Appendix F

Riparian Management Objectives

Resource Management Objectives (RMOs)

Riparian and aquatic ecosystems on the PNF are managed to achieve specific riparian objectives as presented in the SAT Guidelines. Each of the 10 riparian objectives is listed below followed by a discussion that includes current conditions, project design features, and standard management requirements that achieve those objectives.

1) *Maintain or restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems. Water quality parameters that apply to these ecosystems include timing and character of temperature, sediment, and nutrients.*

Sediment

- BAER work and fire suppression rehabilitation work completed after containment of the fire including aerial mulching and mastication would be preserved. Field observations have shown these activities to be very effective in delaying erosion of soil. If harvest activities (particularly along cable and skyline corridors) disturb the rehabilitation efforts the work would be reestablished on the ground.
- To minimize erosion from ground-based harvest units, only 8.7 percent of the total burned area is proposed to be harvested with mechanical equipment. Slope limitations of less than 35 percent (25 percent on granitic soils) are included as a Standard Management Requirement for ground-based equipment operation. Another 9 percent of the burn area would be treated through less erosive methods (according to McIver and Starr, 2000) via cable yarding, helicopter, or contour falling.
- All temporary roads constructed for unit access would be subsoiled and reforested. This would decrease compaction, increase percolation into the roadbed, increase soil stability, and limit concentrated flows as well as surface erosion derived from these temporary roads.

Temperature

- Water temperatures within Indian Creek are moderated by dam releases from lower depths of Antelope Lake (RFEIS Pages 131-132).
- Harvest within perennial stream buffers is limited by equipment exclusion zone 100 to 150 feet from the stream channel depending on slope class. Harvest trees within this buffer must be end lined out. Trees of the largest size classes would be concentrated within perennial RHCAs to further enhance stream shading on these productive fisheries.
- Natural regeneration within the green line zone is not expected to be significantly hindered by treatments; therefore natural recovery processes within streamside area will be allowed to mitigate stream temperatures.

2) *Maintain or restore the stream channel integrity, channel processes, and sediment regime under which the riparian and aquatic ecosystems developed. Elements of the sediment regime include the timing, volume, and character of sediment input and transport.*

The maximum erosion hazard for soil types within the project area, ranging from *low* to *very high,* suggests that channel development has occurred under significant sediment loads. With a highly erosive parent material it is likely that natural erosion of uplands will continue, however with the implementation of the action alternatives Standard Management Requirements focused on retaining channel integrity, channel processes, and background sediment regimes would be implemented.

- Ground-based harvest equipment would be limited to slopes less than 35 percent (25 percent for granitic soils) and restricted from within the area 100 to 150 feet from perennial streams(depending on slope), 50 to 100 feet on intermittent streams and 25 to 50 feet on ephemeral channels as well as meadows and wetlands.
- Full suspension of trees over stream channels, to retain bank stability and channel integrity protects bank stability.
- Retention of all green trees, except those required to be removed for standard operations, and snags provide for bank stability on all stream types.
- Application of Best Management Practices (RFEIS, Appendix C) would further protect channel integrity, channel processes, and help to reduce elevated sediment levels above background regimes.

3) *Maintain or restore instream flows to support desired riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges.*

- Runoff from uplands may be impeded as a result of enhanced ground cover obtained through the actions of lop and scatter as well as by reforestation.
- Within the immediate riparian areas, physical effects derived from in-channel large woody debris (LWD) would be sustained, as no natural in-channel debris would be removed and logs would be fully suspended across stream channels. Future recruitment of LWD would be encouraged through the snag retention standards (Table1, RFEIS Page 11) for channel morphology, channel function, and bank stability.
- There would be no green tree harvest within the project area.
- Instream flows would be assessed during equipment operations with respect to water drafting requirements.

