

Biological Assessment/Evaluation  
Threatened, Endangered, Proposed and Forest Service Sensitive Fish Species

**Smith River Road Management and Route Designation Project**

Klamath Province  
Six Rivers National Forest  
Smith River National Recreation Area

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## **I. INTRODUCTION**

The purpose of this assessment/evaluation is to review and evaluate the proposed Forest Service (FS) action, **Smith River Road Management and Route Designation Project**, in sufficient detail to determine what the proposed action's affect would be to any listed, proposed, or Forest Service sensitive (TES) fish species, coho salmon critical habitat (CH) or coho and chinook salmon Essential Fish Habitat (EFH) listed below.

This project would maintain and manage 469.76 miles of system road, remove and decommission 71.72 miles of system roads and 132.50 miles of non-system roads, and improve and add 46.96 of non-system road as motorized trail or as system roads.

The proposed action includes route designation, route closure, road maintenance, road decommissioning, route signing, and other activities necessary for providing and maintaining safe and efficient access. Road maintenance activities would involve correction of drainage problems to minimize impacts of roads on TES fish and habitat. Routine road maintenance projects help maintain the functionality of the designed drainage structures along roads. Many components of the proposed action (road maintenance, culvert removal/replacement, outsloping, barriers, roadside brushing) would be accomplished using heavy equipment.

Potential impacts to TES fish, CH, and EFH would be reduced by: 1) removing road-related sediment sources (such as failed crossings and road prism slides), 2) reducing the miles of road through decommissioning, 3) reducing hydrologic connectivity of roads, 4) replacing undersized culverts, outsloping, and constructing rolling dips to channel water off the road (stormproofing), and 5) road surface grading and routine road drainage and surface maintenance. Reducing risk to Port-Orford cedar, an important riparian tree species, would be accomplished by seasonal closures or downgrading to operational maintenance level (OML) 1 (year round closures).

The effects of the Smith River Road Management and Route Designation Project are expected to not adversely affect and be beneficial to TES fish, CH, and EFH. Existing road-related sediment sources which can affect salmonid spawning, incubation, rearing, and feeding success, and impact coho critical habitat will be reduced by removing failing stream crossings associated with decommissioning 200 miles of road. Hydrologic connectivity will be reduced through road decommissioning and road maintenance, which will further reduce the amount of fine sediment entering streams. Road maintenance will minimize the likelihood of surface erosion and reduce the transport of sediment on maintained roads to negligible levels.

### **Location**

The project area encompasses the entire Smith River National Recreation Area and Gasquet Ranger District of the Six Rivers National Forest, in Del Norte County, California (Figure 1). The legal location of the project spans from T19N R1E west to R4E, and south to T13N R2E west to R3E (Humboldt Baseline and Meridian).

### **Project Duration**

Implementation of this project would begin in 2007 and would be completed by the end of 2022, depending on available funding and workforce. Each annual allotment of work would be

programmed for the Normal Operating Season (NOS) of 15 May to 15 October.

### **Federally Threatened, Endangered, or Proposed Fish Species**

This biological assessment/evaluation is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (ESA) (19 U. S. C. 1536 (c), 50 CFR 402), and standards established in Forest Service Manual direction (FSM 2672.42).

This BA/BE tiers to the Forest-wide Reference Document dated March, 2004. The Reference Document contains the list of species considered, current management direction, species accounts, (on which the effects of the proposed actions are evaluated), and literature cited. This site-specific BA/BE contains information and analysis for the proposed action.

The following Evolutionary Significant Units (ESUs) of Pacific salmonids are listed under the ESA, are designated as Forest Service Sensitive and may have habitat within the action area(s) or be affected by activities occurring within the action area, or have designated Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

**Coho Salmon (*Oncorhynchus kisutch*)** Southern Oregon/Northern California Coasts (SONCC) Evolutionary Significant Unit (ESU), and designated Critical Habitat (CH).  
Status: Federally Threatened

See attached project area map (Figure 1) for location of CH and EFH.

### **Forest Service Sensitive Species**

**Steelhead (*Oncorhynchus mykiss*)** Klamath Mountain Province (KMP) ESU

**Chinook salmon (*Oncorhynchus tshawytscha*)** Southern Oregon/Northern California Coastal (SONCC) ESU

**Coastal cutthroat trout (*Oncorhynchus clarkii*)** Southern Oregon/ California Coasts (SOCC) ESU

### **Essential Fish Habitat**

The MSA, as amended by the Sustainable Fishery Act of 1996 (Public Law 104-267; U.S.C. 1801 *et seq.*), and its implementing regulations [50 CFR § 600.920(a)] require that before a Federal agency may authorize, fund or carry out any action that may adversely affect **Essential Fish Habitat** (EFH), it must consult with the National Marine Fisheries Service (NMFS).

**Chinook salmon (*O. tshawytscha*)** and **Coho Salmon (*Oncorhynchus kisutch*)** have designated EFH within the project area.

## **II. CONSULTATION TO DATE**

The project was initially discussed with the Six Rivers National Forest Fish and Wildlife Level 1 Team on 23 May, 2006. The Level 1 team visited sites in the project area on 29 August 2006. Specific sites visited focused on roads proposed for decommissioning (including specific culvert sites) that were within close proximity (500 feet) to CH and EFH. Discussion was focused on hydrologic connectivity and potential degree of fine sediment impacts to CH and EFH.

The Forest received a list of threatened, endangered and proposed species that may occur on the Forest on 22 September 2006 (Document # 475021455 92146).

Previous consultations on Forest Service road management actions have occurred on the Six Rivers National Forest and through out the range of coho salmon in the Pacific Northwest. These previous consultations include batch, programmatic, and plan level BAs and Biological Opinions (BOs) that have addressed the road maintenance, road decommissioning, culvert removal, and related road repair activities. These previous consultations on similar actions are used in this BA as references of scientific information for analyzing and determining effects of road management activities.

In 1997, NMFS issued a programmatic BO to the USFS and Bureau of Land Management (BLM) in northern California for routine and non-routine road maintenance and flood response actions (NMFS 1997), addressing effects to coho salmon (Northern California/Southern Oregon and Central California) and steelhead (Central California). In the 1997 BO, NMFS determined that routine road maintenance may result in minimal amounts of fine sediment delivered to stream channels. However, the potential for adverse effects to coho salmon, and steelhead, due to this minimal fine sediment input was negligible. Therefore, the likelihood of affecting survival of coho salmon or steelhead was negligible. NMFS also determined in the 1997 BO that non-routine road maintenance activities (culvert replacement, stormproofing, road repairs, bridge repair and replacement, and road decommissioning) have the potential to deliver fine sediment to streams, but would result in net benefits to stream habitat over time. Although these types of activities may result in a short-term delivery of fine sediment into channels either during implementation or during a following storm event, long-term benefits were expected as a result of these actions (and would not jeopardize the continued existence of coho salmon or steelhead). NMFS identified a low level of incidental take of coho salmon and steelhead from non-routine actions, and designated this low level of incidental take as “unquantifiable”.

NMFS determined similar effects from road maintenance and decommissioning activities in the 2003 BO for 10 Categories of Forest Service and Bureau of Land Management Programmatic Activities in Northwestern Oregon (NMFS 2003). During maintenance activities, NMFS determined that some sediment could enter stream channels from heavy equipment use and disturbance of soils, particularly during culvert replacement actions, and that short-term effects such as localized increases in fine sediment in certain stream reaches could occur. However, effects were unlikely to be prolonged, or result in substantial changes in substrate composition, or decrease growth or survival of freshwater life stages of listed fish species. If projects were successfully implemented, substrate quality should actually improve over time, because chronic sediment sources would be corrected.

In 2004, NMFS issued a new BO for the Northwest Forest Plan that included a plan-level analysis of effects of implementing the Aquatic Conservation Strategy (ACS). Analysis included specific effects of watershed restoration (including culvert replacement upgrades and road decommissioning) and S&Gs for road management. NMFS determined that implementation of road management S&Gs would minimize adverse effects to listed species and critical habitat, and that road upgrades would eliminate or reduce chronic and potential sources of sediment.

### **III. CURRENT MANAGEMENT DIRECTION**

Current Forest Service direction is to close roads not needed for administrative, recreation, resource protection, commercial and/or public access and to manage needed roads at the lowest maintenance level consistent with resource management needs. In addition to Six Rivers National Forest Land and Resource Management Plan (Six Rivers LRMP) standards and guidelines, the Region 5 Forest Service Soil and Water Conservation Handbook established Best Management Practices (BMPs) to guide all road maintenance operations. The BMP Handbook contains guidance in section 12.22 to protect water quality.

See the Six Rivers LRMP (US Forest Service 1995) and the Forest-wide Reference Document dated March, 2004.

#### **IV. DESCRIPTION OF THE PROPOSED ACTION**

The Smith River NRA/Gasquet Ranger District, Six Rivers National Forest, is proposing to designate and manage roads and motorized trails within the Smith River National Recreation Area. The project would address all system and non-system roads currently existing on the District. Roads and trails proposed for designation already exist, and no new construction or relocation would occur.

##### **Purpose and Need for Action**

Providing for the long-term protection of the Smith River National Recreation Area (NRA) and its resources is essential to maintaining the quality of the recreation experience. There is a need to provide for a system of designated routes for the Smith River NRA that:

- Is safe and responsive to public needs and desires
- Is more affordable and efficient to manage
- Has minimal negative ecological effects on the land
- Is in compliance with the Smith River NRA Act.

##### **Proposed Action**

The Smith Rivers NRA defines a road system that is economically and ecologically sustainable (reduces both maintenance costs and risk to sensitive resources) that meets the access needs of the Forest Service and the public. In addition, the Forest will designate routes for off-highway vehicles (OHV) to provide for recreational access and to prevent off road travel.

Actions to be implemented were opportunities identified in the recently completed NRA RAP/OHV Strategy. The management options outlined NRA RAP included which roads to:

- Keep and maintain
- Upgrade or downgrade
- Add to the National Forest System transportation network
- Designate as motorized trails
- Decommission or make a non-motorized trail
- Impose seasonal use periods

The NRA RAP described public and administrative need and potential resource risk for each OML 1, 2 and non-system road on the NRA. The resulting management options of the RAP were developed with extensive public involvement. Since the RAP was completed, additional field review has been accomplished, which has resulted in refined mileage for both system and non-system roads and, in some cases, modified risk ratings. Using this information the following action categories have been developed for this Proposed Action. The proposed action for each OML 1, 2 and non-system roads on the NRA is described in detail in **Tables A through D and the proposed action map are in the appendix.**

### System Roads:

- Keep or Improve and Keep: OML 1-5 System roads that have an identified public and/or administrative need. Some roads need improvement or mitigation if they are to stay on the system. The proposed action includes implementing maintenance activities on the **current 209 miles** of OML 3, 4, and 5 roads. In addition, the NRA is proposing to **keep and maintain 260.76 miles** of OML 1 and 2 system roads (total 469.76 miles) (Table A). Road maintenance work activities that would be implemented are described below.
- Remove from System: System roads that have no identified public or administrative need. These roads may or may not have any resource risk. The NRA is proposing to **remove 71.72 miles** of system roads from the system (Table B).

### Non-System Roads:

- Improve and Add: Non-system roads that have an identified public and/or administrative need. Any road with identified resource risk will need improvement or mitigation if they are to be added to the system. The NRA proposes to **improve and add 46.96 of non-system** road as motorized trail or as system roads (Table C). The NRA will not designate routes for specific types of OHV, but will designate roads and motorized trails to allow both licensed and unlicensed high clearance vehicles (2 or 4 wheel).
- Do Not Add to System: Non-system roads that have no identified public or administrative need, and may or may not have any resource risk. The NRA is proposing **not to add 132.50 miles** of non-system road to the road system (Table D).

**Tables A through D (appendix)** identify the operational maintenance level for each road within the NRA as well as proposed motorized trails. In some cases, roads with identified public need cannot keep or be added to the system because of special circumstances.

Once the designation process is complete, motor vehicle use off designated (signed) routes will be prohibited. Any new user created routes will be barricaded under this decision.

### **The Proposed Action also includes:**

1) The Gasquet Mountain Road, 17N49, is currently an OML3 road. OHV are allowed on OML2 roads and motorized trails. The 17N49 road will be downgraded to OML2 to legally allow OHV use and connect proposed FS OHV routes. FS road 17N49 also connects with Del Norte County road 305, one of the roads that Del Norte County may propose as dual use (both licensed and unlicensed high clearance vehicles). The County is exploring the possibility of designating approximately 60+ miles of low-use County roads within the NRA as dual use to provide OHV recreation opportunities.

2) All roads and trails open to vehicle use will be signed within the next 3 years with a road/trail number and appropriate symbols of allowed use. Roads that are not signed will be considered closed to vehicle access.

3) There is newly acquired public land in the Goose Creek drainage. As part of this proposal, existing roads (15N13 and 14N15) will receive heavy maintenance on the FS portion. The roads are in poor condition and needs crossings and road repair. Sections of these roads are currently not accessible. Neither of these roads are near CH.

4) In addition to the roads already seasonally closed for POC protection, two roads with high risk for POC infection will be gated during the wet season (generally from mid October to the beginning of June). The roads currently protected with seasonal closures have a “Moderate” risk rating to POC. Roads that have a “High” risk rating and that will remain open to traffic (OML 2 or motorized trail) will also be seasonally gated to protect POC.

5) The NRA proposes to add approximately 6.5 miles of existing non-system roads (old mining roads that are 50+ years old) to our motorized trail system in Inventoried Roadless Areas. This includes portions of the roads 18N51.100A, 305.107, 305.109, 305.109A, 305. 129. 17N49.100, 17N49.105, 17N49.106, and 314.1. The NRA also proposes to remove 11.78 miles from Inventoried Roadless areas on the NRA.

### Management Actions

Tables 2-5 show the specific management actions that will occur for each road. These actions include:

- No Change No change in the current management or use would occur.
- Mitigate Resources Risk Mitigations would be applied to reduce or eliminate impacts to botanical, wildlife, aquatic, or Port-Orford cedar.

Reducing risk to aquatic resources would be accomplished by stormproofing (replacing undersized culverts, outsloping, constructing rolling dips to channel water off the road), repairing slumps or slides, and road surface grading.

Reducing risk to Port-Orford cedar, can be accomplished by seasonal closures (gates), decommissioning, or downgrading to OML1 (year round closures).

Reducing risk to botany or wildlife can be accomplished by barricading sensitive habitat areas to prevent off-road travel and by overall reduction in road density across the NRA.

- Reduced Maintenance A road in a reduced maintenance condition is open for motor vehicle use but receives limited road maintenance. Roads suitable for a reduced maintenance condition are in a geologically stable condition and pose no concerns for erosion, sedimentation, or water quality impacts. Roads in a **reduced maintenance condition have no culverts, bridges, or other drainage features that would require periodic maintenance**. Depending on the amount of use or need, a reduced maintenance road could eventually become revegetated and close itself over time.

- Manage as OML 1 In some cases, a road is designated as OML 1 but is currently open and drivable. All roads managed as OML 1 will be closed to vehicle use but are accessible as non-motorized trails.
- Upgrade to OML 2 Upgrading OML1 to OML 2 is an option on roads that are currently receiving high use. Upgrading these roads provides public access and allows the Forest to manage and control the current use to reduce resource risk.
- Downgrading to OML 1 Downgrading is primarily aimed at the reduction of maintenance costs on low-use roads. Downgrading to OML 1 would close the road for vehicle use but would maintain the option of future use.
- Add to Road or Trail System Desirable non-system roads will be added either to the NFS Transportations System (with an OML) or to the Motorized Trail system.
- Remove from System Removing low use or high risk roads from the NFS Transportation System. This can be done through decommissioning, or in some cases, simply removing a currently non-drivable, low-risk road from the database. Decommissioned roads are left in a maintenance-free condition (culverts and other drainage structures removed, reestablishing natural drainage patterns) are not drivable by motor vehicle, and are not on the Forest Transportation System. In areas along roads that show signs of road failure due to slope instability, road prisms can be outsloped (sloped towards downhill side of roadway) to improve surface drainage and to reduce the risk of slumps and landslides. In most cases, the road bed will remain intact and provide non-motorized access. Depending on the slope location, type of stream crossings, and diversion potential of an unneeded road, decommissioning may require as little as a simple barricade or as much as the use of heavy equipment.
- Do Not Add Non-system roads that are no longer needed will not be added to the road or trail system. These roads will have drainage risks repaired if necessary, and in some cases barricaded. These roads will not be signed; therefore will not be available for motorized travel.
- Special Use Permit Roads (SUP): There are two types of Special Use permit roads. FS system roads used for SUP (i.e. State or County road disposal sites) are usually open to the public (although they may be intermittently closed to traffic as needed). SUP roads that are maintained by the permit holder are not open to the public (i.e. Powerline roads)

Removing or upgrading culverts, road outsloping, pulling back fill from channels or on landings, road surface repair, construction of rolling dips or water bars, adding cross drains, and adding barricades or gates will require the use of heavy equipment.

Implementation of this project would begin in 2007 and would be completed by the end of 2022, depending on available funding and workforce.

## **Background**

The Gasquet District (including the Smith River NRA) has approximately 458 miles of FS roads (excluding state and county roads) within its boundaries. The entire Smith River basin is a designated Key Watershed under the Northwest Forest Plan. Access throughout the project area is dependent on FS system roads, as well as state, and county roads. In addition, approximately 200 miles of non-system roads exist. Non-system roads are not maintained by the Forest Service and are not on the Forest Road Inventory. Many non-system roads are associated with mining activities, or are maintained by private entities for special uses (such as powerline access roads).

Forest Service System roads are constructed to specific standards depending on the needs identified for the road. Roads are maintained at one of 5 operational maintenance levels (OML) depending on identified management needs (FSH 7709.58).

