UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2002/01935

February 2, 2004

Mr. James Sears
Director of Public Works
Marion County
5155 Silverton Road NE
Salem, OR 97305-3802

Re: 4(d) Limit 10 Submittal for Limit No. 10(i) Routine Road Maintenance

Dear Mr. Sears:

The National Marine Fisheries Service (NOAA Fisheries) has evaluated the Routine Road Maintenance Program included in the submittal package for Marion County submitted under Limit No. 10(i) of the applicable 4(d) Rule (July 10, 2000; 65 FRN 42422). After evaluation of the submittal package with respect to the criteria for Limit No. 10(i), I concur with your conclusions that the Marion County Routine Road Maintenance Program (program), together with the supporting documentation in the submittal package, adequately addresses all of the relevant 4(d) criteria, and therefore I find that your program meets the criteria for the 4(d) limit 10(i).

This approval does not apply to pesticide, herbicide or fertilizer applications (50 CFR Part 223.203(b)(10)(v)). The Marion County program includes activities beyond routine road maintenance, and these specific activities are not eligible for approval from NOAA Fisheries at this time. The specific activities not eligible for coverage include park maintenance, ferry maintenance and operation, fleet maintenance and service district maintenance that are conducted by Marion County Department of Public Works staff.

This finding applies through the end of calendar year 2008, at which time you may want to resubmit your program for qualification, incorporating any appropriate changes in management practices and effects analysis that may be possible due to advances in scientific understanding between now and then, and the results of the monitoring and evaluation program you have implemented. Specifically, your program includes provisions for monitoring the adequacy of best management practices (BMPs), review of implemented BMPs and their effectiveness, and the evaluation of BMP performance through adaptive management.

Take prohibitions under section 9 of the ESA and applicable 4(d) rules will not apply to the routine road maintenance practices carried out by Marion County in accordance with your

program. As specified in Marion County's submittal, the County will submit annual reports to NOAA Fisheries.

Thank you for the time your staff has invested in developing the routine road maintenance program and submittal package. NOAA Fisheries looks forward to working collaboratively with you to recognize management programs that meet the biological requirements of salmonids, and to strengthen other programs toward the conservation of listed species. Questions regarding this letter or continued implementation of your program should be directed to Dr. Nancy Munn of my staff at 503.231.6269.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Matt Thorburn, Marion County

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Proposed NMFS Approval of the Regional Road Maintenance Program
Submitted by Marion County, Pursuant to Limit No. 10(i) of the July 2000, NMFS 4(d) Rule

Agency:	National Marine Fisheries Service
Consultation Conducted By:	National Marine Fisheries Service, Northwest Region
Date Issued:	February 2, 2004
Issued by:	for Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2002/01935**

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1. INTRODUCTION

1.1 Background and Consultation History

NOAA's National Marine Fisheries Service (NOAA Fisheries) published an Endangered Species Act (ESA) section 4(d) rule adopting regulations necessary and advisable to conserve listed species on July 10, 2000 (65 FR 42422). The 4(d) rule creates a mechanism by which application of ESA section 9(a)(1) take prohibitions may be limited for land and water activities that NOAA Fisheries has found will contribute to the conservation of listed salmonids' habitat, yet may incidentally take[1] listed salmonids. The 4(d) rule includes thirteen enumerated limits upon the extent of the general take prohibition for 14 threatened evolutionarily significant units (ESUs). Limit No. 10 covers routine road maintenance activities. For a state, city, county or port program to qualify under Limit No.10(i), it must adopt a routine road maintenance program (RRMP) that is substantially similar to the Oregon Department of Transportation's RRMP and is determined to meet or exceed the protections provided by the Oregon Department of Transportation RRMP.

On November 5, 2002, Marion County submitted their Routine Road Maintenance Program (RRMP) for qualification under Limit No. 10(i). On March 28, 2003, a Federal Register Notice was published (March 28, 2003, 68 FR 15153) announcing the availability of the RRMP for public comment. The public comment period closed on April 28, 2003. No comments were received that required a response. Following the public review period, NOAA Fisheries prepared an Environmental Assessment for compliance with the National Environmental Policy Act (NEPA). In this case, the proposed approval of the Marion County RRMP under Limit No. 10(I) constitutes a major Federal action, thus requiring a section 7 ESA consultation. NOAA Fisheries initiated ESA section 7 consultation with itself on September 23, 2003.