4) *Maintain or restore the natural timing and variability of the water table in meadows and wetlands.*

Activities proposed in the project area are not expected to negatively impact timing and variability of water tables within meadows and wetlands. Compaction is a limited concern on the decomposed granitic soils within the project area. Compaction can be inversely correlated with porosity, percolation of water into the soil mantle, and the rate of transmissivity through the profile horizontally.

- Low ground pressure equipment would be required for 49 percent of the project area for Alternative A (100 percent for Alternatives C, D and E). Compaction within the remainder of the project area would be limited to temporary roads and

landings, both of which would be subsoiled after project completion (Table 4, RFEIS Page 16).

5) *Maintain or restore the diversity and productive nature of native and desired non-native plant communities in the riparian zone.*
   - Productivity within the green line would be further retained due to equipment exclusion (Table 1, RFEIS Page 11).
   - It is noteworthy that "riparian vegetation response is robust" throughout many of the watersheds.
6) *Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems.*
   - The proposed action includes a measure designed to concentrate larger snags of each size class within perennial RHCAs. On other RHCAs Standard Management Requirements would be implemented (RFEIS Pages 16 to 17).
   - Future woody debris recruitment would be secured through snag retention and retention of all green trees throughout the project area. Furthermore, as required by SNFPA, more than 10 percent of the total area would remain untreated.
   - Reducing the potential for future intense fires by removing excessive fuels provides that most large woody debris retained on site would be at substantially less risk of being consumed by future fires.
   - Areas outside of the riparian areas would be planted with native conifer seedlings to encourage rapid growth of coniferous vegetation. This would assure an adequate natural source of future LWD as soon as possible.

7) *Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian plant communities.*
   - Management Indicator Species are discussed in the RFEIS (Page 99).
   - The Biological Assessment and Evaluation provides a Willow and Alder analysis for riparian dependent species. Analysis results indicate no contribution to loss of viability of riparian dependent species.
   - Riparian zones (specifically the greenline), springs, seeps, and bogs would be identified and protected by equipment exclusion. Impacts would further be reduced by application of BMPs and other Standard Management Requirements (RFEIS Pages 16 and 17).
   - Topics discussed under RMOs #1 and #2 also apply here.

8) *Maintain or restore riparian vegetation to provide adequate summer and winter thermal regulation within the riparian and aquatic zones.*
   - The inlet/outlet pipe for Antelope Dam is located within the lower third of the dam. Releases from the reservoir provide adequately cold water to Indian Creek.
   - Harvest within perennial stream buffers is limited by equipment exclusion zone 100 to 150 feet from the stream channel depending on slope class. Harvest trees within this buffer must be end lined out. Trees of the largest size classes would be concentrated within perennial RHCAs to further enhance stream shading.

- Natural regeneration within the green line zone is not expected to be significantly hindered by treatments

9) *Maintain or restore riparian vegetation to help achieve rates of surface erosion, bank erosion, and channel migration characteristics of those under which the desired communities developed.*
   - The maximum erosion hazard for soil types within the project area, ranging from *low* to *very high*, suggests that channel development has occurred under significant sediment loads.
   - Harvest impacts within green line zone of stream channel buffer would be reduced by equipment exclusion, therefore natural recovery processes within streamside area would be allowed to mitigate stream temperatures.
   - It is noteworthy that "riparian vegetation response is robust" throughout many of the watersheds.
   - Within immediate riparian areas, physical effects derived from in-channel large woody debris (LWD) would be retained, as no natural debris would be removed and logs would be fully suspended across the stream channels. Future recruitment of LWD would be encouraged through the snag retention requirements (Table 1, RFEIS Page 11) for channel morphology, channel function and bank stability.
   - No hardened stream structures are considered within the proposed action that would limit stream channel morphology or migration.

10) *Maintain and restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within that specific geo-climatic ecoregion.*
   - Biological Assessment concluded that there would be no indirect effects on the Hardhead that may occur downstream of the project in Indian Creek (RFEIS Page 107).
   - Habitats for trout and macroinvertebrate populations would be maintained (RFEIS Page 130).