be necessary to insure survival of the underplanted trees.
- Fertilization with nitrogen, or phosphorus or blended fertilizers with micronutrients does not appear to provide significant benefit therefore fertilization is not recommended for disease control purposes.
- Fungicides have been proven effective to control Swiss needle cast in Christmas tree plantations. However, fungicides are not considered an operational treatment for managing infected forest stands.

Hydrology and Stream Channel

Continue collecting streamflow, water temperature and turbidity data at the Tioga Creek stream gaging site. We need this data to evaluate trends and affects of management activities in the future.

Establish permanent channel cross section monitoring sites to determine channel stability and evaluate changes in channel morphology.

Where practical, close the roads located on flood plains and streamside roads that confine stream channels. As part of closing these roads, remove culverts and re-contour slopes at stream crossings.

Upgrade all culverts to accommodate a 100-year flood event, reduce flow velocities, allow free passage of sediments and debris, and allow for passage of vertebrate and invertebrate aquatic species.

Meet or exceed Oregon Department of Environmental Quality (DEQ) standards for non-point source (NPS) pollution and water temperature.

The following are several strategies to consider for restoring degraded channel conditions, water quality, and riparian and flood plain habitat and function:

- Restore the structural integrity of historic riparian vegetation through the use of tree planting, thinning, and species conversion.
- Design and place log and rock in-stream structures at suitable sites on public and private lands, in conjunction with Watershed Associations, to restore and enhance habitats and the stable dimension, pattern and profile of stream types.
- Look for opportunities to restore incised stream channels by designing and/or creating new stream channels or reconnecting old oxbows on top of abandoned flood plains.

Water Quality
Due to the land ownership pattern (20% BLM, 80% private/state) in this Watershed, the BLM should strongly support the Coos Watershed Association in completing restoration activities on private land. This support is especially critical when the association is working on low gradient flood plains that are extremely sensitive systems but provide critical aquatic habitat.

Continue water temperature monitoring. Expand the scope of monitoring to the tributary streams determine the location of trouble spots.

Sediment production, storage, movement, and impacts to aquatic life on at least a drainage size scale should be studied. A sediment analysis should document in-stream base levels and help in monitoring any culvert and upslope stabilization problems or corrections, and determine the effectiveness of any road upgrading or decommissions.

Species and Habitats - Aquatic
Instream Habitat Restoration: Use instream habitat data (ODFW stream surveys where available) to locate potential restoration opportunities. Add wood and boulder clusters to streams where that would be benefit aquatic organisms. Streams to investigate, in order of priority, are:

- Beaver Slide Creek (T. 26 S., R. 10 W., Sec. 35) - add wood for structure to improve habitat complexity and pool frequency.
- Mainstem Tioga Creek, BLM administered lands
- Mainstem Williams River, Sections 10 and 14
- Mink Creek, Reaches 1, 2 and 3- add wood for structure and to improve pool frequency
- Cox Creek, Reach 4 and Tributary A- add wood for structure
- Arrow Creek Tributary, Reach 2- add wood to improve pool frequency
- Coal Creek, Between the new concrete culvert and the mouth.

Riparian Restoration: Use conifer release or alder conversion techniques to reestablish conifers within riparian areas. Conifers have a difficult time establishing and surviving within the natural stream bank disturbance zone. Generally this disturbance zone is within 10-feet of the stream channel. Therefore, retaining a no-cut buffers that are at least 10-feet wide next to the stream channel and reestablishing conifers farther back from the stream planting outside that zone should help meet short term objectives using passive restoration and long term objectives using active restoration. The 10-foot wide no-cut buffers recommended here represent the minimum width. Optimizing attainment of both short term and long term Riparian Reserve function may require wider no-treatment and/or special treatment buffers. See the Density Management and Conversion Treatment and Attaining Riparian Reserve Function recommendations subsection. Take into consideration possible future timber harvest activities on private lands that may influence stream temperature as well. Further investigation is needed, but potential conifer release and alder conversion sites include Tioga Creek and it's tributaries, Coal, Mink, Panther, Upper Cedar, Renfro Creeks, and Arrow Creek Tributary.

Consistent with the Timber Management Guides TM-1a, b, and c (USDA; USDI 1994 pg 31-32) retain on the site, or relocate within the Riparian Reserve or place in stream, the woody material that blows down across the roads that are inside the Riparian Reserves. Place relocated wood as close to the site of origin as possible.

Culverts: Complete culvert condition surveys on BLM controlled roads and at perennial stream crossings. Set priorities according to aquatic organism values and refuge habitat access. Pursue removal

or replacement opportunities. Priorities should focus on Late-Successional Reserves and the Tioga Creek Tier 1 Watershed. Design replacement culverts to pass all aquatic organisms where possible. Specific culverts to check would include Ren Smith Cr., Panther Creek (Sect.4 and Sect.2) and roads 26-9-2.1, 26-9-16.8; 26-9-16.7B (end); 26-9-22.0 B, C, D; 26-12-5.0, -4.2; 27-12-5.0. Consideration should also be given to funding culvert replacements on private lands through cooperative projects with watershed associations and private landowners.