The objective of this biological opinion (Opinion) is to determine whether NOAA Fisheries' proposed approval of the Marion County RRMP is likely to jeopardize the continued existence of the ESA-listed species. The RRMP has the potential to affect four ESUs of threatened salmonids, all of which were addressed in the 4(d) Rule. The four ESUs include: Lower Columbia River (LCR) and Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*), and LCR and UWR steelhead (*O. mykiss*). This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR Part 402.

The objective of the essential fish habitat (EFH) consultation is to determine whether the proposed action may adversely affect designated EFH for coho salmon (*O. kisutch*) and chinook salmon, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

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[1] Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct (ESA section 3(19)). Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding or sheltering.

1.2 Description of the Proposed Action

NOAA Fisheries proposes to approve the RRMP implemented by Marion County for county roads within Marion County per Limit 10(i) of the 4(d) rule. Marion County developed the RRMP so that routine road maintenance activities would be protective of salmonids and their habitat. This consultation will evaluate NOAA Fisheries' proposed decision to approve implementation of the RRMP in Marion County under Limit 10(i) of the July 10, 2000, ESA 4(d) rule. Routine road maintenance activities are recurring activities, either scheduled or predictable, that are needed to maintain the functional integrity of the existing transportation facility.

The Marion County RRMP is comprised of six parts and four attachments:

- Part 1: Cover Letter. The cover letter is from James Sears, the Director of Public Works at Marion County, to D. Robert Lohn, Northwest Regional Administrator of NOAA Fisheries. The letter states that the Marion County Board of Commissioners adopted the RRMP on July 11, 2001. Implementation began at that time.

- Part 2: Program Description and Legal Authority. Marion County Department of Public Works is the responsible entity for the RRMP. The Marion County RRMP is substantially similar to the ODOT RRMP. Attachment 1 is a comparison of the ODOT and Marion County best management practices and the Marion County best management practices are provided in Attachment 2. Part 2 provides information on the legal authority for the RRMP.

- Part 3: Description of the Geographic Area to Which the Program Applies. The program describes the geographic extent of the analysis area, provides a list of county roads or locations where the maintenance activities may effect streams, the location of salmon habitat in the relevant watersheds, and an analysis of the environmental baseline of those watersheds. Part 3 also includes maps that show fish distribution, water quality parameters, primary land cover, riparian condition, and essential salmon habitat.

- Part 4: Description of Listed Species Distribution and Status. The RRMP describes the distribution and status of the four listed ESUs of chinook salmon and steelhead within Marion County.

- Part 5: Relevant Reports. The RRMP provides a bibliography of relevant reports and background information.

- Part 6: Affirmative Conclusion that the Program is Substantially Similar To, or At Least As Protective As ODOT's Program. The RRMP makes the affirmative conclusion that the program is substantially similar to or better than ODOT's program. The training, monitoring, and reporting elements of the RRMP are summarized here as well.

Attachment 1 is a table that compares ODOT's and Marion County's best management practices. Attachment 2 describes the best management practices being implemented by Marion County, including their dust abatement activities. Attachment 3 describes and provides documentation for the Salmon Recovery Mapping Project. The Salmon Recovery Mapping Project reflects a major effort by Marion County to document the best available biological and natural resource geospatial data relevant to threatened salmonids in Marion County. The mapping products direct or limit best management practices where their activities are adjacent to, or have the potential to affect, threatened salmonids. The end result of the project is two different sets of maps: (1) The Sensitive Area Maps that depict the relevant biological and natural resource data at a scale that can be used to direct activities on the ground; and (2) the Environmentally Sensitive Zone Maps that direct or limit best management practices along county roads. Attachment 4 provides instructions on how to connect the best management practices to the Environmentally Sensitive Zone Maps.

The Marion County RRMP includes activities beyond routine road maintenance, and these specific activities are not eligible for approval from NOAA Fisheries at this time. Activities such as park maintenance, ferry maintenance and operation, fleet maintenance, and service districts, are conducted by Marion County Department of Public Works staff. The activities are included in the RRMP because they are part of the day-to-day operation of the Public Works staff, and it is easier for the county to implement a program where all best management practices are packaged together. The best management practices for these activities may provide benefit to fish and fish habitat, but are not eligible for approval from NOAA Fisheries because these activities were not addressed in the ODOT RRMP.

The RRMP does not apply to the construction of new facilities or major expansion of existing facilities. It does not include development or redevelopment activities. Instead, the RRMP encompasses road maintenance work performed on the existing right-of-way structures. The best management practices are developed specifically for each activity type, although many best management practices are consistent for all activities (*e.g.*, refueling must occur a minimum of 25 feet from a waterbody). Additionally many activities reference the Environmentally Sensitive Zone maps that limit the implementation of certain maintenance activities.