### Maintenance Level 1

This level is assigned to roads that are closed to vehicular traffic but still exist on the forest transportation system for potential future use. Maintenance is limited to keeping stream crossing culverts and drainage structures open, or structures are removed.

### Maintenance Level 2

This level is assigned to roads that will be open for use by high clearance vehicles (i.e. 4-wheel drives). Maintenance is focused on keeping drainage structures open, brushing, and keeping roadway clear for safe passage.

### Maintenance Level 3, 4, and 5

These level roads are maintained for use by passenger cars, with greater maintenance required at each higher level. These are the main access roads throughout the NRA. The majority of maintenance activities on the NRA occur on these road levels.

### Non-System Roads

In 2004, all non-system roads were inventoried. Approximately 200 miles of non-system roads were mapped. Non-system roads on the NRA include access to old mining claims, old logging roads on former private land, and user-created roads. Since these roads were not built or maintained to Forest Service standards, they can be very steep and rugged and often are only passable at very low speeds by high clearance vehicles.

The Transportation System Maintenance Handbook (FSH 7709.58) describes the various maintenance levels for managing USFS road systems. Roads assigned operational maintenance levels 3, 4, or 5 are to be maintained in accordance with the requirements of the Highway Safety Act since these roads are accessible by passenger cars. Table 1 displays the miles of road by maintenance level for the project area.

**Table 1. Smith River NRA roads by OML**

<b>OML</b>	<b>Miles</b>
1	83
2	249
Non-system	180
OML 3-5	209
<b>TOTAL</b>	<b>638</b>

### **Road Maintenance Work Activities**

The following definitions describe activities that would occur within the proposed action. All activities incorporate Standards and Guidelines (S&Gs) Best Management Practice (BMPs) as standard practice. Where applicable, the activities described below include pertinent BMPs. Numbers in parentheses (e.g., 811) refer to the R5 Forest Service Specifications for Maintenance of Roads (USDA-FS 1992), which guides the development and administration of Forest road maintenance contracts. Road decommissioning, culvert removal and replacement, stormproofing, and upgrading would occur once on a given road or site. All other activities can be categorized as routine and would be done repeatedly on roads on a 5-10 year return cycle. Not all activities would necessarily occur in the same year.

1. Road decommissioning - includes the following: 1) Outsloping roads at 10% to 30% where necessary to restore natural surface drainage, 2) Ripping the roadbed surface to restore infiltration and promote revegetation, 3) Seeding, mulching and fertilizing restored areas as needed to control short-term surface erosion and invasive weeds, 4) Installing barricades at road take-offs, 5) Crushing and/or removal of cross-drain culverts, 6) Stabilizing road prism landslides, and 7) Removal of stream crossing culverts and associated fill material at a depth to original channel gradient; width to original “canyon” walls or, where not practical, 1.5:1 or flatter side slopes.

Decommissioning roads places them in a maintenance-free condition (culverts and other drainage structures are removed, reestablishing natural drainage patterns), are not drivable by motor vehicle, and are not on the Forest Transportation System. In areas along roads that show signs of road failure due to slope instability, road prisms would be outsloped (sloped towards downhill side of roadway) to improve surface drainage and to reduce the risk of slumps and landslides. In most cases, the road bed will remain intact and provide non-motorized access. Depending on the slope location, type of stream crossings, and diversion potential of an unneeded road, decommissioning may require as little as a simple barricade or as much as the use of heavy equipment. Approximately 204 miles of road would be decommissioned over the 15 year period, with no more than 30 miles per year of ground-disturbing decommissioning activities, and 30 culvert removals (cross drains and stream crossings), within a 5<sup>th</sup> field watershed.

2. Downgrading to OML 1 (Closing of roads) – This work is required when a road is managed as, or downgraded to, an OML1 and may be accomplished through gating, obliterating take-off,

recontouring the take-off, or barring at the road entrance. If earthen barriers are created, they will be treated to avoid erosion into waterways, such as seeding and mulching, as site conditions require. Downgrading is primarily aimed at the reduction of maintenance costs on low-use roads. Downgrading to OML 1 would close the road for vehicle use but would maintain the option of future use. In addition, all stream crossings and cross drains are either removed as described in the road decommissioning section above, or are maintained if no impacts are occurring to TES fish.

3. Grading/Reshaping/Blading - This work consists of grading and shaping native or aggregate roadbeds to a condition that facilitates traffic and provides proper drainage by allowing water to disperse evenly off the roadbed to prevent rutting, rilling, and diversions. This work is generally accomplished by a motor grader. BMPs 2-4, 2-7, 2-11, 2-19, 2-22, and 2-23 will be implemented with these activities. (811) A maximum of 30 miles per year per 5<sup>th</sup> field watershed would occur.

4. Dust abatement - This work consists of applying water and non-petroleum dust palliatives to native and aggregate-surfaced roads to reduce airborne dust. Eighty percent of the time, dust abatement uses only water, with lignin-based palliatives added the remaining 20% when the potential for dust is an air quality concern. The use of lignin additives and the potential for lignin-treated water to enter streams poses no risk of adverse effects to water quality and TES fish. This work would generally be accomplished by spraying water onto the travelway from a water truck. Water would be obtained from identified non-anadromous stream sources, and would follow NOAA Fisheries Water Drafting Specifications. BMP 2-21 will be implemented with this activity.

5. Spot surfacing - This work consists of placing surface aggregate on designated areas. This work includes preparing the area, and furnishing, hauling, and placing all necessary materials in such a way that they blend with the adjacent road cross-section. This work would be accomplished with a dump truck, motor grader, and a small roller. BMPs 2-22 and 2-23 will be applied during spot surfacing. (813)

6. Asphalt pavement patching - This work consists of patching potholes, skin patching of asphalt surfaces, and patching asphalt berms. Generally this work will be accomplished using a grader, dump truck, small paver, and small roller. A backhoe will be used if the damaged area requires digging out. BMPs 2-19, 2-22 and 2-23 will be implemented with this activity. (814)

7. Re-paving - This work consists of re-paving large sections of roads already surfaced with asphalt using a grader, dump truck, paver, roller and laborers. BMPs 2-11, 2-19, 2-22 and 2-23 will be implemented with this activity. Up to 20 miles per 5<sup>th</sup> field watershed would be re-paved annually.

8. New Paving - This work consists of paving sections of existing dirt roads using a grader, dump truck, paver, roller and laborers. BMPs 2-11, 2-19, 2-22 and 2-23 will be implemented with this activity. Up to 10 miles of new paving would occur annually within a 5<sup>th</sup> field watershed. However, new paving would not create new roads and would only be done on existing FS roads.

9. Paved surface cleaning - This work consists of removing loose material from a paved travelway, including bridge decks and paved shoulders. Use of hydraulic flushing will not be permitted within a horizontal distance of 200 feet of stream channels, unless approved by a Forest fisheries biologist. Other cleaning would be accomplished using a power broom or blower, truck with rock blade, and/or grader. BMPs 2-11, 2-19, 2-21, 2-22, and 2-23 will be implemented during this activity. (815)

10. Surface treatment - This work consists of treating asphalt concrete or chip seal-surfaced roads with a seal coat, a chip seal, or an asphalt concrete overlay. The purpose of this work is to rejuvenate the road surface, seal hairline cracks, or to replace a worn surface that has become unsafe. Equipment that may be used include power brooms, dump trucks, paving machines, chip spreaders, and oil distributor trucks. BMPs 2-11, 2-19, 2-21, 2-22, and 2-23 will be implemented during this activity. Less than 1 mile would occur annually within a 5<sup>th</sup> field watershed.

11. Maintenance of unpaved shoulders - This work consists of reshaping unpaved shoulders adjacent to a paved travelway to the original configuration. This work would generally be accomplished with a motor grader and its attachments. There will be no sidecasting in areas where sidecast material could reach stream channels, as defined by a Forest Service fisheries or hydrology specialist. BMPs 2-7, 2-11, and 2-19 will be applied as part of this activity. (816) Up to 1 mile would occur annually within a 5<sup>th</sup> field watershed.

12. Asphalt crack cleaning and repairing - This work consists of cleaning and filling cracks in existing asphaltic concrete (AC) surfaces that are 1/4 inch or wider. Cleaning is usually accomplished with compressed air, and the crack sealant is applied using a propane-heated double-boiler unit with a wand attachment. BMPs 2-22 and 2-23 will be implemented with these actions. (818) Up to 1 mile would occur annually within a 5<sup>th</sup> field watershed.

13. Ditch maintenance - This work consists of removing rock, wood, soil, and other materials from ditches and re-shaping all types of drainage ditches with a motor grader and/or backhoe to provide a waterway that is unobstructed. During this type of operation, care is taken to retain existing vegetation growing along the banks of the ditches as possible. BMPs 2-2, 2-4, 2-6, 2-7, 2-19, and 2-22 apply to this action. (831) Up to 10 miles of ditches would be maintained annually within a 5<sup>th</sup> field watershed.

14. Remove and end haul materials - This work consists of loading, hauling, and placing slide debris or excess materials (such as rock, soil, and vegetation) at designated disposal sites. No disposal sites will be designated within floodplains. This work would normally be accomplished with a wheel loader and dump truck when excess materials are hauled to a disposal site. If materials are used to fill slumps in the road or to outslope road prisms, compaction will be required and a wheel loader, dump truck, compactor, motor grader, and/or backhoe would be used. BMPs 2-3, 2-7, 2-11, 2-19, and 2-22 will be applied with these activities. (832)

15. Culvert placement and replacement - This work includes removal of existing culverts, bed preparation, installation and backfill of new culverts of the size and length specified. Excavation will be conducted as necessary to meet compaction requirements. Culvert replacements would

involve stream crossings and road cross drains. Culvert replacements would not occur within CH or EFH. Work would generally be accomplished with a backhoe, excavator, tractor, and compactor. LRMP: MA10-42, 44. BMPs 2-2, 2-3, 2-10, 2-14, 2-15, 2-17, 2-20 and 2-22 will apply to these activities. (833) A maximum of 30 culverts (cross drains and stream crossings) per year would be placed or replaced within a 5<sup>th</sup> field watershed (as part of stormproofing).

16. Drainage structure maintenance - This work consists of cleaning and reconditioning culverts and other drainage structures such as catchbasins, inlet and outlet channels, and ditchline transition areas. This work is usually accomplished by hand but in extreme cases a backhoe may be used. Work may include cleaning totally plugged culverts or replacing all or part of the drainage structure (See #15 above). Hydraulic flushing of drainage structures is not a standard practice of this activity, and will be designated by the Forest only when all potential impacts are addressed and minimized. BMPs 2-7, 2-11, 2-15, 2-19, and 2-22 will be implemented as part of this activity. (834) Up to 40 drainage structures per year per 5<sup>th</sup> field watershed would be maintained.

17. Roadway drainage maintenance - This work consists of providing drainage on roads that are in OML 1 status and have been closed to traffic, or for routes used only by high-clearance vehicles. This work may include grading and reshaping of the road surface and constructing drivable rolling dips or water bars. At completion of drainage work the road will not necessarily be passable to vehicles. BMPs 2-2, 2-4, 2-6, 2-7, 2-11, 2-19, and 2-22 will be applied with this activity. (835) A maximum of 30 miles of roadway drainage maintenance would occur annually within a 5<sup>th</sup> field watershed. Activities #13, 16 and 17 typically are done together.

18. Vegetation establishment - This work includes the application of seed, fertilizer, and mulch, to roadways and disposal areas that have been disturbed by maintenance activities. Planting also may take place in these areas. This work is usually accomplished by hand, however seed, mulch, and tackifier may be applied mechanically. Also included is the development of native grass seed banks for use in restoration and revegetation activities. BMPs 2-2, 2-4, and 2-22 will be implemented with the described activities.

19. Brushing (Cutting roadway vegetation) - This work consists of cutting all vegetation, including trees, less than 6" in diameter at six inches above the ground in order to improve sight distance and provide overhead clearance. This work is performed by hand with the use of chainsaws or mechanical brush cutters. The objective is to manage roadside vegetation to maintain slope stability while providing for sight distance and drainage needs. All of the work would occur within the road prism. BMPs 2-3, 2-4, 2-5, 2-11, 2-19 and 2-22 will be applied with this action.

20. Logging out - This work includes the removal of fallen trees and snags, which encroach into the roadway, within 4 feet of the roadbed (right-of-way for berm and road maintenance practices). This work is intended to open roads closed by minor windstorms, or other natural occurrences. Some chainsaw and mechanical work may be necessary. Trees would be left on site in RRs. BMPs 2-3, 2-19, and 2-22 will be applied with logging out actions.

21. Hazard removal and cleanup - This work consists of removing and disposing of hazards such as slumps, slides, trees, rocks, stumps and fallen trees that create traffic safety problems. Woody debris and slash in excess of 1 foot in length or 3 inches in diameter will be removed from ditches. Most work will be within the road prism. However, trees outside the road prism with tops that may reach the roadbed when they fall may be removed if they pose a risk to public safety. BMPs 2-3, 2-7, 2-11, 2-19, and 2-22 will be implemented with these activities. Hazard tree guidelines are described under the PDS #18. (854).

22. Sign maintenance - This work consists of cleaning, replacing, and reconditioning of signs, posts, and markers. Forest Service personnel would normally accomplish this work by hand. BMPs 2-3 and 2-22 will be applied with this activity.

23. Slide and Fill Stabilization - This work consists of a variety of stabilizing techniques including spreading seed, fertilizer and mulch (with or without hydro-mulch machines); hand installation of geo-textile support; and remediation using an array of construction equipment (cats, loaders, excavators, scrapers, and trucks). BMPs 2-2, 2-3, 2-10, 2-14, 2-17 and 2-22 will apply to these activities.

24. Storm proofing – This work may include slide and fill stabilization, road narrowing, road reshaping, berm removal, drainage structure and dip maintenance, drainage structure removal, and replacing stream crossings with larger culverts. This proposal does not involve replacing culverts in CH or EFH. BMPs 2-2, 2-3, 2-10, 2-14, 2-17 and 2-22 will apply to this activity. Up to 20 miles of road would be stormproofed annually within a 5<sup>th</sup> field watershed.

25. Bridge repair – This involves structural and surface repair to bridges. All bridges are anchored on footings outside of the stream channel within existing roadbeds. Support structures or abutments repair would not occur within CH or EFH, but within the (existing) road prism. LRMP: MA10-42, 44. BMP 2-15, 2-17 and 2-20 will apply to this activity. Bridge repair could occur on up to 3 sites annually within a 5<sup>th</sup> field watershed.

26. Upgrading – This involves converting an OML 1 road to OML 2 to re-establish use on roads that are currently needed but are in a closed condition. Upgrading includes replacing or maintaining culverts and cross drains, improving surface drainage with drivable rolling dips, and grading and surfacing to reduce the risk to TES fish and provide access. Up to 30 miles of road upgrading would occur annually within a 5<sup>th</sup> field watershed.

## **Project Design Standards**

To reduce the risk of sediment delivery to streams, all applicable Best Management Practices will be implemented.

Streams will be dewatered prior to any activity involving heavy equipment taking place in perennial streams. Specific dewatering methods (pipe, pump, etc) will be determined on a site-by-site basis.

Rocks to stabilized re-contoured stream crossings will be installed where needed to reduce post-treatment channel adjustments. In addition, a combination of native mulch and native seed will be applied on treated road surfaces to reduce surface erosion.

Replacement of stream crossings will be designed to accommodate at least a 100-year flood, including associated bedload and debris;

### **Standards, Guidelines, and Best Management Practices**

Inherent in this proposed action are a comprehensive set of Forest Standards and Guidelines (S&Gs) that are mandated by the Six Rivers LRMP (USDA Forest Service 1995). All Standards and Guidelines relevant to this proposed action (road management, fisheries, riparian reserve, water quality) are sideboards that restrict how each of the Work Activities are implemented to minimize impacts of management activities on TES fish, CH and EFH. In addition, the Region 5 Forest Service, in conjunction with the California Water Resources Board, developed a set of Best Management Practices (BMPs). These BMPs further guide these Work Activities in and around waterways to protect all beneficial uses of water resources, including TES fish and CH and EFH. In total, the Forest S&Gs and BMPs establish and frame the spatial and temporal context within which the Work Activities of the proposed action occur. Many S&Gs and BMPs are spatial restrictions, such as restrictions on proximity of petrochemical storage to streams, while others are temporal restrictions, such as the established Normal Operating Season (dry season) for Work Activities that would entail machinery and/or ground disturbance.

Implementation of S&Gs and BMPs is non-discretionary and is a part of implementing any Work Activity. The Six Rivers LRMP and the Region 5 Forest Service BMP manual are incorporated by reference into this BA and copies are provided as supplementary information on the proposed action.

### **Implementation Schedule for Decommissioning and Stormproofing**

To decommission 200 miles of road and stormproof (including culvert upgrades) all identified roads in 15 years, activities will need to occur annually and at a fairly consistent rate. In total, decommissioning and stormproofing will involve activity at 160 stream crossings. Table 2 and Table 3 display the high risk decommissioning and stormproofing sites that would continue to impact TES fish and habitat. There are 86 crossings that will be completed within the first 3 years, from 2007-2010. The remainder of the identified lower risk decommissioning and stormproofing sites (74 crossings) will be implemented from 2011-2022. Approximately 204 miles of road would be decommissioned over the 15 year period, with no more than 30 miles per year of ground-disturbing decommissioning activities, and up to 30 culverts removed (cross drains and stream crossings), within a 5<sup>th</sup> field watershed. Up to 30 crossings per year per 5<sup>th</sup> field watershed would be replaced through stormproofing.

Table 2. High risk roads that would continue to impact TES fish and habitat if not treated, number of culvert crossings and road miles that would be decommissioned.