Transportation Management Objectives: The roads that are the highest priority for closing, from an aquatic protection perspective, are those roads next to streams in both the Tioga Creek Subwatershed and in the LSR. Where opportunities exist, pull all culverts crossing perennial streams and decompact the road surface by subsoiling or by other appropriate means suited to the site. Work with right-of-way agreement permittees to close as many roads as possible.

- Specific roads that are high priority and have been field reviewed include:
  - *26-10-25.1* (Upper Hog Ranch)- there are 3 culverts on intermittent streams to pull out on this road. The road should also be subsoiled and blocked.
  - *26-10-24.2B,C* (Upper Watertank)- BLM portion only- tank trap only, no culverts to pull, located on stable ground. There are density management opportunities in this area so the road may be needed in the future.
  - *26-10-23.3G* (Hatcher Ck.)- this road is already closed to vehicular traffic, however it parallels the stream and has 8 culverts that should be removed. At least half of the culverts are plugged causing the water to be diverted down the road bed. Two have large fills and the rest have small fills. None of the streams are fish bearing but would have amphibian habitation. Equipment access is poor down this road. A hand crew would be preferable to machinery in order to minimize vegetation disturbance on the road bed.
  - *26-10-35.08* (Beaver Slide Ck.) - this road, which is under private control, parallels a highly productive stream reach on both public and private lands. Consideration should be given to decommissioning portions of the road if the private timber company grants permission to do so.

- The following roads have been identified for closure under the Tioga TMO's however field review for culvert pulling and potential subsoiling still need to be completed by an ID team:
  27-9-5.0 26-9-21.1E 27-9-5.1 26-9-21.3

- Other roads that may be high priority for closure, but have not been field reviewed include:
  25-10-35.0B,C; 26-10-23.3G (the BLM portion); 25-9-30.0, -34.0; 26-7-31.0 (end); 26-8-5.2B, -21.0; 26-9-3.0B, -3.1, -9.1, -32.0B, -16.4, -16.6.

Watershed Scale Cooperation: Work closely with the Coos Watershed Association to develop restoration opportunities on private lands. Set priories for proposed projects, regardless of ownership, to achieve the greatest ecological benefits. Many of the best opportunities are in estuary, wetland, and low gradient habitats. Priority instream/riparian restoration areas are on Daniels, Morgan, Ren Smith and Mink Creeks. Priority road decommissioning activities are on Beaver Slide Creek (26-10-35.08), Coal Creek (25-10-35.0A) and Hatcher Creek (26-10-23.3G) roads.

Aquatic Habitat Restoration

To achieve the ecosystem management goals and objectives of the NWFP and the RMP, aquatic restoration projects should be designed to mimic the physical and biological characteristics of natural stream systems to the greatest extent possible. These projects should incorporate natural structural components, such as large down wood and boulders, and be designed to provide the complex habitats necessary to support full range of native species associated with these aquatic ecosystems. Additionally, instream projects should be patterned to mimic structural features of physically and hydrologically

similar natural streams, and located based upon drainage level analyses of restoration needs rather than individual reaches.

Under the Aquatic Conservation Strategy, key watersheds, like the Tioga Creek Subwatershed, are the highest priority for watershed restoration. The "watershed restoration" component of the Aquatic Conservation Strategy identifies areas of focus for restoration activities. They include roads, riparian vegetation, and in-stream habitat structures.

Culverts:

- Complete culvert inspection and inventory. Replace culverts found to be barriers to fish passage as funding becomes available. When funding is not adequate to fix or replace all fish barrier culverts base culvert replacement priorities on the availability of habitat above the crossing, and on the relative constraint to passage caused by the existing culvert.
- Fish distribution should guide culvert repairs. Culverts crossing perennial streams above the known range of fish distribution should receive the next highest priority for inspection and repairs.

Debris torrents are the primary material delivery mechanism to downslope fish bearing streams. The restoration of large conifer as a component to hillslope processes will provide large wood to the stream channels in the future. Streams, on steep slopes, that form confluences converging at angles of ?45° are important for delivering boulders, gravel, and large woody material to downstream fish bearing streams. Other important sources of large wood are the steep straight tributaries that feed directly into fish bearing streams. Many of these sites are now dominated by red alder trees that regenerated following a management disturbance. These sites are high priority locations for reestablishing conifers. Treatments should be concentrated within one to one and a half site potential tree widths from the stream channel.

Many portions of Tioga Creek and major tributary streams rely more on stream side processes and individual trees falling over than a regular occurrence of debris torrent scale hillslope processes to provide in-stream woody structure. Included is lower Tioga Creek and tributaries below the West Fork, the West Fork Tioga Creek and tributaries, as well as much of the subwatershed above section 8, T.27S., R.9W. Not only have many of these streams been cleared of logging debris and natural log accumulations, but the scale of disturbance up the riparian zones has resulted in a red alder dominated Riparian Reserve. The restoration of these Riparian Reserves to include a large conifer tree component, is important in providing future large woody structure to the stream channels. Priority streams should include the lower Tioga Creek, the West Fork Tioga and tributaries, Burnt Creek, Hog Ranch Creek and Shotgun Creek.

Select in-stream project sites with the assistance of a hydrologist. Use the Rosgen (1994, 1996) stream classification system and Rosgen and Fittante's (1986) suitability guidelines for selecting and evaluating in-stream fish habitat improvement projects to ensure that they are appropriately matched to habitat sites based on stream and valley form characteristics and located based upon drainage level analyses of restoration needs rather than individual reaches.