Prior to approving any substantive change in the Marion County RRMP, NOAA Fisheries would publish notification in the Federal Register announcing the availability of the RRMP or the draft changes for public review and comment. Such an announcement would provide for a comment period of not less than 30 days.

The Federal action of approving the RRMP under Limit 10(i) required environmental review under the National Environmental Policy Act (NEPA). Two environmental assessments (EA) were prepared to meet NOAA Fisheries' environmental documentation requirements under NEPA: A programmatic EA for Limit 10 (NMFS 2003a) and a sequential EA that evaluated the environmental consequences associated with the RRMP submitted by Marion County (NMFS 2003b).

1.3 Action Area

The action area is defined in 50 CFR 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Marion County currently implements its routine road maintenance activities on all county roads in both rural and urban areas of the county. Marion County maintains 1,132 miles of roadway of which 61 miles are within city limits. It does not include other city roads that are maintained by jurisdictions other than Marion County (*e.g.*, City of Salem). This road network includes both paved and gravel surfaces, as well as 208 bridges and 3,367 culverts. The county also has jurisdiction over activities occurring in their right-of-way. Because of potential direct and indirect effects on listed salmonids from implementation of the RRMP, the action area extends to all roads and rights-of-way maintained by Marion County, Oregon, and the waterbodies downslope and downstream of the roads that have the potential to be affected by maintenance activities. It includes all reaches of the Willamette River within the county, plus all tributaries to the Willamette River within the county that either provide habitat to listed salmonids or deliver water to occupied habitat. This includes the Willamette River from the confluence with the Santiam River downstream to Butteville.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Status of ESUs and Habitat

The four threatened salmonid ESUs found in the action area are at risk of becoming endangered. Their status has been attributed to many different factors, including harvest, operation of hatcheries, hydropower development, and destruction of habitat (Federal Caucus 2000, NOAA Fisheries 2003c, 2003d). Additionally, municipal and agricultural water withdrawals cause water shortages throughout the West, creating passage barriers, water quality declines, and eliminating habitat. Though less measurable, the effects of introduced aquatic nuisance species, which compete for habitat and prey on salmon, have caused a decline in salmon populations (He and Kitchell 1990). Recent research has shown that ocean conditions play a profound role in survival to spawning age, and contribute substantially to total salmon population numbers (Beamish *et al.* 2000).

The listing status and biological information for the four threatened species are listed in Table 1.

Table 1. References for Additional Background on Listing Status, Biological Information, and Protective Regulations for the ESA-Listed Species Considered in this Consultation.

Species ESU	Status	Protective Regulations	Biological Information, Historical Population Trends
Chinook salmon (*O. tshawytscha*)			
Lower Columbia River	T 3/24/99; 64 FR 14308	7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Upper Willamette River	T 3/24/99; 64 FR 14308	7/10/00; 65 FR 42422	Myers *et al.*1998; Healey 1991
Steelhead (*O. mykiss*)			
Lower Columbia River	T 3/19/98; 63 FR 13347	7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996
Upper Willamette River	T 3/25/99; 64 FR 14517	7/10/00; 65 FR 42422	Busby *et al.* 1995; 1996

Lower Columbia River Chinook Salmon

The threatened LCR chinook salmon ESU includes all natural-origin populations residing below impassable natural barriers from the mouth of the Columbia River to the crest of the Cascade Range just east of Hood River in Oregon and the White Salmon River in Washington. The listing includes the chinook salmon in the Willamette River to Willamette Falls, Oregon, exclusive of spring-run chinook salmon in the Clackamas River. Critical habitat is not presently designated for this ESU.

Estimated overall abundance of chinook salmon in the ESU is not cause for immediate concern. Long-term trends in fall-run escapement are mixed, with most larger stocks positive, while the spring-run trends are positive or stable. Short-term trends for both runs are more negative, some severely so (Myers *et al.* 1998). However, apart from the relatively large and apparently healthy fall-run population in the Lewis River, production in this ESU appears to be predominantly hatchery-driven with few identifiable native, naturally-reproducing populations. About half of the populations constituting this ESU are very small, increasing the likelihood that risks due to genetic and demographic processes in small populations will be important.

Spawning and juvenile rearing areas have been eliminated or greatly reduced by dam construction, and freshwater habitat is in poor condition in many basins due to forestry practices, urbanization and agriculture. Also of concern is the potential loss of fitness and diversity resulting from the introgression of hatchery fish within the ESU (Myers *et al.* 1998).