<b>Road</b>	<b># of Crossings</b>	<b>Road Miles</b>
14N01G		1.3
15N11A	12	1.6
16N19F	4	0.8
6N32C	1	0.5
16N33	3	1.0
17N36C		1.1
17N48	4	1.7
17N48C		0.5
18N01		0.1
18N03	2	2.0
18N11D	8	1.0
18N12A		0.5
18N20		1.5
18N22		0.6
18N57		0.6
15N36.1		0.6
16N03.2		0.9
17N01.100		4.3
17N04.3		1.0
17N07.102		3.1
17N69.4	3	0.25
18N05.2	1	0.5
18N05.100		2.2
18N07.8	1	0.4
18N09.100A		0.2
18N11D.1	2	2.0
18N11D.2	2	0.25
18N13.101		0.1
305.124		1.65
315.3A		0.25
315.105.D		0.1
315.105E		0.1
405.5	6	2.0
<b>Total</b>	<b>49</b>	<b>35.1</b>

Table 3. High risk roads that would continue to impact TES fish and habitat if not treated, number of culvert crossings and the road miles that would be storm proofed.

**Stormproof**

<b>Road</b>	<b># of Crossings</b>	<b>Miles of road</b>
15N02	3	7.2
15N36N	3	2.4
16N02L	2	2.3
16N02K	2	0.25
16N16	4	2.1
16N18A	5	2.3
16N34	4	0.9
16N36B	4	0.8
17n18c3c		0.7
17n30 4c		1.3
18N05 7c		2.0
18N16		1.2
18N17C		1.2
18N56 2c	3	0.9
<b>Total</b>	<b>37 crossings</b>	<b>25.6 miles</b>

## V. EXISTING ENVIRONMENT

### A. Species Account

The following fish species are known to occur in the project area (Fuller 1995, McCain 1994). See the Forest-wide Reference Document dated March, 2004 for species life history information.

#### **Federally Threatened, Endangered, or Proposed Species**

**Coho Salmon (*Oncorhynchus kisutch*)** Southern Oregon/Northern California Coasts (SONCC) Evolutionary Significant Unit (ESU), and designated Critical Habitat.

Status: Federally Threatened

Both historical and recent abundance trends have been described by NMFS in their coast-wide status review (Weitkamp et al. 1995, pgs. 110-111). Although data is limited for this ESU, the status review made the following summary:

*Most of the information for the northern California region of this ESU was recently summarized by the California Department of Fish and Game. They concluded that “Coho salmon in California, including hatchery stock, could be less than 6 percent of their abundance during the 1940’s, and have experienced at least a 70 percent decline in numbers since the 1960’s.” They also reported that coho salmon populations have been virtually eliminated in many streams and that adults are observed only every third year in some stream, suggesting that two or three brood cycles may already have been eliminated.*

An “Updated Status of Federally listed ESUs of West Coast Salmon and Steelhead” (including coho salmon) was completed in June 2005 (Good *et al.* 2005). The status update included limited new information for coho salmon. In the status update, the BRT stated that, “None of these data contradict the conclusions the BRT reached previously, nor do any data (1995 to present) suggest any marked change, either positive or negative, in the abundance or distribution of coho salmon within the SONCC ESU.”

NMFS describes coho salmon within the Smith River basin as a functionally independent population (Williams et al. 2006). Functionally independent salmon populations can serve primary roles in salmon ESU recovery. Coho salmon in the Smith River basin primarily occur in tributaries of the lower mainstem, particularly Mill Creek and Rowdy Creek. Coho salmon occurrence in the Smith River NRA has been low over the past 30 years, as indicated by annual spawning and juvenile fish surveys since 1976. Adult and juvenile coho are not observed in survey reaches on the NRA every year, but rather sporadically. Spawning and juvenile coho have been observed sporadically in the low gradient and gravel-rich reaches of large 6<sup>th</sup> order tributaries of the North, South, and Middle Forks Smith River, including Hurdygurdy, Patrick, and upper North Fork Smith. Juvenile coho were observed in Hurdygurdy and Patrick Creeks in 1991, and recently in the upper North Fork Smith (outside the NRA) in 2006.

**Critical Habitat (CH):** NMFS designated CH for SONCC coho salmon on May 5, 1999 that encompasses coho-accessible reaches of all rivers (including estuaries and tributaries) between Cape Blanco, Oregon and Punta Gorda, California. Analysis of SONCC coho CH on the SRNF is based on known or suspected coho habitat found within a watershed. CH excludes reaches located above longstanding natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). SONCC coho CH is derived from available historical fish species inventories, and habitat assessments on record at the Six Rivers National Forest Supervisor's Office (SO).

**Essential Fish Habitat (EFH):** The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) set forth a number of new mandates for NOAA Fisheries, regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. Effects to EFH related to this project were analyzed using habitat defined by the SRNF as known or suspected coho and chinook habitat. EFH for coho and chinook were derived from available historical fish species inventories, and habitat assessments on record at the SRNF SO.

The attached project area map (Figure1) displays CH and EFH.

### **Forest Service Sensitive Species**

**Steelhead** (*Oncorhynchus mykiss*) Klamath Mountain Province (KMP) ESU

**Chinook salmon** (*Oncorhynchus tshawytscha*) Southern Oregon/Northern California Coastal (SONCC) ESU

**Coastal cutthroat trout** (*Oncorhynchus clarkii*) Southern Oregon/ California Coasts (SOCC) ESU

### **B. Habitat Status**

Habitat status is described for the above species in NMFS Status Reviews for coho salmon (Weitkamp et al. 1995), Chinook salmon (Meyers et al. 1998), steelhead (Busby et al. 1996), and cutthroat trout (Johnson et al. 1999).

See the Forest-wide Reference Document dated March, 2004 for species habitat status.

### **C. Environmental Baseline**

Assessment of environmental baseline and use of indicators and pathways follows *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS 1996). Information regarding fish habitat baseline conditions of the Smith River is derived primarily from these sources: 1) the Fox Unit Monitoring Fishery Reports for upper South Fork Smith tributaries (USFS 1976 through 1985), 2) SRNF fish habitat inventories and fisheries surveys for Hurdygurdy, Jones, Goose, Patrick, Shelly, Siskiyou Fork, Myrtle, Hardscrabble, and Middle, South, and North Fork Smith, 3) stream survey reports from

the California Department of Fish and Game, 4) the Smith River Ecosystem Analysis (McCain et al. 1995), and 5) Level II stream habitat inventories for North Fork Smith tributaries (Siskiyou Research Group 2004).

Analysis of watershed and road conditions (and effects) is based on *Road Assessment and Restoration Planning in the Smith River Basin* (Ledwith 2003a, Ledwith 2003b). These analyses address current and potential sediment sources, road density and location, drainage network increases, and effects from road drainage features such as stream crossings; and use methods outlined in the *Assessment and Implementation Techniques for Controlling Road-Related Sediment Sources* (Hagans and Weaver, 1997), *Methods for Inventory and Environmental Risk Assessment of Road Drainage Crossings* (Flanagan et. al, 1998)

Watershed condition data were also compiled from *Rating Watershed Condition: Reconnaissance Level Assessment for the National Forests of the Pacific Southwest Region* (USDA Forest Service, Draft 2.4, April 2000). This report was part of a regional USFS effort to evaluate watershed condition and identify effects. Watersheds were delineated at the 5<sup>th</sup> field scale for National Forest Lands, which includes all of the Smith River NRA and Gasquet District lands. The following watershed information is general to the entire action area. More specific watershed data is included for project activities in close proximity to coho salmon CH.

## **Water Quality**

Water Temperature: properly functioning

Water temperature in the project area ranges from 5 degrees C in winter (in tributaries) to 23 degrees C in late summer (in mainstems) (USFS 1976 to 1985). Due to the proximity to the coast and the maritime rain precipitation patterns, stream temperatures rarely approach the freezing point. Shade is provided mainly by red alder, bigleaf maple, Douglas-fir, incense cedar, and Port-orford cedar. Some dense shading from redwood occurs in the western part of the project area. In the anadromous reaches of the Smith River, shade canopy ranges from 20 to 83 percent (USFS 1976 through 1985). The range in water temperature in the Smith River is properly functioning.

Turbidity: properly functioning

The Smith River is well known for its inherent clarity and low turbidity. Turbidity levels are very low and are reflective of the hard ultramafic rock and coarse parent material, and the subsequent coarse substrate that dominates streams of the Smith River basin. Information is available for sediment related turbidity during storms. For Hurdygurdy Creek, the highest turbidity recorded that is on record is 5.5 (Hach FTU) on 14 January 1980. This was at a flow of 1600 cubic feet per second (cfs) and a suspended sediment load of 157 milligrams per liter (USFS 1980).

Turbidity data has also been recorded during storms following wildfire - an indication of the expected level of ash delivered from hillslopes into channels during storms. One of the highest turbidity readings for the Smith basin was observed in November 16, 2002 during the first major storm that followed the Biscuit Fire of 2002, where turbidity (presumably from ash runoff) peaked at 74 at 8:45 pm. The turbidity dropped back to 8 by 8:00 pm the following day. Since the stream

maintains a low turbidity level during a very high storm flow (>100 year return interval) and recovers very quickly from a large pulse of wildfire ash, turbidity can therefore be assumed to be properly functioning.

Sediment: at risk

Management-related sources of sediment exist primarily in the form of road prisms and stream crossings. Crossings are predominantly corrugated metal culverts buried within channels with earthen fills. Stream crossing fills present the most concern since the fills are currently within channels, and in several cases have the potential for stream diversions or are beginning to cause impacts due to crossing failure. Nearly 50% of the stream crossings are in need of routine maintenance. Cross drains and erosional features on roads (gullies, rills, road prism and bank failures) are also sources of sediment.

Mass wasting can be a primary determinant of fine sediment sources. The sensitivity of an area to mass wasting depends on the interaction of the soils and underlying bedrock, slope steepness, and the subsurface hydrology. Much of the District is characterized as steep, mountainous terrain. Road-related mass wasting can be attributed to 1) improper placement and construction of road fills and stream crossings, 2) inadequate culvert sizes to accommodate the peak flows, sediment loads, and woody debris, 3) roads located on soils susceptible to mass wasting, and 4) water diversion onto unstable hillslopes. Road-related mass wasting potential is determined by examining the miles and density of roads located on unstable geologic rock units (Table 4a and b).

**Table 4a. Smith River NRA and Gasquet District Mass Wasting**

<b>Analysis Watershed Name</b>	<b>Mass Wasting Potential</b>
Blue Creek	Moderate Hazard
Lower North Fork Smith	Low Hazard
Middle Fork Smith	High Hazard
Myrtle-Hardscrabble	Moderate Hazard
South Fork Smith	Moderate Hazard

**Table 4b. Criteria for Mass Wasting Ratings**

<b>Rating</b>	<b>Definition</b>
High Hazard	Watersheds characterized by the presence of a large number of roads on unstable geologic types. This results in a situation where it is very likely that the timing, geographic distribution, and magnitude (total volume) of natural land sliding has been significantly altered.
Moderate Hazard	Watersheds characterized by the presence of a moderate number of roads on unstable geologic types. This results in a situation where there is a moderate risk that the timing, geographic distribution, and magnitude (total volume) of natural land sliding has been significantly altered.

Rating	Definition
Low Hazard	Watersheds characterized by the presence of very few, if any, roads on unstable geologic types. This results in a situation where the natural sediment regime is likely to be intact, and it is very unlikely that roads have, or will, significantly modify the timing, geographic distribution, and magnitude (total volume) of natural land sliding in the watershed.

### *North Fork Smith subbasin*

The North Fork Smith subbasin extends northward in to Oregon and drains a large geologic formation known as the Jesephine Ophiolite, and is dominated by lateritic soils that are very old and deeply weathered. The California portion of the subbasin is approximately 40,000 acres, and the Oregon portion is approximately 60,000. The road network here is primarily related to mining activity from the late 1800s to the mid 1900s. A large portion (30,330 acres) of the subbasin is roadless. The North Fork Smith Roadless area includes the majority of the drainage of the North Fork of the Smith River. Approximately 9,000 acres of the western portion of the roadless area has been altered by roads and mining activities. The geologic character of the ophiolitic area is predominantly serpentine/ultramafic with very coarse parent material. Therefore, the potential for fine sediment to be produced is lower than that of the Middle and South Fork subbasins.

Nearly all of the stream crossings within the North Fork Smith subbasin are rocked fords containing very small fills. Potential road-related fine sediment sources in this subbasin are considerably fewer than in the Middle and South Fork subbasins. In the Bear Creek, High Plateau Creek, Peridotite Canyon Creek and Stony Creek watersheds, Forest Road 18N13 (8 miles), Road 18N09 (6 miles) and all of the spur roads (approximately 24 miles) are currently maintained at OML 1 and are in good hydrologic condition, with very little drainage diversions, erosion, and potential for sedimentation.

### *Middle Fork Smith sub basin (including Myrtle-Hardscrabble)*

Within the Middle Fork Smith subbasin, 108 roads have either a stream crossing, cross drain, or erosional feature for a total of 829 features. Crossing types in the subbasin are diverse with 357 (82%) fitted with corrugated metal culverts, 44 (10%) fords, 21 (5%) Humboldt crossing and 13 (3%) bridges. Eighty four stream crossing sites (19%) were identified as high, 208 (48%) as medium, and 145 (33%) low priority. High and medium priority stream crossings could potentially be a source of approximately 231,866 cubic yards of sediment.

A total of 311 cross drains exist in the Middle Fork Smith subbasin. Of these, 37 (12%) were identified as high priority. These culverts commonly have plugged inlets and directly delivery sediment to the stream network through surface flow paths (i.e., rills and gullies). These flow paths are chronic contributors of fine (i.e., silt and clay) sediment from the road surface and

inboard ditches. The main cause of these flow paths is long sections of uncontrolled flow along the road surface and inboard ditch.

120 (39%) cross drains are in need of routine maintenance. The most common problem (50% of sites) is sediment plugging of the culvert inlet. Plugged cross drains can divert water either onto the road surface or hillslope causing erosion, or into downroad cross drains or stream crossings possibly causing these sites to fail. Other maintenance needs include treating buried outlets, filled inboard ditches, and broken drop inlet covers.

A total of 81 road-related erosional features have been identified in the Middle Fork Smith watershed. Types of erosional features include: 31 cutslope failures, 28 fillslope failures, and 22 roadbed failures. These sites are the source of an estimated 99,030 cubic yards of sediment that is beginning to enter the stream network.

Within the Middle Fork Smith subbasin, 248 roads (132 system and 116 non-system) have been inventoried and evaluated. A total of 437 stream crossings exist in the Middle Fork Smith watershed giving a stream crossing density of 1.7 crossings per mile of road. Road density is approximately 0.003 miles/acre. Knopki, Little Jones, and Siskiyou Fork watersheds in the upper Middle Fork area have the majority of road-related impacts. In the Knopki watershed, 18N11D and complex of roads has 17 features in which 13 are high priority. Seven stream crossings have failed with an estimated 500-1000 cubic yards of sediment left to deliver to the stream network. In addition there are 7 erosional features in which 6 are considered high priority with potential delivery of 20,352 cubic yards of sediment to the stream network. Many of these sites have been identified as chronic sources of sediment to Knopki Creek.

18N05 is a ridge to valley road in which the lower 2 miles are in close proximity to a perennial tributary of Knopki Creek. The stream crossings (9) are old fords and Humboldt crossings that are failing and currently diverting. There are four erosional features that are in the process of recovering but still have the capacity to deliver 1,145 cubic yards of sediment to the stream network. The road has been abandoned for 20 plus years and is heavily vegetated. Treating this road would result in potential “sediment savings” of 2,150 cubic yards. Table 5a describes the potential sediment sources existing in the Middle Fork Smith sub basin.

**Table 5a. Potential sediment yield from road-related sites in the Middle Fork Smith sub basin (from Ledwith 2003a).**

Site Type	Total number of sites	Number of high priority sites	Number of medium priority sites	Future yield to streams (cy)	Number of sites that need maintenance	Number of sites currently diverting	Number of sites with diversion potential
Stream Crossings	437	84	205	231,866 <sup>1</sup>	149	33	181
Cross Drains	311	37	64	N/A	120	N/A	302
Erosional Features	81	35	10	44,339 <sup>2</sup>	N/A	N/A	N/A
Totals	829	156	279	276,205	269	33	483

<sup>1</sup> Includes stream crossings ranked high or medium priority. At stream crossings with diversion potential, future erosion is difficult to predict. A minimum estimate of the stream crossing fill volume was used as a predicted value for this table.

<sup>2</sup> Includes erosional features ranked high and medium priority.

### *South Fork Smith sub basin and Blue Creek*

Within the South Fork Smith subbasin, 264 roads (164 system and 100 non-system) have been inventoried and evaluated. A majority of the roads pose little risk to the stream network, with only minor evidence of past sediment delivery to streams. Only 110 (45%) of the roads have either a stream crossing, cross drain, or erosional feature for a total of 1,059 features. Of these sites, 415 (39%) need treatment for a potential sediment savings of 287,013 cubic yards.

Twelve high priority roads are identified as sediment sources. 15N11A is an abandoned haul road to Canthook Creek. There are 12 high priority sites on the road including 8 stream crossings that have failed and are contributing sediment to the stream network. Some of these crossings are actively diverting causing roadbed and fillslope erosion. The road ends at Canthook Creek where the stream is eroding the road fill delivering sediment directly into the stream. The area surrounding 15N11A has multiple crossings and landings along Canthook Creek. Treatment of these areas would result in “sediment savings” of 3,655 cubic yards.

There are 7 high priority sites between County Road 405 and road 16N03 with many sites delivering sediment to the stream system. The first half mile of 405.5 follows a perennial tributary of Hurdy Gurdy Creek. Within this section are two erosional features and two stream crossings that are chronic sources of sediment to the stream. The drainage system on 16N03.2 is not working adequately causing roadbed and fillslope erosion. The high priority stream crossing at mile post 0.69 is rapidly failing and may deliver the whole prism to the stream network. Treatment of these roads would result in “sediment savings” of 6,896 cubic yards.