- In-stream habitat restoration structures proposed for the Rosgen type B channel portion of Tioga Creek should incorporate design features that mimic naturally occurring large log jams.
- Existing habitat improvement projects in Tioga Creek Subwatershed are concentrated in the Rosgen type C channel. Structural complexity should be increased in these project areas in lower Tioga Creek. Clusters of pre-commercial to commercial thinning sized conifers should continue to be added to pools at existing project sites, however they have only short term functions.

On sites where an abundance of large conifer trees exist, tree lining/cutting should be considered to provide long term structural complexity. The following items should be considered when tree lining is

proposed:

- At each site, select a large live tree that can serve as a "key", spanner conifer log, 2 to 3 times the width of the active channel, with root wad attached. This log should be placed perpendicular to, or angled downstream from, the stream channel.
- A minimum of 2 additional live conifer "brace" logs should be selected and placed on top of the key piece and at an angle to the key log. This will provide different obstruction angles for high stream flows to interact with streambanks and flood plain.
- Additional hardwood trees could be added to the accumulation to contribute twigs, branches, and additional edges.
- Consider other wildlife needs when designing this type of project.
- If line pulling/cutting creates individual gaps greater than a 10^{th} of an acre the ID team should evaluate the need for further treatments to facilitate tree regeneration.

Avoid placing cut logs of lengths less than 2 to 3 times the active channel width in the stream channel. If selected, expect these log to be floated downstream. Anchoring logs at a site is an option. It should be done with large boulders and steel cable should be avoided.

Large whole conifer trees or large conifer logs should be incorporated into the design and configuration of existing or future boulder weirs, vortex weirs, boulder clusters, or boulder/log jams. Large boulders should be used as anchors/wedges to secure logs in place. Structures should resemble the remnants of a debris torrent or land slide which were the dominant natural in-channel habitat feature in Tioga Creek and many of the tributaries.

Log jams are important contributors to the biologic and hydrologic process of streams and rivers. They are especially important in maintaining watertables for low flow releases, and for causing interactions of the stream or river with the flood plain. Log jams should be retained unless there is compelling risk of damage to the environment or property. An interdisciplinary team (ID) including a hydrologist should review all log/debris jam removal proposals to evaluate both ecological affects and risks to adjacent landowners. This ID team should consider ways to modify the log jam without total removal to meet desired habitat objectives, while assessing the risks to adjacent private property and fish passage. Access to important spawning or rearing habitat should be maintained.

Coordinate with ODFW to relocate problem beavers trapped on agricultural lands to streams on BLM lands.

Species and Habitats - Wildlife:

Threatened and Endangered Species: Implement BLM Policy 6840.06(A) for threatened and endangered species with emphasis on the following:

- Conserve T/E species and the ecosystems on which they depend.
- Ensure that all actions authorized, funded, or carried out by the BLM are in compliance with the ESA.
- Cooperate with the FWS/NMFS in planning and providing for the recovery of T/E species.
- Retain in Federal ownership all habitat essential for the survival or recovery of any T/E species, including suitable habitat that was used historically by these species.

Each of the four species (marbled murrelet, northern spotted owl, peregrine falcon and bald eagle) has a Recovery Plan that outlines specific goals. Implement these Plans and follow their steps to provide secure habitats and increase populations to levels where it may be possible to delist the species.

Bald eagle: On suitable sites, inside the Riparian Reserve and LSR, design density management treatments to obtain and retain habitat favorable for bald eagle. Suitable sites are ridges and windward slopes that are within approximately 1-mile of Coos River down stream of Tioga Creek. Pending on the ground examination, potential sites on BLM land may exist in the following sections:

Township	Sections	Township	Sections
T.25S., R10W	27, 29, 31, & 33	T.25S., R.12W.	35
T.26S., R.9W	17 & 18	T.26S., R10W.	3, 5, 6 & 11
T.26S., R11W.	1 & 6	T.26S., R12W.	1 & 2

Field verifications would determine if Coos River is directly visible from potential roost trees. Design density management treatments to obtain large dominant trees with an open branching pattern, and to obtain large snags. Design Matrix timber sales, on those sites where field examination finds a potential for bald eagle habitat, to include retaining and culturing large open branched trees, large snags, and protective screens. The Bald Eagle Recovery Plan requires protective buffers around occupied sites.

Maintaining full Riparian Reserves along the river area would also preserve future nesting options for eagles. The Pacific Bald Eagle Recovery Plan identified habitat loss as the primary threat to bald eagles (U.S. Fish and Wildlife Service 1986). In addition to habitat needs, bald eagles require a nesting area free of unusual disturbance to complete their nesting cycle. The recovery plan identifies criteria for minimizing disturbance to nesting bald eagles (U.S. Fish and Wildlife Service 1986).

Special Status Species That Are Not Federally Listed: Meet the general management objectives for species of consideration:

- Ensure that actions authorized on BLM-administered lands do not contribute to the need to list special status species under provisions of the Endangered Species Act (BLM Policy 6840).
- Maintain or restore a landscape conducive to movement of individuals among habitat patches.