Upper Willamette River Chinook Salmon

The threatened UWR chinook salmon ESU includes native spring populations in the Willamette River and tributaries upstream of Willamette Falls, including naturally-produced spring-run fish in the Clackamas River. Critical habitat is not presently designated for this ESU.

The abundance of naturally-produced spring-run chinook in the ESU has declined substantially from historic levels. Historic escapement levels may have been as high as 200,000 fish per year (Myers *et al.* 1998). Current natural escapement is less than 5,000 fish, and about two-thirds of the natural spawners are estimated to be first-generation hatchery fish (Myers *et al.* 1998). Although natural escapements are substantially depressed, the number of naturally-spawning fish have gradually increased in recent years (NMFS 2001).

The primary cause of decline of chinook in this ESU is the blockage of access to large areas of spawning and rearing habitat by dam construction. The remaining habitat has been degraded by thermal effects of dams, forestry practices, agriculture, and urbanization. Another concern for this ESU is that commercial and recreational harvest have been high relative to the apparent productivity of natural populations. New fishing regulations are expected to reduce harvest mortality by 70% from historic levels. Efforts have been taken to remedy some of the past hatchery practices including limiting the proportion of hatchery spawners in some natural production areas, and reincorporating local-origin wild fish into the hatchery broodstock.

Upper Willamette Steelhead

The UWR steelhead ESU includes all naturally-produced steelhead in the Willamette River and its tributaries upstream of Willamette Falls. No estimates of abundance prior to the 1960s are available. Abundance has been declining steeply since the late 1980s going from an average of over 15,000 in the 1970s and 1980s to several thousand today (Busby *et al.* 1996). Critical habitat is not presently designated for this ESU.

The potential negative influence of hatchery fish through genetic effects and competition between native and non-native stocks was noted as the primary factor of concern for this ESU (Busby *et al.* 1996). Habitat blockage from dams and habitat degradation from logging and urbanization have contributed to stream flow and temperature problems and loss of riparian habitat (Bottom *et al.* 1985, Busby *et al.* 1996).

Lower Columbia River Steelhead

The threatened LCR steelhead ESU includes all naturally-produced steelhead in tributaries to the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, excluding steelhead in the Willamette River above Willamette Falls and steelhead in the Little and Big White Salmon Rivers in Washington (Middle Columbia ESU) (Busby *et al.* 1996). Critical habitat is not presently designated for this ESU.

No estimates of historical abundance (pre-1960s) specific to this ESU are available. A conservative estimate of current abundance puts the average run size at greater than 16,000. Abundance trends are mixed and possibly affected by short-term climate conditions. At the

time of NOAA Fisheries' status review (Busby *et al.* 1996), the majority of stocks for which data were available within this ESU were declining, although some had increased strongly. Since 1996, listed LCR steelhead populations have generally increased, with some populations rebounding more quickly than others.

The magnitude of hatchery production, habitat blockages from dams, and habitat degradation from logging and urbanization are areas of concern. The widespread production of hatchery steelhead within this ESU creates specific concerns for summer steelhead and Oregon winter-run steelhead stocks, where there appears to be substantial overlap in spawning between hatchery and natural fish (Busby *et al.* 1996). Most of the hatchery stocks originate from stocks within the ESU, but many are not native to local river basins.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations combined with the Habitat Approach (NMFS 1999): (1) Consider the status and biological requirements of the species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species and whether the action is consistent with the available recovery strategy; (4) consider cumulative effects; and (5) determine whether the proposed action, in light of the above factors is likely to appreciably reduce the likelihood of species survival in the wild or destroy or adversely modify critical habitat. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species. If NOAA Fisheries finds that the action is likely to jeopardize the listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of listed species under the existing environmental baseline.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmonids is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species, taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to a naturally-reproducing population level, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful adult and juvenile migration, juvenile rearing, and adult spawning. LCR and UWR chinook salmon and LCR and UWR steelhead survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while removing adverse impacts of current practices. In conducting analyses of habitat-altering actions, NOAA Fisheries defines the biological requirements in terms of a concept called Properly Functioning Condition (PFC) and applies a "habitat approach" to its analysis (NMFS 1999). The status of LCR and UWR chinook salmon and LCR and UWR steelhead, based upon their risk of extinction, has not significantly improved since the species were listed.

The specific biological requirements affected by the proposed RRMP include food availability and habitat attributes including water quality, flow/hydrology, habitat access and migratory impediments, riparian elements and channel condition and dynamics.

2.1.4 Environmental Baseline

In step 2 of NOAA Fisheries' analysis, we evaluate the relevance of the environmental baseline in the action area to the species' current status. The environmental baseline is an analysis of the effects of past and ongoing human-caused and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. The action area is defined by NOAA Fisheries regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action."