16N33 used to connect 17N04 to 16N03 until a middle section was decommissioned. The upper section, beginning at 17N04, is two miles long and has two stream crossings and two cross drains which are plugged and diverting causing erosion. The last mile of this road, down to the decommissioned section, runs along a perennial tributary of Hurdy Gurdy Creek. The drainage is poor with long stretches of saturated roadbed. Runoff in this section is routed down the road causing gullying and erosion of the hillslope. There are also numerous fillslope failures. 16N33 Lower starts at 16N03. The first 0.6 miles (to intersection of 16N31, A & B) is fairly stable with 3 features. The second 0.6 miles is in poor condition with 9 fillslope failures and 4 road gullies. There is also a failed stream crossing (16N33-0.89) which is actively eroding the fillslope. Treatment of these roads would result in “sediment savings” of 40,101 cubic yards. Table 5b describes the potential sediment sources existing in the South Fork Smith subbasin.

**Table 5b. Potential sediment yield from road-related sites in the South Fork Smith sub basin (Ledwith 2003b).**

Site Type	Total number of sites	Number of high priority sites	Number of medium priority sites	Future yield to streams (cy)	Number of sites that need maintenance	Number of sites currently diverting	Number of sites with diversion potential
Stream Crossings	410	51	194	270,986 <sup>1</sup>	175	14	146
Cross Drains	613	67	76	N/A	238	N/A	426
Erosional Features	36	17	10	16,027 <sup>2</sup>	N/A	N/A	N/A
Totals	1,059	135	280	287,013	413	14	572

<sup>1</sup> Includes stream crossings ranked high or medium priority. At stream crossings with diversion potential, future erosion is difficult to predict. A minimum estimate of the stream crossing fill volume was used as a predicted value for this table.

<sup>2</sup> Includes erosional features ranked high and medium priority.
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### Chemical Contaminants and Nutrients: at risk

No known toxic chemical contaminants occur in the watershed. There is a risk of chemical contamination to streams from unrestricted motor vehicle traffic on stream banks and gravel bars at dispersed streamside recreation sites.

Recreational use of popular streamside recreation sites and the potential for water contamination from human waste has resulted in additional vault or portable toilets placed throughout the Smith River NRA in the last 5 years.

The Smith basin is at risk of not properly functioning with regard to this indicator.

### **Habitat Access**

#### Physical Barriers: properly functioning

There are no known anadromous fish migrations barriers associated with any Forest Road (Six Rivers National Forest Fish Passage Survey, 2001). A few road-stream crossings have been identified as potential barriers to resident coastal cutthroat trout in the Middle Fork Smith River and Blue Creek. To what extent resident fish are affected by these possible barriers is unknown, and further analysis of these areas is a priority. In general, the location of the potential barrier is in the upper portions of the watershed and the extent to which resident fish are affected appears to be minimal.

The only artificial anadromous barrier on the Smith River was on Monkey Creek (which blocked approximately 3 miles of anadromous habitat) and was removed in 1995. No other artificial barriers exist and the stream system has approximately 300 miles of habitat accessible to anadromous fish. Therefore, the Smith basin is properly functioning with regard to habitat access.

### **Habitat Elements**

#### Substrate: properly functioning

In the Smith River, sources of substrate mainly originate from natural debris, rotational, and translational landslides. Although channel aggradation is evident in some depositional reaches of the system, such as lower Hurdygurdy and Jones Creeks, substrate composition is very coarse and is dominated by cobble and gravel. The large 1964 “rain-on-snow” storm event de-stabilized logged areas and activated many landslides in the watershed, which delivered a very large pulse of hillslope debris and sediment to the channel, resulting in aggradation (Fox Unit Monitoring Fishery Reports, USFS 1976 through 1985). Smaller storms from the 1970s to the present periodically reactivated some landslides, but have also progressively downcut through the aggraded areas and have slowly routed, transported, and stored the channel sediment from the 1964 event to stable bar locations.

In depositional areas of lower Hurdygurdy, Patrick, Craigs, Monkey, and Coon Creeks, channel aggradation is influenced by the legacy of placer and hydraulic mining that occurred in the late 1800s, which washed out coarse material from lower hillslopes and delivered material to the lower reaches. The fine sediment component of substrate has been measured in the Smith basin. Fine sediment (<.85 millimeter particle size) in depositional reaches (including gravel bars) associated with salmon spawning habitat was measured from 1976 to 1984 in Hurdygurdy Creek (a primary salmon spawning area) and ranged from 3.5% to 5% (USFS 1976 to 1985). A fine sediment percentage of 20% has been documented as a threshold where salmon egg mortality begins to greatly increase (Reiser and Bjornn 1979, Bjornn and Reiser 1991). These data indicate that in depositional features such as gravel bars (i.e. spawning habitat) where fine sediment can accumulate and have a defined impact, the level of fine sediment is very low and the Smith basin is properly functioning with regard to substrate.

Large Woody Debris: at risk

Large wood availability in the Smith River have been at low levels for at least the past 4 decades (CDFG 1963, 1972, 1978; USFS 1991). Much of the large woody debris (LWD) is above the bank full channel and potentially functions during high flow periods. This distribution of LWD is characteristic of the Smith River basin and due in large part to the intensity of storm events and associated flow responses, and to the predominance of steep confined stream reaches that prevent LWD from accumulating. A 1972 stream survey documented 10 LWD jams in the 12 mile anadromous reach of Hurdygurdy Creek, ranging from 67 to 13,000 cubic yards in size (CDFG 1972). In pools, LWD provides channel complexity and the habitat components of cover and bank stability, however these sites comprise a small proportion of the total stream area when compared to other habitat types and cover elements. Instream cover provided by LWD in pools averages is 6%, and for riffle and run habitats is 2% (USFS 1991). Habitat surveys throughout the basin have documented very low quantities of LWD. Therefore, the Smith River basin is at risk of properly functioning with regard to LWD.

Pool Frequency: properly functioning

Pool/riffle ratio (by occurrence) is approximately 1/3. Pools comprise approximately 18% of the total surface area, compared to riffles that comprise the remaining 82%. The predominate pools are bedrock-formed. Pools are more abundant in the mainstems of the North, Middle, and South Forks Smith, and in the lower reaches of primary tributaries including Diamond, Stony, Hardscrabble, Myrtle, Patrick, Monkey, Siskiyou Fork, Hurdygurdy, Craigs, Coon, Gordon, Jones, Goose, and Rock Creeks. Pools generally become smaller and/or less abundant progressively upstream in the steeper channel reaches, however they are common at natural falls barriers – which can provide important cool water refugia during low flows in summer. Stream habitat inventories of these major tributaries indicate that the predominant pool-forming elements are bedrock flow obstructions, and the most common cover element is interstitial space within the coarse substrate. Given that pool formation and frequency is controlled primarily by the natural processes of scour and fill around bedrock obstructions, and that those processes have not been altered, pool frequency is therefore properly functioning.

Pool Quality: properly functioning

Due to the lack of LWD cover, the complexity of pools (e.g. amount of cover, spatial partitions, and substrate diversity) is less than what would potentially exist with more abundant LWD. This lack of complexity directly relates to the quality of pool habitats for overwintering coho salmon (Meehan and Bjornn 1991). However, this low abundance of LWD is characteristic of the Smith River basin and due in large part to the predominance of steep confined stream reaches that prevent LWD from accumulating, and the intensity of storm events and associated flow responses. The amount of LWD jams present in the project area (middle and upper reaches of the Smith basin) prior to European settlement and subsequent LWD removal may have been low compared to other basins. For example, LWD jams are non-existent in the North Fork Smith mainstem, a reach that has had no intentional removal and very low amounts of direct channel disturbance (road crossings, streamside timber harvest, etc.) All other important attributes, such as depth, temperature refugia, interstitial cover space, bedrock cover ledges, and pool volume are at their potential. Therefore, given the overall condition of these important attributes, pool quality is best described as properly functioning.

Off-channel Habitat: properly functioning

Due to the predominant steep incised channel morphology of the stream system in the project area, abundance of off-channel habitat is low. In lower reaches of the main tributaries, backwater alcoves and edgewater type habitat comprise typically 2% of the total habitat surface area, and are commonly associated with channel braids or overflow channels near gravel bars. However, in comparison to their availability, these isolated small habitats are highly utilized by newly emerged salmonids in early spring during high flows. Based on habitat inventories throughout the Smith River basin, the low amount of off-channel habitat is typical for the dominant B channel types and indicates that the stream system is controlled by rock type and channel gradient and is therefore within the expected range (Rosgen 1994). Therefore, off-channel habitat is properly functioning.

Refugia: properly functioning

The value of the Smith River as a fish habitat refuge is high and is reflective of the overall habitat conditions in the Smith River basin. The refugia values are highlighted by the fact that the entire basin is designated as a Key Watershed under the Northwest Forest Plan. The Smith River supports all freshwater life stages of Chinook salmon, coho salmon, steelhead, and coastal cutthroat, as well as Pacific lamprey, and several species of amphibians. Any given sub basin or watershed can be expected to provide sufficient refuge habitat in the event of a large catastrophic disturbance in a nearby watershed, such as a wildfire or debris landslide. Therefore, the Smith River is assumed to be properly functioning as a fish habitat refuge.

**Channel Conditions and Dynamics**Width/depth Ratio: properly functioning

Although channel aggradation is evident in some reaches, the w/d ratio is within expected ranges for typical channels in the Smith River (Fox Unit Monitoring Fishery Reports, USFS 1976 through

1985; Siskiyou Research Group 2004). In depositional reaches, the average width/depth ratio of the wetted channel measured during summer flows is 6.55/1.0, and ranges from 3.18/1.0 in trench pools to 17.0/1.0 in high gradient riffles. In reaches of the Smith River system, bankfull width/depth ratio ranges from below 20 to over 50. Smith River channels are predominantly steep and relatively incised Rosgen B forms (Rosgen 1994), where the width/depth ratio is fairly resilient to changes from sediment input and flooding. Overall, the width/depth ratio is properly functioning.

Streambank Condition: properly functioning

Streambank condition can be described in terms of stability. Streambank stability data are available for upper South Fork and North Fork tributaries (measured as % reach length) and ranges from zero in steep narrow bedrock channels such as the North Fork Smith subbasin (Siskiyou Research Group 2004), to approximately 11% of the stream channel in lower Hurdygurdy Creek where mining has occurred (Fox Unit Monitoring Fishery Reports). Portions of the Middle Fork Smith River are influenced by extensive streambank alterations from Highway 199, but have maintained high stability due to the predominance of boulder and bedrock banks. Due to the predominance of bedrock streambanks in the Smith River system, streambank condition is properly functioning.

Floodplain Condition: properly functioning

Roads can directly affect physical channel dynamics when they encroach on floodplains or restrict channel migration. Floodplains help dissipate excess energy during high flows and recharge soil moisture and groundwater. Floodplain function is compromised when roads encroach on or isolate floodplains. This can increase peak flows. When peak flows increase, more water is available for in-channel erosion, which affects channel stability. Restricting channel migration can cause channel straightening which increases the stream energy available for channel erosion. This can also result in channel instability. Altering channel pattern affects a stream's ability to transport materials, including wood and sediment.

The project area is predominantly comprised of steep narrow canyons and valley floors, where floodplains within the bankfull level are small and localized as to their influence. However, in lower gradient reaches throughout the Smith River system, small floodplains do exist, are well connected to the channel, and are properly functioning.

## **Flow/Hydrology**

Peak/Base Flow: properly functioning

Roads can divert surface flow, expand channel networks, convert subsurface flow to surface flow, and reduce infiltration. A channel network can be expanded by road ditches and road-related erosional features (e.g. gullies and rills), which intercept and concentrate runoff from their natural flow path. These factors may affect the overall hydrology in a watershed, particularly the quantity and timing of flow.

Reduced infiltration contributes to additional surface flow since water does not infiltrate for storage in the soil profile, but rather runs off as overland or surface flow. Storage and movement of water through the soil profile as subsurface flow regulates and sustains base flows in stream channels. When infiltration during storms is reduced, more water becomes available as surface runoff, and less water is available as subsurface. This can result in quicker, higher, and sharper stream peak flow responses to storms (“flashiness”), and lower less sustained base flows during dry periods.

Road Hazard Potential can be used to represent the potential for altered hydrologic regime (changes in runoff response) and stream diversions associated with roads. The overall condition class is determined by examining the slope position, slope gradient, proximity to stream channels, number of stream crossings, and density of the road system for each watershed (Table 6a and b).

**Table 6a. Smith River NRA and Gasquet District Road Hazard Potential**

<b>Analysis Watershed Name</b>	<b>Road Hazard Potential</b>
Blue Creek	Low Hazard
Lower North Fork Smith	Low Hazard
Middle Fork Smith	Moderate Hazard
Myrtle-Hardscrabble	Moderate Hazard
South Fork Smith	Low Hazard

**Table 6b. Criteria for Road Hazard Potential Ratings**

<b>Rating</b>	<b>Definition</b>
High Hazard	The density and distribution of roads within the watershed indicate there is a high probability that the hydrologic regime (ie., timing, magnitude, duration, and spatial distribution of runoff flows) is substantially altered. Roads within the watershed exhibit at least 3 of the following characteristics: (a) densities >0.25 miles/square mile on slope classes >45%, (b) densities >0.5 miles/square mile in middle and lower slope positions, (c) densities > 0.25 mile/square mile within 100 meters of stream channel (hydrologically connected), (d) > 1 stream crossing/mile of road.
Moderate Hazard	The density and distribution of roads within the watershed indicate there is a moderate probability that the hydrologic regime is substantially altered. Roads within the watershed exhibit 1 - 2 of the following characteristics: (a) densities >0.25 miles/square mile on slope classes >45%, (b) densities >0.5 miles/square mile in middle and lower slope positions, (c) densities > 0.25 mile/square mile within 100 meters of stream channel (hydrologically connected), (d) > 1 stream crossing/mile of road.
Low Hazard	The density and distribution of roads within the watershed indicate the hydrologic regime is substantially intact and unaltered. Roads within the watershed exhibit the following characteristics: (a) densities <0.25 miles/square mile on slope classes >45%, (b) densities <0.5 miles/square mile in middle and lower slope positions, (c) densities < 0.25 mile/square mile within 100 meters of stream channel (hydrologically connected), (d) (watershed average) < 1 stream crossing/mile of road.

Definitions:

**Hydrologically Connected:** Any road segment that, during a 'design' runoff event, has a continuous surface flowpath between any part of the road prism and a natural stream channel (any declivity in the land that exhibits a defined channel and evidence of scour and deposition) is a hydrologically connected road segment. This process uses proximity of roads to streams as a surrogate for identifying hydrologically connected roads to streams.

Hydrologic Regime: The timing, magnitude, duration, and spatial distribution of peak , high, and low flow runoff within a watershed.

Regardless of the land use history and the associated disturbance in the watershed, a significant portion of the land area is undisturbed to the point where the peak/base flow has not been measurably altered. As hillslopes, old landslide scars, and decommissioned roads continue to stabilize, it is expected that the peak/base flow response will continue to function properly.

Increase in Drainage Network: at risk

All road-stream crossings provide a point of hydrologic connectivity, but the lengths of connectivity differ at each site. Cross-drains, water bars, drainage dips, and other road drainage structures may be hydrologically connected to a channel if the diverted flow is sufficient to create a gully that leads to a stream channel. Connectivity also occurs when ditches or the road surface deliver directly to the stream at road-stream crossings. Roads cuts with long, continuous ditch lengths can intercept ground water, route it as surface water and may locally increase peak flows during storm events. Drainage ditches that are connected to road-stream crossings provide a conduit for road-related sediment to enter stream channels.

Road-stream proximity (roads within 105 meters of stream) and road-stream density are displayed in Table 7 to indicate the extent of hydrologic connectivity within a watershed.

**Table 7. Hydrologic Connectivity on the Smith River NRA and Gasquet District**

Analysis Watershed Name	Road-Stream Proximity (mi/sq mi)	Crossing Density (#/sq mi)
Blue Creek	0.21	0.54
North Fork Smith	0.27	0.39
Middle Fork Smith	0.63	1.17
Myrtle-Hardscrabble	0.60	1.04
South Fork Smith	0.32	0.56

#### *North Fork Smith subbasin*

A large portion (30,330 acres) of the subbasin is roadless, The North Fork Smith Roadless area includes the majority of the drainage of the North Fork of the Smith River. Approximately 9,000 acres of the western portion of the roadless area has been altered by roads and mining activities. The geologic character of the ophiolitic area is predominantly serpentine/ultramafic with very coarse parent material. Nearly all of the stream crossings within the North Fork Smith subbasin are rocked fords containing very small fills. Potential road-related fine sediment sources in this subbasin are considerably fewer than in the Middle and South Fork subbasins. In the Bear Creek, High Plateau Creek, Peridotite Canyon Creek and Stony Creek watersheds, Forest Road 18N13 (8 miles), Road 18N09 (6 miles) and all of the spur roads (approximately 24 miles) are currently maintained at OML 1 and are in good hydrologic condition, with very little drainage diversions, erosion, and potential for sedimentation. Therefore, the increase in drainage network indicator is properly functioning.