Survey and Manage/Protection Buffer Species: Maintain the viability, at both site-specific and range-wide scales of Survey and Manage/Protection Buffer Species. Apply the appropriate protocols during project planning so as not to impact species viability.

Bats: Improve bat roosting opportunities on four BLM-controlled bridges by installing bat boxes or other structures. No improvements to increase the sun exposure are recommended for these bridges. Upper Tioga Creek #2 (Tie Road) and South Fork Coos River (Mainline) bridges are fully exposed to sunlight for most of the day (Keeley 1998). Topographic shading and shading by an old growth stand prevents sun exposure to Upper Tioga #4 (Coos River Mainline); due to these factors it is not recommended to try to improve sun exposure to this bridge. Sun exposure is limited on the Upper Tioga Creek #3 (junction) bridge due to topographic shading.

Potential Sites to Improve Bat Habitat on Bridges in the Watershed.

Site name	Legal	Improve roost potential
Upper Tioga Creek #2 (Tie Road)	26-9-31 SW	X
Upper Tioga Creek #3 (junction)	26-9-31 SE	X
Upper Tioga #4 (Coos River Mainline)	26-9-31 NW	X
South Fork Coos River (Mainline)	26-9-19	X

Road Closures: To reduce fragmentation of the Connectivity Blocks, close spurs within this LUA in the

following areas:

Sect. 34, T.25S., R.9W.
Ren Smith area
Closure of spurs off the 25-12-35.0 and 26-12-1.1 roads

Snag Management on Matrix Land: Manage second growth stands to attain the snag sizes, numbers, and decay classes that will support 40% of potential population levels of those primary excavator species that can use 17-inch and smaller snags by age 50-years, and all primary excavators by time of regeneration harvest. Techniques could include but are not limited to using commercial thinning, individual tree culturing, snag creation as part of timber sale projects, or green tree retention with snag recruitment from those green trees in the future.

The following table shows the minimum sizes and numbers of snags that will meet the 40% population level objective:

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 40 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)			
Number of snags needed to support a 40% population	11+	3	3	6	2.4	0.1
	15+	95	0	95	38.0	1.0
	17+	40	10	50	20.0	0.5
	25+	2	0	2	0.8	0.0
	Totals:	**140**	**13**	**153**	**61.2**	**1.5**

If any hard snags smaller than 19 inches, or any decay class 3 snags larger than 19 inches are used to meet the 40% standard for snag habitat in the Matrix, then we will need to retain an equal number of green trees, in addition to the ROD/RMP required green tree retention, to provide for future snag recruitment. Alternately, we could create sufficient snags from 19-inch and larger trees, at the time of the regeneration harvest, to insure meeting the hard snag component of the 40% habitat requirement with 19-inch+ decay class 1 and 2 snags. These actions will make it possible to comply with the 40% snag habitat over the near term standard and guidelines in the District RMP.

The following table shows the number of snags/ acre we need to retain in a regeneration unit to meet the RMP/ROD requirement to provide a least 40% snag habitat levels on Matrix land, with the per-acre requirements met on average areas no larger than 40 acres, in those areas where there are no suitable snags outside the regeneration unit boundary:

Regeneration unit size	Area outside the regeneration unit but inside the 40-acre neighborhood	Total number of snags needed to meet the 40% snag level in the 40-acre neighborhood	Snags/ acre needed on the regeneration unit, following harvest, if there are no suitable snags in the 40-acre neighborhood outside the regeneration unit.
40-acres	0	61.2	1.53
30-acres	10-acres	61.2	2.04
20-acres	20-acres	61.2	3.06
16-acres	24-acres	61.2	3.8
<16-acres	>24-acres	Increasing snag densities to greater than 3.8 snags/ acre inside the regeneration unit boundary may not result in greater numbers of primary cavity excavator birds. This is because territory size or other factors may be more limiting than snag numbers. Therefore, when the regeneration unit is less than 16-acres, ID teams should establish snag retention levels based on an estimate of the number of primary excavator birds that can occupy the 40-acre neighborhood.	

Snag Management: In the LSR, manage snags to meet the 100% population potentials for cavity dependent species (3.8 snags per acre). Recruit snags in drainages that are below the 40% population level, and allow drainages above this percentage to naturally reach the 100% level. Inventories on densities and composition would be needed before this recommendation could be implemented. See Brown *et al.* (1985) for snag composition and distribution recommendations, and the LSR Assessment for additional recommendations concerning snags in the LSR.

The Aquatic Conservation Strategy and the Density Management and Conversion Treatments recommendation sections contain snag recommendations for the Riparian Reserve.

Scheduling Projects and Road Closures: Avoid chronic ongoing disturbance by concentrating management activities spatially and temporally. To the extent practical, coordinate road closures with efforts to complete maintenance and restoration projects so when we finish the maintenance and restoration work we can close the road with the expectation that we will not need the road again in the foreseeable future.

Schedule regeneration cuts in the Matrix in a way that minimizes fragmentation:

- Harvest spatially disconnected late-successional patches before harvesting stands that are connected to large contiguous late-successional blocks.
- Select regeneration units from the edge of late-successional blocks instead of from the interior of large contiguous blocks

Density Management Inside the Riparian Reserves to Provide Wildlife Late-Successional and Connectivity Habitats: The following are recommendations to obtain the target characteristics listed in Table WL-5.