### *Middle Fork Smith subbasin (including Myrtle-Hardscrabble)*

Within the Middle Fork Smith subbasin, roads 17N08, 18N07, and 18N11 experience high traffic loads and have a combined 29 high priority sites between them which accounts for 28% of all high priority sites. These roads are chronic contributors of sediment to nearby streams with 17N08 contributing directly to Little Jones Creek and 18N07 contributing directly to Knopki Creek. Common problems on these roads include undersized culverts, plugged culverts, and roadbed gullies. The drainage pattern on these roads is mostly insloped with 92% of the stream crossings under-sized for the 100-year storm event, and 77% having the potential to divert if overtopped. The roads also have some of the longest inboard ditches in the watershed. The average inboard ditch, without a break in slope, for 18N07 was 1,102 feet and 641 feet for 17N08. Beyond addressing the specific problems at each high priority site, these roads would benefit from culvert upgrades, installation of diversion prevention dips, and breaks in slope to reduce length of inboard ditches. Treatment of these roads would result in potential “sediment savings” of 97,969 cubic yards. Due to the current condition of roads and length of hydrologically connected road drainage features, the increase in drainage network indicator is at risk of not properly functioning.

### *South Fork Smith subbasin*

A total of 613 cross drains have been identified in the South Fork Smith subbasin. Of these, 67 (11%) were identified as needing immediate treatment. The most common problems at these pipes were plugged inlets and direct delivery of sediment to the stream network through surface flow paths (i.e., rills and gullies). These flow paths can be chronic contributors of fine (i.e., silt and clay) sediment from the road surface and inboard ditches. The main cause of these flow paths is long sections of uncontrolled flow along the road surface and inboard ditch. In these situations, the most effective treatment is the installation of additional drainage features to reduce the road-related drainage density.

238 (39%) cross drain sites were identified as needing simple routine maintenance. The most common problem (60% of the sites) is sediment plugging the culvert inlet. Sites that plug can divert water either onto the road surface or hillslope causing erosion, or into downroad cross drains or stream crossings, expanding the drainage network and eventually causing the downstream sites to fail. Due to the current condition of roads and length of hydrologically connected road drainage features, the increase in drainage network indicator is at risk of not properly functioning.

## **Watershed Conditions**

Road Density and Location: at risk

Road networks can impact watershed processes through surface erosion and the generation and transport of increased loads fine sediment. Surface erosion is highly dependant on soils, road surfacing, road grade, age of the road, traffic volumes, and the effectiveness and spacing of drainage structures. Studies have indicated that sediment delivery to stream systems is highest in

the initial years after road construction, although unlined ditches and road surfaces with little armor can remain chronic sources of sediment.

Surface erosion condition is determined by examining the density of roads on erodible soils (Table 8a and b). This indicator addresses the potential for altered sediment regime associated with surface erosion accelerated by road construction and road maintenance.

**Table 8a. Smith River and Gasquet District Surface Erosion**

<b>Analysis Watershed Name</b>	<b>Road Hazard Potential</b>
Blue Creek	Low Hazard
Lower North Fork Smith	Low Hazard
Middle Fork Smith	Moderate Hazard
Myrtle-Hardscrabble	Moderate Hazard
South Fork Smith	Low Hazard

**Table 8b. Criteria for Surface Erosion Ratings**

<b>Rating</b>	<b>Definition</b>
High Hazard	Significant alteration of the natural sediment regime associated with surface erosion is likely or evident. Conditions are characterized by the presence of higher road densities and associated disturbance to soil and vegetation on soils highly sensitive to accelerated erosion (high - very high Erosion Hazard Ratings).
Moderate Hazard	Moderate alteration of the natural sediment regime associated with surface erosion is likely or evident. Overall disturbance is variable, with low to moderate road densities and associated disturbance to soil and vegetation on soils highly sensitive to accelerated erosion (high - very high Erosion Hazard Ratings).
Low Hazard	Minor or no alteration of the natural sediment regime associated with surface erosion is likely or evident. Overall disturbance is low and are characterized by the presence of low road densities and associated disturbance to soil and vegetation on soils highly sensitive to accelerated erosion (high - very high Erosion Hazard Ratings).

Drainage structure, function, and spacing are key to minimizing the amount of surface flow, which directly affects surface erosion. Subsequent project level Roads Analysis may consider new cross drain spacing guidelines using the Water Erosion Prediction Program (WEPP) to model surface erosion from roads have been derived (Morfin et al., 1996). The WEPP model provides for input ranges of local climatic conditions, surfacing material characteristics, maintenance frequency, distance between cross drains, and road grade typical for National Forests. (USDA Forest Service, Water/Road Interaction Series, 1998).

Stream crossing density reflects the extent to which roads have modified the channel network and is an indicator of the potential for culvert failures. The relatively low density of road-stream crossings across the Smith River NRA is attributable to the high proportion of roads on or near ridgelines and not in frequent proximity to channels. The consequences of culvert failures can range from minor to substantial. Minor failures introduce culvert fill material that exceeds the transport capacity of the channel, causing it to become aggraded and widened. It can take several years for the channel to adjust and move the sediment downstream, but generally the effects are localized and remain within a relative short distance downstream of the crossing. Substantial failures can generate debris flows and entrain additional sediment as they progress downhill and downstream. The impacts from debris flows can extend far from the culvert failure site and take many years for the channel to adjust and riparian vegetation to reestablish. Stream crossings on steep terrain, with a lot of woody debris upstream, have the greatest potential for debris flows. Adequate road maintenance is critical in these areas.

Culvert diversions also pose significant risks in terms of off-site sedimentation. Diversions occur when a culvert plugs and the stream flow follows the roadbed instead of crossing the road and returning to the original channel. When the diverted stream flow accumulates enough water and sediment, it can create a gully and eventually cross the road and scour a new channel on the hillslope. Upgrading culvert size, increasing the number of cross drain culverts, water bars, or larger drivable surface drains (rolling dips) can minimize diversion potential.

Table 9 describes estimated road-crossing density for the District. Estimates may be actually higher or lower than predicted depending on accuracy of the stream or road coverage. The relatively low crossing density throughout the project area is attributed to the majority of roads located in the upper third of the watershed where stream density is lower. During the Smith River RAP, data on road-stream crossing density was field verified to identify specific sites and areas of concern. This included an extensive road and culvert inventory in the South and Middle Fork Smith River sub-basins (Ledwith 2003).

**Table 9. Smith River NRA and Gasquet District Road-Stream Crossing Density**

<b>Analysis Watershed Name</b>	<b>Crossing Density (#/sq mi)</b>
Blue Creek	0.54
Lower North Fork Smith	0.39
Middle Fork Smith	1.17
Myrtle-Hardscrabble	1.04
South Fork Smith	0.56

Portions of roads in the Smith River basin are near streams and affect flow hydrology (within 105 meters of a channel). A smaller portion of these are also within valley bottoms of stream systems. Overall road density across the Smith River basin is relatively low at approximately 1.6 mile per square mile. Therefore, the low road density that includes a portion near channels (location indicator) best describes this indicator as at risk of not properly functioning.

Disturbance History: at risk

Human disturbance history in the Smith River basin includes timber harvest and mining. Approximately 58,000 acres (FS and private) in the project are have had some form of timber management. Most of the private lands are located in the upper Hurdygurdy, Goose, and Little Jones Creek watersheds. Approximately 15% of the watershed has had some form of human disturbance, and the forest age for much of this disturbed area is less than 50 years old (early mature).

Past hydraulic mining, primarily for gold, altered certain streamchannels, including Hurdygurdy, Craigs, Coon, Patrick, and Myrtle Creeks. For example, the lower 4 miles of Hurdygurdy Creek were at the heart of the Big Flat Mining District, that was most active from 1878 to 1889 and again between 1932 and 1939. This mining district encompassed approximately 1,500 acres, and contained two major ditch systems, ten hydraulic pits, numerous placers, and smaller ditches and penstock sections (USFS 1976 through 1985). Hydraulic mining altered channels and riparian areas significantly. Huge volumes of hillslope sediment were washed down to riparian and streamside areas, and LWD was removed from the channel to facilitate the mining of alluvial gold placer deposits within the substrate and near the channel. The removal of LWD reduced habitat complexity, LWD recruitment potential, and the ability of the channel to store and route the introduced sediment. Much of the landscape where hydraulic mining occurred is recovering, and previously altered riparian stands in areas like lower Hurdygurdy Creek are approaching 70 to 80 years and are beginning to provide RR functions.

This amount of disturbance history from timber harvest and mining results in the watershed to be at risk of not properly functioning.

#### Riparian Reserves: properly functioning

The road system directly affects riparian communities where it impinges on riparian areas. Roads can indirectly affect riparian communities by intercepting surface and subsurface flows and routing these flows so that riparian areas dry up and the riparian vegetation is replaced with upland vegetation. Riparian plant communities play a vital role in providing shade. Removal or degradation of these communities can affect stream stability and water temperatures, which in turn, affects aquatic habitat.

The condition and function of the riparian reserves varies throughout the project area. Functions provided by the riparian reserves that are important for aquatic TES species include shade canopy and thermal buffering, LWD production from the mortality and recruitment of mature trees, protection of small floodplains important for overwintering habitat, and production of nutrient and food sources. As described above, the shade canopy is currently adequate to maintain stream temperatures within the range necessary for productive salmonid habitat.

Due to the timber harvest history (described above), approximately 10% of the RRs in the project area are in an early to early mature seral stage (approximately 15,000 acres of private land are included in this estimate). These RRs are predominantly within plantations or thinning areas comprised of the Douglas-fir plant series and typically range from 25 to 60 years old. Over the next 100 years, LWD recruitment potential will likely be low in these areas until they mature and

develop the potential for LWD recruitment. The remaining majority (90%) of the RRs have not been managed, and range from early mature to old growth. Variation in seral stage is due to mainly to fire, windthrow, and landslides. These RRs function properly and will continue to provide shade, food, nutrients, and LWD. Therefore, the overall current RR baseline condition at the Smith River basin scale, is that RRs are properly functioning.

**Table 10. Pathways and indicators for the Smith River Basin  
Smith River**

				ENVIRONMENTAL BASELINE		
				Properly Functioning	At Risk	Not Properly Functioning
<b>WATER QUALITY</b>						
Temperature						
Sediment/Turbidity	turbidity		sediment			
Chem. Contam/Nut						
<b>HABITAT ACCESS</b>						
Physical Barriers						
<b>HABITAT ELEMENTS</b>						
Substrate						
Large Woody Debris						
Pool Frequency						
Pool Quality						
Off-channel Habitat						
Refugia						
<b>CHANNEL CONDITION &amp; DYNAMICS</b>						
Width/Depth ratio						
Streambank Cond.						
Floodplain Connectivity						
<b>FLOW/HYRDOLOGY</b>						
Peak/Base Flows						
Drainage Network Increase						
<b>WATERSHED CONDITIONS</b>						
Road Density & Location						
Disturbance History						
Riparian Reserves						

## **Middle Fork of Smith River**

Most activities planned are too far away to effect coho salmon and their CH, therefore, road work activities that are in close proximity to coho salmon and their CH will be focused on for this analysis. To assess impacts from the proposed action, a more specific set of data are used to analyze impacts from activities within close proximity to coho salmon CH.

The following information was stated above to show habitat indicators for the entire Smith River basin. However this information is again shown to analyze effects of the project within the Upper Middle Fork of the Smith River. Habitat indicators discussed below are only for sediment and turbidity because those habitat indicators are the only ones that have the potential to be affected.

### **Sediment and Turbidity – At Risk**

Within the Middle Fork Smith subbasin, 108 roads have either a stream crossing, cross drain, or erosional feature for a total of 829 features. Crossing types in the subbasin are diverse with 357 (82%) fitted with corrugated metal culverts, 44 (10%) fords, 21 (5%) Humboldt crossing and 13 (3%) bridges. Eighty four stream crossing sites (19%) were identified as high, 208 (48%) as medium, and 145 (33%) low priority. High and medium priority stream crossings could potentially be a source of approximately 231,866 cubic yards of sediment.

A total of 311 cross drains exist in the Middle Fork Smith subbasin. Of these, 37 (12%) were identified as high priority. These culverts commonly have plugged inlets and directly delivery sediment to the stream network through surface flow paths (i.e., rills and gullies). These flow paths are chronic contributors of fine (i.e., silt and clay) sediment from the road surface and inboard ditches. The main cause of these flow paths is long sections of uncontrolled flow along the road surface and inboard ditch.

120 (39%) cross drains are in need of routine maintenance. The most common problem (50% of sites) is sediment plugging of the culvert inlet. Plugged cross drains can divert water either onto the road surface or hillslope causing erosion, or into downroad cross drains or stream crossings possibly causing these sites to fail. Other maintenance needs include treating buried outlets, filled inboard ditches, and broken drop inlet covers.

A total of 81 road-related erosional features have been identified in the Middle Fork Smith watershed. Types of erosional features include: 31 cutslope failures, 28 fillslope failures, and 22 roadbed failures. These sites are the source of an estimated 99,030 cubic yards of sediment that is beginning to enter the stream network.

Within the Middle Fork Smith subbasin, 248 roads (132 system and 116 non-system) have been inventoried and evaluated. A total of 437 stream crossings exist in the Middle Fork Smith watershed giving a stream crossing density of 1.7 crossings per mile of road. Road density is approximately 0.003 miles/acre. Knopki, Little Jones, and Siskiyou Fork watersheds in the upper Middle Fork area have the majority of road-related impacts. In the Knopki watershed, 18N11D and complex of roads has 17 features in which 13 are high priority. Seven stream crossings have failed with an estimated 500-1000 cubic yards of sediment left to deliver to the

stream network. In addition there are 7 erosional features in which 6 are considered high priority with potential delivery of 20,352 cubic yards of sediment to the stream network. Many of these sites have been identified as chronic sources of sediment to Knopki Creek.

18N05 is a ridge to valley road in which the lower 2 miles are in close proximity to a perennial tributary of Knopki Creek. The stream crossings (9) are old fords and Humboldt crossings that are failing and currently diverting. There are four erosional features that are in the process of recovering but still have the capacity to deliver 1,145 cubic yards of sediment to the stream network. The road has been abandoned for 20 plus years and is heavily vegetated. Treating this road would result in potential “sediment savings” of 2,150 cubic yards. Table 11 describes the potential sediment sources existing in the Middle Fork Smith sub basin.

**Table 11. Potential sediment yield from road-related sites in the Middle Fork Smith sub basin (from Ledwith 2003a).**

Site Type	Total number of sites	Number of high priority sites	Number of medium priority sites	Future yield to streams (cy)	Number of sites that need maintenance	Number of sites currently diverting	Number of sites with diversion potential
Stream Crossings	437	84	205	231,866 <sup>1</sup>	149	33	181
Cross Drains	311	37	64	N/A	120	N/A	302
Erosional Features	81	35	10	44,339 <sup>2</sup>	N/A	N/A	N/A
Totals	829	156	279	276,205	269	33	483

<sup>1</sup> Includes stream crossings ranked high or medium priority. At stream crossings with diversion potential, future erosion is difficult to predict. A minimum estimate of the stream crossing fill volume was used as a predicted value for this table.

<sup>2</sup> Includes erosional features ranked high and medium priority.

**Table 12. Pathways and indicators for Knopki Creek and the Upper Middle Fork Smith River**  
**Knopki and Upper Middle Fork Smith River**

	ENVIRONMENTAL BASELINE		
	Properly Functioning	At Risk	Not Properly Functioning
<b>WATER QUALITY</b>			
Temperature			
Sediment/Turbidity	turbidity	sediment	
Chem. Contam/Nut			
<b>HABITAT ACCESS</b>			
Physical Barriers			
<b>HABITAT ELEMENTS</b>			
Substrate			
Large Woody Debris			
Pool Frequency			
Pool Quality			
Off-channel Habitat			
Refugia			
<b>CHANNEL CONDITION &amp; DYNAMICS</b>			
Width/Depth ratio			
Streambank Cond.			
Floodplain Connectivity			
<b>FLOW/HYRDOLOGY</b>			
Peak/Base Flows			
Drainage Network Increase			
<b>WATERSHED CONDITIONS</b>			
Road Density & Location			
Disturbance History			
Riparian Reserves			

## **Diamond Creek**

### **Sediment and Turbidity - Properly Functioning.**

The aquatic habitats of Diamond Creek consist of cobble / boulder dominated rapids, riffles, and non-turbulent riffles and cobble / boulder dominated mid-channel pools, lateral scour pools, trench pools, and plunge pools. Gravel is the sub-dominant substrate component in both fast water and slow water habitat trending toward co-dominance with larger substrate in the upper reaches. Gravel is present either as interstitial fill between larger substrate, in eddy deposits, in occasional large patches in pooltails, and along stream margins. Bedrock outcrop is common throughout the surveyed section and is often a contributor to pool formation and maintenance. Sand is a minor substrate component in Diamond Creek. The substrate of Diamond Creek is not embedded. Several side channels occur in Diamond Creek of which some offer rearing and refuge habitat opportunities that differ from the main channel. Water quality and clarity is excellent. Water temperature was cool throughout the surveyed section ranging from 16<sup>0</sup> C to 10<sup>0</sup> C, well below lethal levels.

Although Diamond Creek is designated as CH, recent stream surveys in Diamond Creek (Siskiyou Research Group 2004) did not detect presence of juvenile coho.

**Table 13. Pathways and indicators for Diamond Creek**

<b>Diamond Creek</b> <b>SUMMARY of SURVEYED</b> <b>HABITAT PARAMETERS</b>	<b>ENVIRONMENTAL</b> <b>BASELINE</b>		
	<b>Properly</b> <b>Functioning</b>	<b>At</b> <b>Risk</b>	<b>Not Properly</b> <b>Functioning</b>
<b>WATER QUALITY</b> Temperature range is 16C to 10C, below lethal levels for fish. Riparian provided shade is dependent on geology. Shade is less common in peridotite/serpentine dominated areas. Best riparian shade in upper watershed. No suspended sediment detected. Negligible turbidity. Water is clear.			
<b>HABITAT ACCESS</b> No barriers to migration observed. A bedrock waterfall and a bedrock chute may inhibit migration in upper watershed during low flow.			
<b>HABITAT ELEMENTS</b> Fast water dominated expressed mainly as rapids and riffles. Boulder/cobble dominated substrate. Gravel is found more often as interstitial fill rather than in patches suitable for spawning. The streambed is not embedded. Large woody debris density is naturally low. Though recently burned, the riparian zone appears intact and unmanaged. Pool density is naturally low. Pools formed by boulders and bedrock. Average pool depth is 4.4 feet. Side channels offer some rearing and refuge habitat that differs from main channel. Anadromy likely extends 8.15 miles up from mouth.			
<b>CHANNEL CONDITION</b> Stable with evidence of active bank instability observed. Bank instability is naturally occurring. With localized exceptions at landslides, the channel is not aggraded.			
<b>HYDROLOGY</b> Measured discharge within expected range. Currently used roads in the watershed have either had stream crossings converted to rolling dips or have had culverts replaced. Stream is fed by numerous tributaries, seeps, and springs.			
<b>WATERSHED CONDITIONS</b> Road density is approximately 0.96 miles per square mile. Most sub-watersheds have a higher road density. Most roads are high in subwatersheds, or along drainage divides, or decommissioned. Road 18N09 parallels the stream in reaches two and three, currently shows signs of erosion, and may be a future sediment source.			

## VI. EFFECTS OF THE PROPOSED ACTION

The proposed action does not involve activities within TES fish, CH, or EFH. Therefore no direct effects to TES fish and CH or EFH are anticipated from this project. The project encompasses the entire Smith River NRA and Gasquet District, and all activities would be distributed across the entire project area.

### **1. Effects on Relevant Indicators and TES Fish, CH, and EFH**

#### **Water Quality**

Water Temperature: maintain

Riparian vegetation could potentially be disturbed during road decommissioning, culvert/bridge removal or replacement and upgrade, or stormproofing activities. Riparian trees may be cut and excavated to access each site and restore proper channel dimensions. This type of activity is likely to have no or only localized effects on stream shade and water temperature because of the small amount of vegetation being removed at any site. Road maintenance would potentially involve disturbance to riparian vegetation. Brushing along roads that parallel the stream channel for several miles could increase water temperatures due to reduction of shade. Generally, however, brushing is limited to within four feet of the road ditchline and outside shoulder. Maintenance of roads that do not closely parallel streams is likely to have little or no effect on water temperature, and therefore would not likely result in any adverse effects to TES fish, CH, or EFH.

Water temperature would therefore remain as properly functioning. Water temperature will continue to be within the range that is beneficial for salmonid growth, reproduction, egg incubation, and survival. Removal or closure of roads would have a positive effect on stream temperature in the long term. Trees and other riparian vegetation would re-colonize a decommissioned roadbed and, in time, help shade the stream.

Turbidity: maintain

Fine sediment introduced into a waterway can cause turbidity. An increase in turbidity can affect fish and filter-feeding macro-invertebrates downstream of the work site. At moderate levels, turbidity has the potential to adversely affect primary and secondary productivity; at higher levels, turbidity may interfere with feeding and may injure and even kill both juvenile and adult fish (Spence *et al.* 1996, Berg and Northcote 1985).

The proposed road maintenance and road decommissioning actions would generally help to limit sediment input and turbidity from road systems over time. However, activities themselves could potentially contribute some short term sediment to streams. Fine sediment could be generated from surface and drainage maintenance (*e.g.*, grading and ditch cleaning), culvert replacement and repair, culvert cleaning, stabilization of storm-damaged roads, road repairs and stabilization, and removal of material from small landslides. The amount of fine sediment which could potentially enter a stream as a result of road maintenance activities would be minimized through

the implementation of the inherent S&Gs and BMPs. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. This is primarily due to small intermittent streams (where activities would take place, outside of CH) that are hydrologically connected to larger streams where coho salmon CH exists. Disturbed soil will most likely be transported during the first heavy rains of winter after work has been completed. As sediment moves down these smaller streams, the amount of sediment is diluted from settling and dilution from other tributaries entering the transport stream. When sediment finally gets into coho salmon CH the small amount of sediment and flow from the transport tributary stream is even further diluted by entering larger streams where coho salmon may be present. Therefore, the proposed action would not result in adverse effects. Pulses of sediment and increases in turbidity would be short term and at negligible levels that would not harm, or kill TES fish, or adversely affect CH or EFH.

As discussed in the baseline channel conditions section, the overall potential for increased turbidity levels from the proposed action is very low and is reflective of the hard basalt geology and subsequent coarse substrate that dominates streams of the Smith River basin. The Smith River will maintain a low turbidity range that allows for a high rate of success in salmonid incubation, rearing, feeding, and spawning. Turbidity is expected to not change from the proposed action and will remain properly functioning.

#### Sediment: maintain

Increases in sediment supply beyond the transport capability of a CH or EFH stream can cause stream channel instability, aggradation (sometimes to the extent that perennial streams become intermittent; Cederholm and Reid 1987), widening, loss of pools, and a reduction in gravel quality (Sullivan *et al.* 1987, Furniss 1991, Swanston 1991). For salmon, these changes can mean reduced spawning and rearing success when spawning areas are covered, eggs and fry suffocate or are trapped in redds, food abundance is reduced, and over-wintering habitat is reduced (Cederholm and Reid 1987, Hicks *et al.* 1991).

The proposed action would reduce sediment input and turbidity from road systems over time. However, the work activities themselves can contribute some short term increases in sediment to streams. Fine sediment can be generated from surface and drainage maintenance (*e.g.*, grading and ditch cleaning), culvert replacement and repair, culvert cleaning, stabilization of storm-damaged roads, road repairs and stabilization, and removal of material from small landslides. The amount of fine sediment which could potentially enter a stream as a result of road maintenance activities will depend on the road surface type, the road maintenance being performed, proximity of the road to the stream, whether road ditches are connected to streams, and the density and type of vegetation and other materials between the road and the stream. The inherent S&Gs and BMPs will limit the amount of fine sediment entering stream channels. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. This is primarily due to small intermittent streams (where activities would take place) that are hydrologically connected to larger streams where coho salmon CH exists. As sediment moves down these smaller streams, the amount of sediment is diluted from settling out and dilution from other tributaries. When sediment finally gets into coho salmon CH the small amount of sediment and flow from the

tributary stream is even further diluted by entering larger streams where coho salmon may be present. Therefore, the proposed action would not result in adverse effects. Pulses of sediment would be short term and would be at negligible levels that would not harm, or kill TES fish, or adversely effect CH or EFH.

The proposed action would address the current potential sediment yield described in the baseline discussion through road maintenance, road decommissioning, culvert removal/replacement, and stormproofing. Table 14 summarizes the net reduction of the proposed action over the project area. The amount of road-related sediment from FS roads is expected to greatly decrease as a result of the proposed decommissioning (culvert removals), culvert replacements, stormproofing, upgrading/downgrading, and drainage structure maintenance activities. All road work activities entailing machinery and/or ground disturbance will occur in the dry season; minimizing the potential for mobilized or transported sediment, and subsequent turbidity increases. Road maintenance will disperse precipitation runoff evenly from roads and prevent runoff concentration and subsequent rills and gullies from forming.

Table 14. Number and type of sites treated and amount of fine sediment reduced

Site Type	Total number of sites	Number of high priority sites	Number of medium priority sites	Fine sediment reduced (cubic yd)
Stream Crossings (culverts and Humboldt crossings)	847	135	399	502,852
Cross Drains	924	104	140	N/A
Erosional Features	117	52	20	60,366
Totals	1,888	291	559	563,218

Restriction of motor vehicles to designated and improved FS routes will eliminate cross-country motorized vehicle traffic, including on streambanks and gravel bars, and reduce the direct contact of vehicle tires to soil and further reduce the likelihood of any mobilization and transport of fine sediment into channels.

The proposed action will be beneficial to the sediment processes in the project area, and sediment is expected to decrease from FS roads. FS road-related sediment sources will be reduced, and the percentage of fine sediment in the substrate will remain low (<12%) and will not impede spawning success, egg incubation, and fry emergence. The proposed action would have long-term benefits to general water quality within the Smith River. However, due to the location of county and state roads along valley floors and in close proximity to the Middle and South Forks Smith river, road-related sediment will continue to be delivered to channels and the Smith River basin will continue to be at risk regarding this indicator.

Chemical Contaminants and Nutrients: maintain

Contamination to the stream channel from the proposed activities could occur from equipment leaks (*e.g.*, diesel fuel, oil, hydraulic fluids, and antifreezes) or spills from refueling during project implementation. However, following the inherent S&G and BMPs will reduce the risk of these hazards. Overall risk to water quality should be negligible. Asphalt used during resurfacing can leach out petroleum hydrocarbons, which can be toxic and influence pH. Because routine maintenance generally patches small road segments, during dry conditions, hydrocarbon leaching should have a minimal effect on water quality and therefore would not adversely effect coho salmon or their CH..

Closing roads in riparian reserves that access streambanks and bars, and restricting vehicles to designated routes, will reduce the potential for oil and gasoline (petrochemical) contamination. Upon completion of this proposed action, risk of contaminantion will decrease from FS roads. The proposed action would have long-term benefits by permanently reducing the risk of water contamination and related impacts to TES fish, CH, and EFH. However, due to the location and extent of county and state highways adjacent to streams, this indicator will continue to be at risk.

### **Habitat Access**

Physical Barriers: maintain

The project will not create any new barriers to fish migration. Therefore, the watershed will continue to properly function with regard to habitat access. Anadromous salmonids will continue to be able to access the anadromous reaches of the Smith River.

### **Habitat Elements**

Substrate: maintain

Some sediment may enter stream channels because of heavy equipment use and disturbance of soils, particularly during road decommissioning and culvert removal/replacements. Short-term sediment pulses in certain stream reaches may occur. However, effects are unlikely to result in decrease growth or survival of freshwater life stages of TES fish. Due to the distance sediment would have to travel downstream in hydrologically connected streams; it is unlikely that enough sediment would reach coho salmon and their CH to cause adverse effects.

The project will reduce fine sediment, and substrate composition will be maintained at high quality for spawning, rearing, and for benthic fauna. Therefore, the Smith River will remain properly function with regard to substrate.

Large Woody Debris: maintain

Large woody debris (LWD) is an important component of TES fish habitat, particularly coho salmon. LWD regulates sediment and flow routing, influences stream channel complexity and stability, and provides hydraulic refugia and cover within stream systems (Bisson *et al.* 1987, Gregory *et al.* 1987, Hicks *et al.* 1991, Sedell and Beschta 1991, Bilby and Bisson 1998). LWD

also plays a key role in retaining salmon carcasses (Cederholm and Peterson 1985), a major source of nitrogen and carbon in stream ecosystems (Bilby *et al.* 1996).

In the mainstems and lower reaches of major tributaries of the Smith River basin, LWD has been reduced through a variety of human activities that include past timber harvest practices and associated activities, placer and hydraulic mining activities, as well as the mandated cleanup activities that removed wood from streams throughout the region from the 1950s through the 1970s (FEMAT 1993, Bilby and Bisson 1998). The removal of trees within a distance equal to one site-potential tree height of streams (approximately 170 to 240 feet for mature conifer trees west of the Cascades, FEMAT 1993) have the potential to change the distribution, size, and abundance of large wood available for recruitment from streamside stands (Hicks *et al.* 1991, Ralph *et al.* 1994, Murphy 1995, Spence *et al.* 1996).

Headwater streams in the Smith River basin play an important role in watershed function. LWD in headwater streams increases sediment retention by forming depositional areas and dissipating energy; retains non-woody organic matter, allowing it to be biologically processed prior to downstream export as dissolved and particulate nutrients; and delays surface water passage, allowing it to be cooled by mixing with ground water (Sullivan *et al.* 1987, Murphy 1995, Spence *et al.* 1996, Bisson and Bilby 1998). Additional wood can be recruited to fish-bearing streams from upslope and upstream areas through landslides and debris flows (McGarry 1994, Reeves *et al.* 1995). In some areas, wood transported in this manner may constitute up to 50% of the wood recruited to downstream reaches (McGarry 1994). McDade *et al.* (1990) could not account for 48% of the existing LWD pieces in a study of recruitment from streamside areas.

LWD availability will not be altered by this proposed action. LWD will remain at risk in the Smith River. Until amounts of LWD sufficient to improve pool quality start to accumulate, much of the large woody debris will continue to occur above the bank full channel and potentially function during high flow periods. Juvenile and adult salmonids will continue to utilize these ephemeral habitats during winter storms as velocity refugia from potentially flushing flows. This proposed action will not affect how salmonids utilize LWD-associated habitats.

Pool Frequency: maintain

Pool/riffle ratio (by occurrence) will not be impacted by this proposed action and will remain at 1/3. Pool frequency will therefore continue to properly function. Pools at the current frequency and availability will continue to provide deep water juvenile salmonid rearing habitats, feeding areas, and adult salmonid resting and holding areas.

Pool Quality: maintain

The proposed action will not result in a change in pool quality; therefore pool quality will remain properly functioning. As described in the previous LWD section, the quality of pools (e.g. amount of cover, spatial partitions, and substrate diversity) for overwintering coho salmon will likely remain as less than optimal (Meehan and Bjornn 1991).

Off-channel Habitat: maintain

Off-channel habitat will continue to properly function and will not be impacted by this proposed action. This type of habitat will provide early rearing areas for newly-emerged juvenile salmonids as they feed, avoid predation, and grow.

Refugia: maintain

The proposed action will not impact or reduce the amount or quality of properly functioning fish habitat refugia, especially in relation to CH and EFH. Watersheds will function to provide habitats and resources (food, water, dissolved oxygen) for salmonids in all freshwater life stages in the event of a catastrophic habitat loss in an adjacent stream, and serve as a refugia network of CH and EFH for coho and Chinook salmon throughout the Smith River basin.

### **Channel Conditions and Dynamics**

Width/depth Ratio: maintain

The proposed action will not impact the width/depth ratio and it will remain as properly functioning.

Streambank Condition: maintain

Streambanks may be disturbed when culverts are removed or replaced. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. Maintenance activities may result in a loss of riparian vegetation if the road is close to the channel, which could cause some localized streambank instability. However, any resulting reduction of stability from these activities would be minor, and the effects to downstream TES fish and CH and EFH would be negligible.

Streambank condition will be protected from the restriction of motor vehicles to designated routes. Therefore, streambank condition will continue to properly function.

Floodplain Condition: maintain

The proposed action will not impact floodplain conditions. Floodplains will continue to properly function.

### **Flow/Hydrology**

Peak/Base Flow: maintain

The proposed action will further protect watershed processes related to natural peak/base flow (described in the baseline section), and it is expected that the peak/base flow response will continue to function properly.

Increase in Drainage Network: maintain >> restore

The proposed action will reduce hydrologic connectivity from the road system and improve the drainage network from roads. 200 miles of road will be decommissioned and the amount of connected ditches and road related gullies will be reduced. Drainage network processes will be improved and the landscape will have a more natural drainage pattern that is closer to what existed prior to road construction.

**Watershed Conditions**

Road Density and Location: maintain

Location of roads in relation to streams, specifically hillslope position, strongly influences how much surface and subsurface water flow a road intercepts. Mid-slope and lower slope roads in the Smith River basin can potentially intercept and re-route flows. The proposed action would decrease runoff from maintained roads and therefore protect processes that maintain natural sediment transport efficiency and peak stream flow hydrology, and in turn protect stream channel stability. The removal of culverts, stormproofing, and maintaining proper road surface drainage would restore natural hillslope drainage patterns.

The proposed action will reduce FS road density throughout the basin, with a portion of the reduction being near stream channels. This reduction is expected to be beneficial for downstream TES fish and CH and EFH by reducing the potential for road-related sediment delivery to the channel. However, due to the location of county and state roads along valley floors and in close proximity to the Middle and South Forks Smith river, road location will continue to be at risk.

Disturbance History: maintain

Restoration of disturbed landscapes through FS road decommissioning will help facilitate and augment the natural rate of watershed recovery. As road miles are reduced, forests in harvested areas mature, and mined and logged areas continue to stabilize over the long term, this indicator will begin to approach a properly functioning condition. However, due to the location of county and state roads along valley floors and in close proximity to the Middle and South Forks Smith river, road-related disturbance will continue in close proximity to channels and the Smith River basin will continue to be at risk regarding this indicator.

Riparian Reserves: maintain

Because of their proximity and connections to streams, ecological conditions and processes in riparian areas can strongly influence TES fish CH and EFH. Riparian areas function to provide shade, cover, and channel structural elements; supply and process nutrients; support food webs; supply substrate materials; stabilize streambanks; filter upland sediments; and provide linkages to side channels, floodplains, and groundwater (Sullivan *et al.* 1987, Gregory *et al.* 1991, FEMAT 1993, Spence *et al.* 1996).

Most riparian area functions affecting streams and anadromous fish (including bank stability, shade, litterfall, large wood recruitment) occur within a distance equal to the height of a site potential tree from the edge of the streambank (FEMAT 1993, p. V-27; Spence *et al.* 1996, p. 216-220) for streams without a floodplain, and decline rapidly beyond that distance. Where there is a floodplain, riparian area functions may extend for a distance equal to the height of a site-potential tree from the edge of the floodplain, since during a flood the entire floodplain can function as the stream channel (Rhodes *et al.* 1994).

The proposed action will further protect the processes that maintain the condition and function of RRs, therefore RRs will be maintained as properly functioning.

**Over all, the above habitat indicators would be maintained over the period of this project (15 years), and are likely to improve due to FS actions, such as this project (improving sediment delivery to streams from roads) and disturbed areas from previous management practices are likely to become restored and heal with time.**

## **2. Effects of Specific Work Activities on TES Fish, CH, and EFH**

The following describes potential effects from each work activity listed above in the Proposed Action section. All activities incorporate Standards and Guidelines (S&Gs) and Best Management Practice (BMPs) as standard practice. Road decommissioning, culvert removal and replacement, downgrading, stormproofing, and upgrading would occur once on a given road or site. All other activities can be categorized as routine and would be done repeatedly on roads on a 3-10 year return cycle. Not all activities would necessarily occur in the same year.