All Riparian Reserves:

- Meet ACS objectives by using an appropriate mix of passive and active management. The most sensitive parts of the Riparian Reserve, with respect to the near term benefits provided by the forest vegetation to the aquatic system, are those areas within a zone whose width is equal to the half the average height of the overstory trees. Outside that zone, ID Teams will have greater flexibility in both meeting ACS objectives, and providing for connectivity and benefitting late-successional associated species.

Riparian Reserves where connectivity between LSRs is the target characteristic and where species of consideration is the northern spotted owl (see Table WL-5 in Wildlife Section):

- Maintain at least a 40% canopy closure overall. Otherwise, follow the density management recommendations in this document. Entries in the column titled "Density Management based on conventional thinning spacings" on table DM-1 describe the limitations and benefits that come with managing for connectivity. The projected conditions given in that column were based on a 120 trees/ acre post-treatment stocking level. That stocking level was selected for analysis purposes only. Higher or lower stocking levels may be more appropriate depending on the conditions on a proposed project site.
- To obtain the sizes and numbers of trees, down wood and snags recommended in this document, consistent with retaining at least a 40% canopy closure, consider creating small gaps and/or wide spacing around individual trees to obtain some coarse limbed trees for nesting habitat, for future large snag and large down wood recruitment, and to provide large wood to meet ACS objectives.
- Create small gaps when that will benefit the species the northern spotted owl prey on.
- ID teams may want to consider decreasing canopy closure to less than 40% in those areas where the following three conditions can be met:
    - Treatment is consistent with ACS.
    - Treatment will set the stand on a trajectory to develop late-successional characteristics.

- Near by Matrix land can provide connectivity until the canopy closure in the treated area exceeds 40%.

Riparian Reserves where the target characteristic is late-successional habitat and the species of consideration are marbled murrelets and bald eagles (see Table WL-5 in the Wildlife Section):

- Follow the density management recommendations in this document. The benefits and limitations of these density management projects, may fit the descriptions either under the "Density Management based on conventional thinning spacings" column or the "Density management with the objective of rapid diameter growth for overstory trees and regenerating an understory" column in Table DM-1, or may be a blend of both sets of descriptions.
- See the bald eagle subsection of the wildlife recommendations for additional bald eagle habitat management recommendations.

Riparian Reserves inside the LSR:

- Follow LSR Assessment recommendations.
- Integrate treatments inside and outside the Riparian Reserves so they fit the larger landscape.

Species and Habitats - Botanical Species

Additional inventories, including on the ground surveys, are needed to identify, classify and set restoration priorities for the entire Watershed. Act on restoration opportunities as they are identified through the ID team process.

Restoration and protection of fire dependent scarce habitats will require the use of fire or a management action designed to emulate the affects of fire. These restoration opportunities include restoring or expanding small prairies associated with rock outcrops, and reestablishing fire prairies.

Obtain and propagate seed from native plants for restoration purposes.

Species and Habitats - Noxious Weeds

The most effective noxious weed strategy is to prevent their introduction in the first place. The second most effective method is to not allow noxious weeds to become established by immediately treating newly infected sites before the weeds can spread. Treat new infection centers as soon as possible, consistent with applying treatment during appropriate biological windows.

- The isolated occurrences of broom in the Bateman area should have priority in being treated. Roadside broom in this area has spread from a landing at the end of the 25-8-30.0 road into an adjacent plantation.
- Monitor the cat trail around FOI unit 242393 (Sec. 24,T27S.,R.9W.) for gorse resprouts and germinants. Retreat this area as needed to prevent gorse establishment.

Continue identifying infection centers, controlling, monitoring and retreating, as needed, the broom along the Burnt Mountain Road. Expand the program to other areas as needed.

To prevent the spread of broom, wash vehicles used in the broom infected in the northern part of the Umpqua Resource Area before deploying those vehicles to the infection free/ lightly infected areas in the southern part of the Resource Area.

Manage noxious weeds consistent with the current District noxious weed E.A., and with the "Prototype Weed Prevention Measures" in Appendix 4 of *Partners Against Weeds an Action Plan for the Bureau of Land Management* (USDI 1996b).

Human Use

The Tioga Creek Recreation Site, as it is proposed, would be at risk of flood damage, and may increase the risk of vandalism to the Tioga Creek stream gauge, which is on the same site. Pursue development of this and other recreation sites only after we are certain of a demand for developed campgrounds in the Watershed. If we carry out the proposal to build a Tioga Creek Recreation Site, locate the campground outside the flood plain.

If we develop recreation facilities in Riparian Reserves, design those facilities so as not to prevent meeting the ACS objectives, and document this through the NEPA process.

Consider converting long roads, identified through the TMO process for decommissioning, into trails. These trails will provide access for administrative, fire control, and recreational purposes. We can convert the decommissioned roads into trails by using those portions of the road bed left intact after decommissioning, and constructing short trail segments to provide access around where we pull culverts or where road fills have been pulled back. The most cost effective time to convert a closed road to a trail may be at the time the road is closed and culverts pulled.

Discourage the establishment of new dispersed camp sites next to streams by blocking all temporary streamside access spurs upon project completion.

If we find one or more dispersed camp sites preventing the attainment of the Aquatic Conservation Strategy Objectives, exhaust options to remedy the problem(s) that do not involve closing the sites to camping.

Aquatic Conservation Strategy

Riparian Reserve Widths: When considering altering Riparian Reserve widths, follow procedures for site evaluation outlined in *The Riparian Reserve Techniques and Synthesis - Supplement to Section II of Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis Version 2.2* (RRTT 1997). The Ecological Protection Width Needs Diagram (FEMAT 1993 pg. V-38, and USDA; USDI 1994 pg. B-15) provides guidance as to needed reserve widths based on slope and rock type. The following sections and maps in this Watershed Analysis contain information needed by an ID Team that is proposing and analyzing changes to the Riparian Reserve boundaries:

- ACS Appendix - B: Aquatic Conservation Strategy Objectives and Wildlife Species,
- ACS Appendix - C: Aquatic Conservation Strategy Objectives and Botanical Species,
- Map Erod-1: Shaded Relief of Probable Mass Wasting,
- Map Erod-2: The Timber Production Capability Classification Map of the South Fork Coos Watershed.

The South Fork Coos Watershed Analysis, combined with a site specific NEPA analysis, can support a "Level I Analysis" that can result in alterations to the outer half of the interim Riparian Reserve on up to 10% of the intermittent stream reserve acres. Additional analysis will be needed if a proposed change would affect more than 10% of the acres or if the proposed change would reduce the Riparian Reserve width to less than half the site potential tree height.

Survey for the following J-2 species on sites that would be affected by a proposal to delineate a Riparian Reserve width that is less than the interim width:

- Wildlife: Papillose tail-dropper, blue-grey tail-dropper, Oregon megomphix, southern torrent salamander, and tailed frog. Three others that are not J2 species but should be considered are the Del Norte salamander, white-footed vole and bald eagle. ACS Appendix - B contains the analysis used to arrive at this list of species, and additional discussion.

- Botany: *Kurzia mackinoana, Bensoniella oregana, Helvella compressa, Leptogium saturinum,* and *Cetralia cetrarioides.* ACS Appendix - C contains the analysis used to arrive at this list of species and a discussion on habitats and the likelihood of finding each of these species in the Watershed.

Post-Catastrophic Event Salvage: Allow salvage operations inside the Riparian Reserve when necessary to attain the ACS objectives and so long as present and future woody debris needs are met (USDI 1995). In the context of the ACS objectives, salvage activities inside the Riparian Reserve may be needed and therefore justifiable to obtain sufficient planting spaces for rapid reforestation, and to reduce hazards created by a catastrophic event that may further threaten the function of the Riparian Reserve. If a catastrophic disturbance occurs in the Watershed, apply the salvage and CWD retention guidelines in the South Coast- Northern Klamath Late-Successional Reserve Assessment (USDI; USDA 1998, pg. 72, 73) to the Riparian Reserve:

- The following recommendations for minimum down wood retention following partial salvage are based on Spies and Franklin (1991), Spies *et al.* (1988), and Ursitti (1990):
  - First site potential tree height – 3,600 - 9,400 cubic feet/ acre (includes all wood 4-inches in diameter and 1-meter long and larger).
  - Second site potential tree height– 1,600 - 2,300 cubic feet/ acre (includes all wood greater than 4-inches on the large end).
- Retain all green conifer trees likely to survive. On sites supporting hardwood stands that are not candidates for hardwood conversion, retain green hardwoods to the extent that doing so will allow attainment of the ACS objectives and will allow the replacement stand to be put on a trajectory to develop late-successional/ old-growth characteristics.
- Retain all soft snags to the extent practical. Following a salvage activity that is in response to large scale disturbances, retain at least 24 hard snags per acre of the largest diameter available on-site, and that are greater than 16-feet tall.

Retain, and save to the extent practical all decay class III - V down wood. Retain sufficient decay class I and II down wood to insure an adequate future supply of decay class III -V down wood.

Should blowdown occur next to a stream, retaining those trees that fall across or into the stream to the extent consistent with protecting habitat and down stream values. Retention of blowdown material in the streams will allow that material to provide dead shade and by that partially mitigate the loss of shade from standing trees.

Density Management and Conversion Treatments and Attaining Riparian Reserve Function
The following recommendations are for Riparian Reserve stands that are less than 80-years old:

Snags: Several of the following snag management recommendations are drawn from the LSR Assessment (USDI; USDA 1998). The intent is to provide consistency between the recommendations for the Riparian Reserve and the Late-Successional Reserve.

Manage stands to attain snag sizes, numbers, and decay classes that will support 100% of potential population levels of those primary excavator species using the Watershed by stand age 100-years.

Use stand growth models, or other techniques, to design density management treatments to put the stands on a trajectory to produce 17-inch dbh snags by age 60-years, and 20-inch dbh and larger snags by age 100-years.

If it is necessary to kill trees to provide snag and down wood habitat, select trees to kill from among the smaller two-thirds of the trees in the stand. Killing trees from among the larger third of the trees in the stand will delay attainment of other late-successional attributes and would select against the trees that are best adapted to the site.