1. Road decommissioning - Road decommissioning would result in significant long-term benefits for aquatic habitats (Furniss *et al.* 1991; FEMAT 1993). Road decommissioning would include a variety of measures associated with restoration of hydrologic functions including culvert removal, decompaction of road surfaces (ripping), outsloping, waterbarring, fill removal, revegetation with native species, and roadway barricading (to exclude vehicular traffic). Road decommissioning would not occur in CH or EFH, therefore no direct adverse effects would occur from these activities. However, these actions could potentially result in sediment delivery to hydrologically connected streams. The inherent S&Gs and BMPs will limit the amount of fine sediment entering stream channels. Where sediment does enter a stream, it is anticipated that it would be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. This is primarily due to small streams (where activities would take place) that are hydrologically connected to larger streams where coho salmon CH exists. As sediment moves down these smaller streams, the amount of sediment is diluted from settling out and dilution from other tributaries. When sediment finally gets into coho salmon CH the small amount of sediment and flow from the tributary stream is even further diluted by entering larger streams where coho salmon may be present. Therefore, the proposed action would not result in adverse effects. Pulses of sediment would be short term and would be at discountable levels that would not harm or kill TES fish, or adversely affect CH or EFH.

Contamination to a stream channel could occur from equipment leaks (*e.g.*, diesel fuel, oil, hydraulic fluids, and antifreezes) or spills from refueling. However, following the inherent S&G

and BMPs will reduce the risk of short-term adverse effects on TES fish, CH, and EFH. Due to all of the work activities taking place outside of coho salmon CH, it is unlikely that a spill of petroleum products or contaminants would adversely affect coho salmon or their CH.

Streambanks may be disturbed when culverts are removed or replaced. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. Maintenance activities may result in a loss of Decommissioning and reduction in road density would decrease runoff from maintained roads and therefore protect processes that maintain natural sediment transport efficiency and peak stream flow hydrology, and in turn protect stream channel stability. The removal of culverts, stormproofing, and maintaining proper road surface drainage would restore natural hillslope drainage patterns. This reduction is expected to be beneficial for downstream TES fish and CH and EFH by reducing the potential for road-related sediment delivery to the channel. Because of the potential for short-term pulses of sediment, each project site would be designed, timed, and implemented according to the relevant S&Gs and BMPs to minimize effects to TES fish species.

2. Downgrading to OML 1 – This activity would close the road for vehicle use but would maintain the option of future use. In addition, all stream crossings and cross drains are either removed as described in the road decommissioning section above, or are maintained if no impacts are occurring to TES fish. Potential for short-term localized effects may occur from culvert removal, roadbed ripping, outcropping, waterbarring, and fill removal. However, downgrading roads would not occur near CH or EFH, and no direct effects would occur from this activity. Work would generally be accomplished with a backhoe, excavator, tractor, and compactor. LRMP: MA10-42, 44. BMPs 2-2, 2-3, 2-10, 2-14, 2-15, 2-17, 2-20 and 2-22 will apply to these activities and will insure that any resulting sediment or surface disturbance resulting in sediment and turbidity increases that would be discountable by the time it reaches coho salmon and their CH.

Streambanks may be disturbed when culverts are removed or replaced. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. However, any resulting reduction of stability from these activities would be minor, and the effects to TES fish and CH and EFH would be negligible.

All roads that would be downgraded are more than 0.25 miles from any CH or EFH, many are over 5 miles from CH or EFH. All of the 65 upgrading/downgrading crossings are high in slope position and are intermittent crossings. Therefore, downgrading grading would not adversely affect listed fish due to proximity to listed fish and their habitat.

Contamination to a stream channel could occur from equipment leaks (*e.g.*, diesel fuel, oil, hydraulic fluids, and antifreezes). However, following the inherent S&G and BMPs will reduce the risk of short-term adverse effects on TES fish, CH, and EFH. Due to all of the work activities taking place away from coho salmon CH, it is unlikely that a spill of petroleum products or contaminants would adversely affect coho salmon or their CH.

Streambanks may be disturbed when culverts are removed through downgrading. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. However, any resulting reduction of stability from these activities would be minor, and the effects to TES fish and CH and EFH would be negligible.

After downgrading, OML 1 roads would have less runoff. The removal of culverts, roadbed ripping, outsloping, waterbarring, and fill removal would restore natural hillslope drainage patterns. This reduction is expected to be beneficial for downstream TES fish and CH and EFH by reducing the potential for road-related sediment delivery to the channel during storms.

As described in the effects of decommissioning section above, these actions could potentially result in sediment delivery to downstream TES fish, CH, and EFH. The inherent S&Gs and BMPs will limit the amount of fine sediment entering stream channels to negligible levels. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. This is primarily due to small intermittent streams (where activities would take place) that are hydrologically connected to larger streams where coho salmon CH exists. As sediment moves down these smaller streams, settling out and dilution from other tributaries would occur. When this sediment ultimately reaches coho salmon CH, any remaining small amount of sediment and flow from the originating tributary stream would be even further diluted by the water volume of the larger streams where coho salmon may be present. Therefore, the proposed action would not result in adverse effects. Pulses of sediment would be short term and would be at discountable levels that would not harm or kill TES fish, or impact CH or EFH.

3. Grading/Reshaping/Blading - This work consists of grading and shaping native or aggregate roadbeds to a condition that facilitates traffic and provides proper drainage by allowing water to disperse evenly off the roadbed to prevent rutting, rilling, and diversions – which will reduce transport of fine sediment to channels. This work is generally accomplished by a motor grader.

These road maintenance activities themselves can contribute some sediment to streams. The amount of fine sediment which could potentially enter a stream as a result of road maintenance activities will depend on the road surface type, weather conditions at the time the road maintenance is being performed, proximity of the road to the stream, whether road ditches are connected to streams, and the density and type of vegetation and other materials between the road and the stream. Road maintenance is anticipated to generate only negligible amounts of sediment. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. Furthermore, most roads are far away from coho salmon and their CH. Maintenance of roads is designed to limit the amount of sediment from roads and create a more natural surface drainage.

BMPs 2-4, 2-7, 2-11, 2-19, 2-22, and 2-23 will limit the amount of fine sediment entering stream channels to negligible levels. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level that would not adversely affect listed fish and their CH. This is primarily due to small intermittent streams (where activities would take place) that are hydrologically connected to larger streams where coho salmon CH exists. As sediment moves down these smaller streams, the amount of sediment is diluted from settling out and dilution

from other tributaries. When sediment would ultimately reach occupied coho salmon CH, the small amount of sediment would be further diluted to discountable levels. Therefore, the proposed action would not result in adverse effects. Pulses of sediment would be short term and would be at low negligible levels that would not harm or kill TES fish, or impact CH or EFH. A long-term beneficial effect of reducing fine sediment transport to stream channels is expected.

4. Dust abatement – is required to meet California air quality standards. Water is obtained from identified non-anadromous stream sources, and would follow NOAA Fisheries Water Drafting Specifications. BMP 2-21 will be implemented with this activity. Application of water on roads to control dust will have no effect on TES fish, CH, or EFH, due to little or no overland flow into stream channels.

5. Spot surfacing - This work would be accomplished with a dump truck, motor grader, and a small roller. BMPs 2-22 and 2-23 will be applied during spot surfacing. Asphalt used during resurfacing can leach out petroleum hydrocarbons, which can be toxic and influence pH. Because routine maintenance generally patches small road segments, during dry conditions, the minute level of hydrocarbon leaching would not likely adversely affect TES fish, CH, or EFH.

6. Asphalt pavement patching - Generally this work will be accomplished using a grader, dump truck, small paver, and small roller. A backhoe will be used if the damaged area requires digging out. BMPs 2-19, 2-22 and 2-23 will be implemented with this activity. Asphalt used during patching can leach out petroleum hydrocarbons, which can be toxic and influence pH. Because routine maintenance generally patches small road segments, during dry conditions, the extent of hydrocarbon leaching would be minimal and would not likely adversely affect TES fish, CH, or EFH.

7. Re-paving - This work consists of re-paving large sections of roads already surfaced with asphalt using a grader, dump truck, paver, roller and laborers. BMPs 2-11, 2-19, 2-22 and 2-23 will be implemented with this activity. As described above, asphalt can leach out petroleum hydrocarbons, which can be toxic and influence pH. Because of the low amount of paved roads (OML 4 and 5), the extent of hydrocarbon leaching would be minimal and would not likely adversely affect TES fish, CH, or EFH.

8. New Paving - This work consists of paving sections of existing dirt roads using a grader, dump truck, paver, roller and laborers. BMPs 2-11, 2-19, 2-22 and 2-23 will be implemented with this activity. Asphalt used during new paving can leach out petroleum hydrocarbons, which can be toxic and influence pH. However, any new paving would involve small road segments during dry conditions. Therefore, the extent of hydrocarbon leaching would be minimal and would not likely adversely affect TS fish, CH, or EFH.

9. Paved surface cleaning - This work consists of removing loose material from a paved travelway, including bridge decks and paved shoulders, using a power broom or blower, truck with rock blade, and/or grader. Use of hydraulic flushing will not be permitted within a horizontal distance of 200 feet of stream channels, unless approved by a Forest fisheries biologist. BMPs 2-11, 2-19, 2-21, 2-22, and 2-23 will be implemented during this activity.

Paved surface cleaning would have no effect on TES fish, CH, or EFH due to no material reaching streams with coho CH.

10. Surface treatment - This work consists of treating asphalt concrete or chip seal-surfaced roads with a seal coat, a chip seal, or an asphalt concrete overlay. The purpose of this work is to rejuvenate the road surface, seal hairline cracks, or to replace a worn surface that has become unsafe. Equipment that may be used include power brooms, dump trucks, paving machines, chip spreaders, and oil distributor trucks. BMPs 2-11, 2-19, 2-21, 2-22, and 2-23 will be implemented during this activity. Surface treatment can leach out petroleum hydrocarbons, which can be toxic to fish if it reaches a stream. Because of the proximity and low amount of paved roads to CH and EFH (OML 4 and 5), the extent of hydrocarbon leaching would be minimal and would not likely adversely affect TES fish, CH, or EFH.

11. Maintenance of unpaved shoulders - This work would generally be accomplished with a motor grader and its attachments. There will be no sidecasting in areas where sidecast material could reach stream channels, as defined by a Forest Service fisheries or hydrology specialist. BMPs 2-7, 2-11, and 2-19 will be applied as part of this activity. This activity is aimed at stabilizing road shoulders to reduce risk of failure. There is a very low probability that any shoulder work would be hydrologically connected and any disturbances that occur on the shoulder are unlikely to get transported to coho salmon CH. Therefore this activity is not likely to adversely affect TES fish CH, or EFH.

12. Asphalt crack cleaning and repairing - This work consists of cleaning and filling cracks in existing asphaltic concrete (AC) surfaces that are 1/4 inch or wider. Cleaning is usually accomplished with compressed air, and the crack sealant is applied using a propane-heated double-boiler unit with a wand attachment. BMPs 2-22 and 2-23 will be implemented with these actions. This activity can also leach out petroleum hydrocarbons, which can be toxic to fish and influence pH in streams. Because this activity involves very small road segments, during dry conditions, the extent of hydrocarbon leaching would be minimal and would not likely adversely affect TS fish, CH, or EFH.

13. Ditch maintenance - This work consists of removing rock, wood, soil, and other materials from ditches and re-shaping all types of drainage ditches with a motor grader and/or backhoe to provide a waterway that is unobstructed. During this type of operation, care is taken to retain existing vegetation growing along the banks of the ditches as possible. BMPs 2-2, 2-4, 2-6, 2-7, 2-19, and 2-22 apply to this action.

Fine sediment can be generated from ditch cleaning. The amount of fine sediment which could potentially enter a stream as a result of this activity depends whether road ditches are connected to streams. The inherent S&Gs and BMPs restrict these activities to the NOS to limit the amount of fine sediment entering stream channels. Where sediment does enter the stream, it is expected to be minimal and quickly diluted. These sediment pulses from ditch maintenance should be short term and would not likely adversely affect TES fish, CH, or EFH.

14. Remove and end haul materials - This work consists of loading, hauling, and placing slide debris or excess materials (such as rock, soil, and vegetation) at designated disposal sites. No disposal sites will be designated within floodplains. This work would normally be accomplished

with a wheel loader, excavator, and dump truck when excess materials are hauled to a disposal site. BMPs 2-3, 2-7, 2-11, 2-19, and 2-22 will be applied with these activities. Removing and end hauling material will occur within road prisms and will not yield fine sediment to channels, and therefore is not likely to adversely affect TES fish, CH, or EFH.

15. Culvert placement and replacement - This work includes removal of existing culverts, bed preparation, installation and backfill of new culverts of the size and length specified. Culvert replacements would involve stream crossings and road cross drains. Culvert replacements would not occur near CH or EFH, and no direct or indirect adverse effects would occur from this activity. Work would generally be accomplished with a backhoe, excavator, tractor, and compactor. LRMP: MA10-42, 44. BMPs 2-2, 2-3, 2-10, 2-14, 2-15, 2-17, 2-20 and 2-22 will apply to these activities and will insure that any resulting sediment or surface disturbance is minimized. Where sediment does enter a stream, it is anticipated to be diluted and reduced to a discountable level (due to proximity) that would not adversely affect listed fish and their CH. This is primarily due to small intermittent streams (where activities would take place) that are hydrologically connected to larger streams where coho salmon CH exists. As sediment moves down these smaller streams, the amount of sediment is diluted from settling out and dilution from other tributaries. When sediment finally gets into coho salmon CH the small amount of sediment and flow from the tributary stream is even further diluted by entering larger streams where coho salmon may be present. Therefore, the proposed action would not result in adverse effects. Pulses of sediment would be short term and would be at discountable levels that would not harm or kill TES fish, or impact CH or EFH.

Streambanks may be disturbed when culverts are removed or replaced. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. However, any resulting reduction of stability from these activities would be minor, and the effects to TES fish and CH and EFH would be negligible.

16. Drainage structure maintenance - This work consists of cleaning and reconditioning culverts and other drainage structures such as catchbasins, inlet and outlet channels, and ditchline transition areas. This work is usually accomplished by hand but in extreme cases a backhoe may be used. Hydraulic flushing of drainage structures is not a standard practice of this activity, and will be designated by the Forest only when all potential impacts are addressed and minimized. BMPs 2-7, 2-11, 2-15, 2-19, and 2-22 will be implemented as part of this activity.

Fine sediment can be generated from drainage structure maintenance. The inherent S&Gs and BMPs restrict this activity to the NOS and require that resulting fine sediment be placed in locations where potential surface transport to channels during storms is prevented, such as end hauling sediment to designated disposal areas outside of Riparian Reserves. Therefore, drainage structure maintenance will result in negligible amounts of fine sediment potentially being transported to CH and EFH, and therefore is not likely to adversely affect TES fish, CH, or EFH.

17. Roadway drainage maintenance - This work consists of providing drainage on roads that are in OML 1 status and have been closed to traffic, or for routes used only by high-clearance vehicles. This work may include grading and reshaping of the road surface and constructing

drivable rolling dips or water bars. BMPs 2-2, 2-4, 2-6, 2-7, 2-11, 2-19, and 2-22 will be applied with this activity. Roadway drainage maintenance would reduce sediment input and turbidity from road systems over time. The amount of fine sediment which could potentially enter a stream and affect TES fish, CH, or EFH as a result of roadway drainage maintenance activities is expected to be negligible. Roadway drainage maintenance is not likely adversely affect TES fish, CH or EFH.

18. Vegetation establishment - This work includes the application of seed, seedlings, saplings, fertilizer, and mulch, to roadways and disposal areas that have been disturbed by maintenance activities. This work is usually accomplished by hand, however seed, mulch, and tackifier may be applied mechanically. BMPs 2-2, 2-4, and 2-22 will be implemented with the described activities. Vegetation establishment would not affect TES fish, CH, or EFH, and would limit sediment transport as vegetation holds soil in place.

19. Brushing (Cutting roadway vegetation) - This work consists of cutting all vegetation, including trees, less than 6" in diameter at six inches above the ground in order to improve sight distance and provide overhead clearance. This work is performed by hand with the use of chainsaws or mechanical brush cutters. All of the work would occur within the road prism. BMPs 2-3, 2-4, 2-5, 2-11, 2-19 and 2-22 will be applied with this action. Where road segments are close enough to be shaded by roadside vegetation, and are parallel to channels, brushing may reduce shade in minute locations, but is not likely to occur in a sufficient extent to lead to increased stream temperatures. Therefore, brushing is not likely to adversely affect TES fish, CH, or EFH.

20. Logging out - This work includes chainsaws and mechanical equipment to remove fallen trees and snags from windstorms, which encroach into the roadway, within 4 feet of the roadbed. BMPs 2-3, 2-19, and 2-22 will be applied with logging out actions. Logging out trees of this size would not effect TES fish, CH, or EFH.

21. Hazard removal and cleanup - This work consists of removing and disposing of hazards such as slumps, slides, trees, rocks, stumps and fallen trees that create traffic safety problems. Woody debris and slash in excess of 1 foot in length or 3 inches in diameter will be removed from ditches. Most work will be within the road prism. BMPs 2-3, 2-7, 2-11, 2-19, and 2-22 will be implemented with these activities. These activities will occur within the road prism and would only potentially release negligible levels of fine sediment that could be transported to downstream TES fish, CH, and EFH. Therefore these activities would not likely adversely affect TES fish, CH, or EFH.

22. Sign maintenance - This work consists of cleaning, replacing, and reconditioning of signs, posts, and markers. Forest Service personnel would normally accomplish this work by hand. BMPs 2-3 and 2-22 will be applied with this activity. Sign maintenance would not effect TES fish, CH, or EFH.

23. Slide and Fill Stabilization - This work consists of a variety of stabilizing techniques including spreading seed, fertilizer and mulch (with or without hydro-mulch machines); hand installation of geo-textile support; and remediation using an array of construction equipment

(cats, loaders, excavators, scrapers, and trucks). BMPs 2-2, 2-3, 2-10, 2-14, 2-17 and 2-22 will apply to these activities. These activities will occur within the road prism and would only potentially release negligible levels of fine sediment that could be transported to downstream TES fish, CH, and EFH. Therefore, slide and fill stabilization activities would not likely adversely effect TES fish, CH, or EFH.

24. Storm proofing – This work may include slide and fill stabilization, road narrowing, road reshaping, berm removal, drainage structure and dip maintenance, drainage structure removal, and replacing stream crossings with larger culverts. This proposal does not involve replacing culverts in CH or EFH. BMPs 2-2, 2-3, 2-10, 2-14, 2-17 and 2-22 will apply to this activity and will insure that any resulting sediment or surface disturbance is minimized.

All roads that would be stormproofed (culvert replacement) are more than .25 miles from any CH or EFH, many are over 5 miles from CH or EFH. Of the 37 culverts identified above that would be stormproofed within the first 3 years, 21 are perennial crossings. Therefore, stormproofing would not adversely affect listed fish due to proximity to listed fish and their habitat.

25. Bridge repair LRMP: MA10-42, 44. BMP 2-15, 2-17 and 2-20 will apply to this activity. Bridge repair would not occur in CH or EFH. Bridge repair would not result in disturbance to streambanks or downstream TES fish, CH, and EFH. Potential for contamination from equipment leaks (*e.g.*, diesel fuel, oil, hydraulic fluids, and antifreezes) will be minimized by following the inherent S&G and BMPs. Any resulting impacts from bridge repair would be minor, and the effects to TES fish and CH and EFH would be negligible as all work would be conducted outside of coho CH.

26. Upgrading – this involves converting an OML 1 road to OML 2 to re-establish use on roads that are currently needed but are in a closed condition. Upgrading includes replacing or maintaining culverts and cross drains, improving surface drainage with drivable rolling dips, and grading and surfacing to reduce the risk to TES fish and provides access. Upgrading would not occur near CH or EFH, and no direct effects would occur from this activity. Work would generally be accomplished with a backhoe, excavator, tractor, and compactor. LRMP: MA10-42, 44. BMPs 2-2, 2-3, 2-10, 2-14, 2-15, 2-17, 2-20 and 2-22 will apply to these activities and will insure that any resulting sediment or surface disturbance is minimized.

Streambanks may be disturbed when culverts are removed or replaced. Streambank vegetation may be potentially removed from a site causing streambanks to be temporarily exposed to streamflow until new vegetation is reestablished. However, any resulting reduction of stability from these activities would be minor, and the effects to TES fish and CH and EFH would be negligible.

All roads that would be upgraded are more than .25 miles from any CH or EFH, many are over 5 miles from CH or EFH. All of the 65 upgrading/downgrading crossings are high in slope position and are intermittent crossings. Therefore, upgrading would not adversely affect listed fish due to proximity to listed fish and their habitat, but would result in long-term beneficial effects by reducing road-related sediment risks.

***3. Effects of Decommissioning on Sediment and Turbidity indicators in Areas of Close Proximity to coho salmon CH within the Middle Fork Smith River.***

The roads in closest proximity to CH and EFH proposed for decommissioning are 18N03 and 18N09.102 and are within 500 feet of CH and EFH. 18N03 is approximately 400 feet from the upper Middle Fork Smith River and has six intermittent culverts that would be removed. 18N03 has a stable road bed and is currently outsloped with no inboard ditches. This project would be done during the summer with no flow in any of the six intermittent streams. Disturbed soils would most likely have time to settle (over summer), erosion control efforts (BMP's and S&G's) would limit the amount of material that could be potentially washed into the intermittent streams that are hydrological connected. Material (sediment) that does end up in these intermittent streams would be transported downstream towards coho salmon CH. While this material is being transported downstream, some of the material (larger size particles) will settle out in slower reaches of these streams. Also, as streams move downhill other springs, seeps and tributaries that increase the amount of flow in them will dilute the level of sediment. When this transported material finally reaches the Middle Fork Smith River (much larger channel), the small amount of sediment and flow that would reach the river, would be quickly diluted even more from the large amount of water that it would be flowing into the Middle Fork Smith River.

***4. Effects of Road Decommissioning on Sediment and Turbidity indicators in Areas of Close Proximity to coho salmon CH within Diamond Creek***

18N09.102 is approximately 300 feet from Diamond Creek and has only intermittent low water crossings and would only require approximately 1 mile of outsloping and waterbarring. Since this road already has low water crossings, little work or soil disturbance would take place in channel crossing areas. Outsloping of the road would create natural hydrological drainage and water would not get concentrated. Therefore, very little material is expected to be transported out of this area. All other roads proposed for decommissioning are more than 0.25 miles from CH and EFH and would have discountable levels of turbidity and sediment reaching coho salmon and their CH for the same reasons listed above (dilution of small amounts of sediment).

***5. Effects of Road Maintenance on Sediment and Turbidity indicators in Areas of Close Proximity to coho salmon CH within Middle Fork Smith River and Diamond Creek.***

Roads within 500 feet of CH and EFH that would receive maintenance activities (numbers 3-23 described above) are 1) 3 miles section of 18N07 along the upper Middle Fork and Knopki Creek, 2) 4 mile section of 18N09 along Diamond Creek, 3) the lower 1 mile section of 17N01 along Siskiyou Fork. All three of these roads would receive the following maintenance activities at a frequency of 2-5 times during the 15 year project period: 1) blading/shaping/grading, 2) dust abatement, 3) spot surfacing, 4) repaving, 5) maintenance of unpaved shoulders, 6) ditch maintenance, 7) end hauling slide material, 8) culvert and cross drain replacement, 9) drainage structure maintenance, 10) brushing, 11) logging out, 12) hazard removal, 13) sign maintenance, 14) slide and fill stabilization, and 15) bridge repair. Specific amounts of each of these activities and their potential effects are described for the 3 roads below.

18N07

0.1 mile of maintenance of unpaved shoulders, end hauling, hazard removal, slide and fill stabilization 3 miles of blading/shaping/grading, dust abatement, spot surfacing, repaving, sign maintenance, brushing, logging out, hazard removal, repair on 3 bridges, and drainage structure maintenance on 12 cross drains and 5 intermittent culverts.

All of the 5 intermittent culverts are currently functioning properly and are not scheduled for replacement or repair within the timeframe of this proposed action. Blading, shaping, grading, and drainage structure maintenance would result in negligible amounts of sediment due to the nature of the disturbance and the inherent S&Gs and BMPs that minimize sediment transport.

18N09

.2 miles of maintenance of unpaved shoulders, end hauling, hazard removal, slide and fill stabilization, 4 miles of blading/shaping/grading, dust abatement, spot surfacing, repaving, ditch maintenance, sign maintenance, brushing, logging out, hazard removal, and drainage structure maintenance and on 10 cross drains.

No culvert removal or replacement would occur. Any sediment produced from cross drain maintenance would be negligible and excess material would be end hauled to locations where sediment could not reach Diamond Creek. Any potential sediment resulting from these activities is expected to be negligible due to the inherent S&Gs and BMPs.

17N01

0.1 mile of maintenance of unpaved shoulders, end hauling, hazard removal, slide and fill stabilization, 1 miles of blading/shaping/grading, dust abatement, spot surfacing, repaving, ditch maintenance, sign maintenance, brushing, logging out, hazard removal, repair on 2 bridges, and drainage structure maintenance and replacement on 8 cross drains and 2 intermittent culverts.

Any potential sediment resulting from these activities is expected to be negligible due to the inherent S&Gs and BMPs. As determined by The Level 1 team on a site visit to the project area on 29 August 2006, the channels at the 2 culvert stream crossings are not hydrologically connected to Siskiyou Fork, rather they drain subsurface into a flat below the project area and do not reach Siskiyou Fork. Therefore, no sediment transport to Siskiyou Fork would result from these sites.

### **3. Effects Summary**

Road decommissioning, culvert placement and replacement, stormproofing, ditch and drainage structure maintenance, bridge repair, grading, reshaping, blading, downgrades and upgrades would result in significant long-term benefits for aquatic habitats (Furniss *et al.* 1991; FEMAT 1993). In total, these activities would improve hillslope drainage patterns, reduce hydrologic connectivity, and reduce road-related sediment delivery to streams. These actions however could potentially result in short-term indirect adverse effects including: 1) disturbance of stream

substrates (outside of CH) and downstream sediment delivery, 2) short-term loss of streambank vegetation and localized effect on stability, 3) small patches of riparian tree removal and minute losses in shade and changes in microclimate, and 4) risk of petrochemical leaks from heavy equipment. Because of the potential for short-term adverse effects, each project site would be designed, timed, and implemented according to the relevant S&Gs and BMPs to minimize adverse effects to TES fish species.

Spot surfacing, surface treatment, asphalt crack cleaning, patching, paving, brushing, shoulder maintenance, blading, end hauling, road and hillslope stabilization, hazard removal and cleanup, and roadway drainage maintenance may result in minimal amounts of fine sediment delivered to stream channels (NMFS 1997), or yield trace amounts of toxic hydrocarbons or other petrochemicals. However, the potential for adverse effects to TES fish and CH, and coho and chinook salmon EFH, due to this minimal fine sediment input, or the likelihood of toxic chemicals reaching a channel, is negligible. Therefore, the likelihood of affecting survival of TES fish or adversely effecting CH or EFH is negligible.

Sign maintenance, dust abatement, logging out, and vegetation establishment will have no effect on TES fish, CH, or EFH.

All activities include the application of S&Gs and BMPs to minimize the risk of project impacts, especially to minimize introduction of fine sediment into stream channels, and minimize the potential for adverse effects to TES fish, CH, and EFH.

Table 15 summarizes the number and types of structures and sites treated, and the expected reduction in fine sediment sources from the proposed Smith River Road Management and Route Designation Project.

**Table 15. Number and type of sites proposed for treatment and resulting sediment source reduction from the Smith River Road Management and Route Designation Project.**

Site Type	Total number of sites	Number of high priority sites	Number of medium priority sites	Number of sites that need maintenance	Number of sites currently diverting	Number of sites with diversion potential	Fine sediment reduced (cubic yd)
Stream Crossings	847	135	399	324	47	327	502,852
Cross Drains	924	104	140	358	N/A	728	N/A
Erosional Features	117	52	20	N/A	N/A	N/A	60,366
Totals	1,888	291	559	682	47	1,055	563,218

#### Timing and Duration:

All activities involving machinery and ground disturbance will occur annually during the dry season, usually between April 15 and October 15 (Normal Operating Season). The proposed activities would be implemented annually from 2007 through 2022. Potential short-term sediment pulses to downstream TES fish, CH, and EFH could originate once from each proposed culvert replacement/removal site. Potential short-term sediment pulses to downstream to TES fish, CH, and EFH from any of the identified work activities described above could occur within

3-10 year cycles, or 2-5 times during the project period, from OML 2-5 roads receiving maintenance treatments. Other work activities that are not likely to adversely affect TES fish, CH or EFH would also occur 2-5 times within the project period.

Nature of the Effect:

The effects of the Smith River Road Management and Route Designation Project are expected to have long term benefits to TES fish, CH, and EFH. Road-related sediment sources which can affect salmonid spawning, incubation, rearing, and feeding success, and impact coho critical habitat will be reduced by removing failing stream crossings associated with decommissioning 200 miles of road. Hydrologic connectivity will be reduced through road decommissioning and road maintenance, which will further reduce the amount of fine sediment entering streams. Road maintenance will minimize the likelihood of surface erosion and reduce the transport of sediment on maintained roads to negligible levels.

Eliminating off-highway motor vehicle traffic in riparian areas and on streambanks and gravel bars will reduce the potential for petrochemical contamination to streams. The risk of toxic pollution to water quality will be reduced to negligible levels. Water quality will benefit, and clean water for spawning, incubation, rearing, and feeding will be maintained.

Disturbance Frequency, Intensity, and Severity:

Road maintenance work activities (numbers 3 through 23 described above) would occur 2-5 times within the project period and would not likely adversely affect TES fish, CH or EFH.

Approximately 204 miles of road would be decommissioned over the 15 year period, with no more than 30 miles per year of ground-disturbing decommissioning activities, and up to 30 culverts removed, within a 5<sup>th</sup> field watershed. Up to 30 crossings per year per 5<sup>th</sup> field watershed would be replaced through stormproofing.

Up to 20 miles of road would be stormproofed annually within a 5<sup>th</sup> field watershed. Bridge repair could occur on up to 3 sites annually within a 5<sup>th</sup> field watershed. Up to 30 miles of road upgrading and downgrading would occur annually within a 5<sup>th</sup> field watershed.

Up to 20 miles per 5<sup>th</sup> field watershed would be re-paved annually (usually in small segments). Up to 10 miles of new paving would occur annually within a 5<sup>th</sup> field watershed. Up to 40 drainage structures per year per 5<sup>th</sup> field watershed would be maintained. A maximum of 30 miles of roadway drainage maintenance would occur annually within a 5<sup>th</sup> field watershed. A maximum of 30 miles per year of grading/shaping/blading per 5<sup>th</sup> field watershed would occur. Up to 10 miles of ditches would be maintained annually within a 5<sup>th</sup> field watershed. Less than 1 mile of surface treatment would occur annually within a 5<sup>th</sup> field watershed.

**Aggregated Effects**

The proposed action comprises of a suite of activities that would be implemented on roads throughout the project area. Concurrent activities (road decommissioning, road stormproofing,

road upgrading/downgrading, and road maintenance) could occur within a single 5<sup>th</sup> field watershed, and in all 5<sup>th</sup> fields, at the maximum levels described above. These concurrent activities are in total expected to result in net combined overall (5<sup>th</sup> field and project area scale) beneficial effects to coho salmon, CH and EFH. For reasons described above throughout the effects discussion, and most notably related to: 1) proximity of CH and EFH, and 2) the very small likelihood of coho salmon occurrence in the project area, the net combined disturbance (primarily sediment delivery) levels at the 5<sup>th</sup> field and project area scales are expected to be discountable and would not have adverse effects to coho salmon and their CH.

### Conclusion

Roads may have unavoidable effects on streams, no matter how well they are located, designed or maintained (FEMAT 1993). Roads can affect streams directly by accelerating erosion and sediment loadings, by altering channel morphology, and by changing the runoff characteristics of watersheds (Furniss *et al.* 1991). Hauge *et al.* (1979) discussed several ways that roads can affect hillslope drainage, including changes in infiltration rates, interception and diversion of subsurface flow, changes in the watershed area of small streams, changes in the time distribution of water yield to channels, and changes in fine (micro) details of drainage. Gibbons and Salo (1973 *op cit* Furniss 1991) found that sediment contributions per unit area from roads is much greater than that from all other land management activities combined, including log skidding and yarding. In general, roads have been a primary source of sediment impacts in developed watersheds (Everett *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994).

The effects of the Smith River Road Management and Route Designation Project are expected to not adversely affect TES fish, CH, and EFH and would be beneficial to TES fish, CH, and EFH. Road-related sediment sources which can affect salmonid spawning, incubation, rearing, and feeding success, and impact coho critical habitat will be reduced by removing failing stream crossings associated with decommissioning 200 miles of road. Hydrologic connectivity will be reduced through road decommissioning and road maintenance, which will further reduce the amount of fine sediment entering streams. Road maintenance will minimize the likelihood of surface erosion and reduce the transport of sediment on maintained roads to negligible levels.

### Cumulative Effects under ESA

Cumulative effects are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area of the Federal action subject to consultation. Future private or state activities that are reasonably certain to occur within the project area include:

- 1) County road maintenance on roads 305, 314, 315, 316, 324, 405, 411, and 427 (approximately 75 miles)
- 2) California state highway 199 road maintenance (approximately 31 miles)

The amount of road-related sediment from FS roads is expected to greatly decrease as a result of any of the proposed action. FS road-related sediment sources will be reduced, and percentage of fine sediment in the substrate will remain low (<12%) and will not impede spawning success, egg incubation, and fry emergence. However, due to the location of county and state roads along valley floors and in close proximity to the Middle and South Forks Smith river, road-related sediment will continue to be delivered to channels in areas of the Smith River basin.

Closing roads in riparian reserves that access streambanks and bars and restricting vehicles to designated routes will reduce the potential for oil and gasoline (petrochemical) contamination. Upon completion of this proposed action, risk of contamination will decrease from FS roads. However, due to the location and extent of county and state highways adjacent to streams, contamination will continue to be a risk.

Restoration of disturbed landscapes through FS road decommissioning will help facilitate and augment the natural rate of watershed recovery. As road miles are reduced, forests in harvested areas mature, and mined and logged areas continue to stabilize over the long term, the legacy of effects from past activities will begin to recede. However, due to the location of county and state roads along valley floors and in close proximity to the Middle and South Forks Smith river, road-related disturbance will continue in close proximity to channels in the Smith River basin, but would not cause cumulative impacts due to the proposed action..

## **VII. DETERMINATION**

Based upon the beneficial nature of this proposed action, it is the determination of the fisheries biologist that this project may affect, and is not likely to adversely affect coho salmon and its designated critical habitat.

This project would not adversely affect coho salmon and Chinook salmon EFH. Effects to CH and EFH are expected to be beneficial.

The proposed action would not impact Forest Service Sensitive Chinook salmon, steelhead, and coastal cutthroat trout, and not lead to a trend toward listing of these species. The proposed action would have long term beneficial effects to these species are their habitats.

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