The following table shows the minimum sizes and numbers that will meet the 100% population level objective:

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 40 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)			
Number of snags needed to support a 100% population	11+	8	8	16	6.4	0.2
	15+	237	0	237	94.8	2.4
	17+	100	24	124	49.6	1.2
	25+	6	0	6	2.4	0.1
	Totals:	**351**	**32**	**383**	**153.2**	**3.8**

The above table shows the minimum sized snags that the primary excavator species can use. The primary excavator species prefer to use larger snags when available (20-inch dbh minimum, at least 30-inch dbh average). Therefore, manage Riparian Reserve stands to provide 3.8 snags per acre greater than 20-inches dbh by age 100-years, where it is practical to do so without delaying attainment of other late-successional habitat attributes or preventing attainment of ACS objectives in the long term.

On a site by site bases, ID teams may defer attaining snag levels supportive of 100% of potential population levels if the ID team finds that attaining the snag recommendations would delay attainment of scarce late-successional habitat attributes, or would prevent the attainment of ACS objectives in the long term.

ID teams may defer delay killing trees to attain target snag levels if post-treatment mortality following a density management treatment is predicted. However, at least 3 snags per acre on north facing slopes and 1 snag per acre on south facing slopes will be retained on completion of any density management treatment.

Down Wood: Manage stands so that when the stands are 80-years old, they will have the potential to attain the following levels of down wood. These recommendations for down wood attainment are based on Spies and Franklin (1991), Spies *et al.* (1988), and Ursitti (1990):

- First site potential tree height – 3,600 - 9,400 cubic feet/ acre (includes all wood 4-inches in diameter and 1-meter long and larger).
- Second site potential tree height– 1,600 - 2,300 cubic feet/ acre (includes all wood greater than 4-inches on the large end).
- At least 255 cubic feet of decay class I or II[2]. Where possible and consistent with obtaining other late-successional stand characteristics, obtain decay class I and II amounts comparable with the upper end of the range observed in old-growth (385 cubic feet/ acre). These higher levels would enhance habitats for large woody debris associated species and would compensate for those areas where large

[2] ROD/RMP CWD direction for the Matrix rule is retain at least 120 lineal feet of decay class I & II logs that are at least 16"X16'. A 16' long log, 14" small end & 16" large end, contains 19.7 cubic feet. If we obtain the minimum standard of 120 lineal feet of logs that are 16'X16" (7.5 16-ft logs/ acre), we will have 147.75 cubic feet/ acre. Spies & Franklin (1991) show the following levels of decay class II material 4" diameter & larger by age class: 13 to 64 cubic feet in 40 to 80-yr old stands; 56 to 255 cubic feet in 80 to 195-year old stands and 137 to 385 cubic feet in older stands.

woody debris amounts are near or below the natural variability.

Meeting these levels of down wood may be unobtainable or in some cases undesirable in younger stands. However, density management treatment designs should put stands on a trajectory to attain these levels by stand age 80-years, or provide for supplementing down wood levels through future projects.

Stand Selection for Density Management:

- Focus efforts on stands that were regenerated following timber harvest and on previously thinned stands.
- The higher priority stands for density management are the younger stands because they will more readily respond to treatment. These are stands between 25 and 45-years old.

Density Management and Landscape Patterns: Manage for landscape level diversity rather than attempting to maximize diversity within all stands. A practice of maximizing within stand diversity in all stands will result in decreased diversity between stands and by that lower landscape level diversity. Use fire patterns as a model for managing for landscape level diversity. Sources of information on fire patterns applicable to the South Fork Coos Watershed are in:

- The Tioga Appendix: Fire History
- Managing for Landscape Level Diversity Appendix
- South Coast - Northern Klamath Late-Successional Reserve Assessment (USDA; USDI 1998): Appendix B. - Fire History, Patterns, and Stand Level Effects in the Hemlock Zone.

These sources indicate forests that regenerated following a single stand replacement fire, which were not subsequently modified by a moderate severity disturbance, exhibit the following landscape patterns:

- Stands on the north aspects and riparian areas exhibit the greatest stand structural complexity
- Stands on south aspects tend to be more uniform, less structurally complex but do exhibit characteristics that are less common on the north aspect stands.
- Benches, riparian zones, moist stable headwalls, and areas subject to frequent low to moderate severity fires are the most likely areas for green tree patches to survive stand replacement events.

Density Management Design Features to Provide and/or Protect Habitats: Minimize soil and litter disturbance and the loss of down wood by using the least ground disturbing logging system practical for the site. This would benefit terrestrial amphibians (Density Management Appendix). On projects where we will need to do site preparation to obtain understory regeneration, provide refuge areas like untreated patches, and clusters of large woody debris. The Density Management Appendix suggests other activities to consider in density management projects that will benefit wildlife and protect or provide wildlife habitats.

Retain existing stand level diversity. For example retain wolf trees, remnant old trees, and large down wood. Retain hardwoods to the extent that their retention does not prevent or delay attainment of late-successional characteristics.

On appropriate locations on the landscape, increase stand level diversity by cutting gaps, leaving unthinned clumps, and creating snag patches. Intentionally increase the size of natural gaps by cutting and removing trees around rock outcrops, and thin soil-rockland areas.

No-treatment and Special-treatment Buffers next to Streams: Table DM-1 describes the opportunity costs and benefits associated with both passive and active restoration strategies with respect to attaining the intended functions of the Riparian Reserve. ID Teams can use the information in Table DM-1 to develop stand prescriptions that combine passive restoration and active treatments to optimize stream, riparian stand and upland forest restoration. The decision space described by Table DM-1 is as follows:

- The analysis in Table DM-1 shows the minimum no-treatment forested buffer needed along streams to have a width of 20-feet or a width equal to half the tree crown diameter of the streamside trees, whichever is wider. A 10 to 20-foot no-treatment stream side buffer is recommended next to brushfield conversion projects.
- Functionally, the widest forested buffer needed to protect aquatic values is a width equal to half the height of the overstory trees on the site at the time of treatment. These buffers are zones where passive and active restoration strategies are blended to optimize short term protection with long term restoration. ID teams may identify sites where it is appropriate to use no-treatment buffers that are wider than 20-feet or wider than half a tree crown width. However, relying solely on a passive restoration strategy can greatly delay attainment of some Riparian Reserve functions and perpetuate stand conditions associated with densely stocked plantations.
- Table DM-1 shows an array of treatments next to streams and buffer widths, which fall between the extremes described above, can benefit attainment of both aquatic protection and Riparian Reserve function. This is provided the buffers are designed to meet site specific needs and the prescriptions take advantage of protection provided by aspect and topographic position.
- The no-treatment and special treatment buffers widths discussed above are based on slope distances.

Stand conversion projects:

Threshold for considering conversion treatment - Mixed stands with 40 or 50 well-spaced, established, free to grow conifer per acre may be on a trajectory to become old-growth without additional treatment.

Deciding between a conversion or a release treatment - Give higher priority to treating stands with releaseable conifer than to stands that have to be converted by cutting down the current stand and starting over. Stands with at least 40 well-spaced releaseable conifers per acre are candidates for a release treatment.

On sites where alder stands will be converted to a conifer or mixed stands:

- Retain all releaseable conifers.
- Retain existing conifer snags and conifer CWD.
- Retain myrtles, bigleaf maples, and other long lived hardwood trees to the extent it is compatible with establishing a conifer component on the site.
- Where large live myrtles and bigleaf maples are present on conversion units, ID teams may want to experiment with providing cavity habitat by pruning up to 3 large limbs/ acre. This would encourage formation of rotten limb stumps that can eventually provide cavity habitat for excavator species.
- Where practical, retain at least two alder logs/ ac that are at least 12 inches in diameter on the large end and at least 16 feet long. When the alder trees in a stand are too small to generally supply 12 inch or larger diameter logs across the unit, then the ID team is encouraged to set CWD retention levels compatible with the piece sizes the alder stand can provide.

References

Brown, E.R. et. al. 1985. *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington*, 2 vol. USDA, FS, PNW. Portland, OR.

FEMAT. 1993 *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment*. Portland, OR.

Keeley, B. 1998. *Bat Use of Bridges, Bureau of Land Management, Coos Bay District*. Bat Conservation International, Inc. Austin, TX. 15 pp.

Riparian Reserve Technical Team (RRTT). 1997. *Riparian Reserve Evaluation Techniques and Synthesis Supplement to Section II of Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis Ver 2.2*. REO Portland, OR.

Rosgen D.L., 1994. *A classification of natural rivers*. Catena. 22:169-199

Rosgen, D.L. 1996. "Applied River Morphology" Wildland Hydrology, Pagosa Springs, Co.

Rosgen, D.L.; Fittante, B.L. 1986. *Fish Habitat Structures- A Selection Guide Using Stream Classification*. 5th Trout Stream Habitat Improvement Workshop. Lock Haven Univ., Lock Haven, PA. Penn. Fish Comm. Publics, Hamsburg, PA.

Niemiec, S.S; Ahrens, G.R.; Willits, S.; Hibbs, D.E. 1995. *Hardwoods of the Pacific Northwest*, For. Res. Lab., Ore. St. Univ., Corvallis. Contribution 8 115 pg.
Spies, T.A.; Franklin, J.F.; Thomas, T.B. 1988. *Coarse Woody Debris in Douglas-fir forest of Western Oregon and Washington*. Ecology, 69(6):1689-1702.
Spies, T.A.; Franklin, J.F. 1991. *The Structure of Natural Young, Mature, and Old-growth Douglas-fir Forests in Oregon and Washington*. pg. 91-109. in Wildlife and Vegetation of Unmanaged Douglas-fir Forests.
USDI. 1995. *Coos Bay District Record of Decision and Resource Management Plan, May 1995*. Coos Bay Dist.-BLM, North Bend, OR. 99 pp. plus appendices and maps.
USDI. 1996b. *Partners Against Weeds An Action Plan for the Bureau of Land Management*. 41pg.
USDA; USDI 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl - Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*. FS; BLM, Portland OR.
USDI; USDA. 1998 *South Coast - Northern Klamath Late-Successional Reserve Assessment - Final May 1998*. On file Coos Bay Dist.-BLM, North Bend OR.
USFWS. 1986. *Recovery Plan for the Pacific Bald Eagle*. USFWS. Portland, OR.
Ursitti, V. 1990. *Riparian Vegetation and Abundance of Woody Debris in Streams of Southwestern Oregon*. Thesis. Ore. Stat. Univ. Corvallis.