For the purpose of this consultation, the action area includes all waters throughout Marion County within the range of the four threatened salmon and steelhead ESUs. As defined above, the action area extends to all roads and rights-of-way maintained by Marion County, Oregon, and the waterbodies downslope and downstream of the roads that have the potential to be affected by maintenance activities. It includes all reaches of the Willamette River within the county, plus all tributaries to the Willamette River within the county that either provide habitat to listed salmonids or deliver water to occupied habitat. This includes the Willamette River from the confluence with the Santiam River downstream to Butteville. The action area may extend upstream or downstream of maintenance activities, based on their potential to affect fish passage, riparian succession, the hydrologic cycle, erosion, the transportation and deposition of sediments, and other ecological processes related to the formation and maintenance of salmon habitats. Indirect effects may occur throughout the watershed where other activities depend on RRMP activities for their justification or usefulness. The major factors influencing the

environmental baseline within the action area include habitat modifications, hatchery practices, and harvest management.

Habitat

Marion County is entirely within the Willamette River watershed. The Willamette River watershed covers a vast area (764,439 acres) bordered on the east and west by the Cascades and the Pacific coast ranges. It drains from as far south as Cottage Grove, Oregon, and flows north to its confluence with the Columbia River. The Willamette River watershed is the largest river basin in Oregon. It is home to most of the state's human population, its largest cities, and many major industries. The watershed also contains some of Oregon's most productive agricultural lands and supports important fishery resources (City of Portland 2001).

The uplands (Coast and Cascade ranges) receive about 80% of the precipitation falling on the Willamette River basin, and store much of this water as snow. Ecosystem productivity in these upland streams is relatively low, with aquatic insects gleaning much of their diet from material that falls into running water. In larger, slower tributaries, more plant material is produced in the stream itself. The mainstem supports a highly productive algal community that blooms as temperatures rise in the summer. Insects and some vertebrates feed on these plants, and many vertebrates, including salmonids, feed on stream-dwelling insects and zooplankton.

Significant changes have occurred in the watershed since the arrival of Europeans in the 1800s. The watershed was mostly forested prior to the arrival of white settlers. Now, about half the basin is still forested. One-third of the basin is used for agriculture, and about five percent is urbanized or is in residential use. The river receives direct inputs from treated municipal wastes and industrial effluents. Nonpoint source input from agricultural, silvicultural, residential, urban and industrial land uses are also significant, especially during rainfall runoff. Much of the habitat for Willamette River salmonids has been degraded by various land use practices or eliminated by dams.

Wild salmonid populations have declined precipitously over the last century in the Willamette River (WRI 1999). The population changes have been attributed to myriad factors, including habitat functional quality and availability. Both natural and human-induced activity have contributed to the decline. While human disturbances may have minimal impacts individually, the number, magnitude, duration, and cumulative impacts since Euro-American settlement combine to form the primary cause of the decline of numerous salmon stocks in fresh water. Historical and current human-caused disturbances include: (1) Clearing and channelizing rivers; (2) sending logs down streams via splash dams; (3) extensive land clearing; (4) diverting water; (5) livestock grazing in waterways; (6) mining run-off; (7) constructing logging roads and accelerating erosion; (8) removing old growth forests; (9) filling and diking of wetlands and estuaries; (10) armoring shorelines and streambanks; (11) developing hydroelectric dams; (12) creating barriers to fish migration; (13) increasing surface run-off; (14) contaminating water and sediments; (15) introducing non-native plants and animals; (16) changing levels of oxygen and nutrients in waterways; and (17) over-fishing.

In Marion County, the most common land use is agriculture, which covers 298,109 acres and accounts for 39 percent of the land base of the county (ODFW Willamette Valley Land Use/Land Cover Map 1998). The second most common land cover type is Douglas fir, western hemlock and grand fir forests which cover 29 percent of the land area. Five percent of the land is urban and 0.1 percent is parks. Within 100 feet of a streams, agriculture accounts for 24 percent of the total land area with the fir forest at 30 percent. Urban areas occupy 3 percent of the riparian areas.

Marion County has approximately 51 dams. Because dams obstruct the flow of rivers, they change the physical flow of water, resulting in areas that are either drier than normal or flooded. Changing the depth and flow of rivers also affects the water's temperature, and changes the flow of materials carried in river water. They stop the flow of debris, nutrients, sediments, and reduce the size and quality of floodplains. As a result, reservoirs eventually fill with sediments and inadequate amounts of sediments reach the deltas and estuaries. Dams also change the movement of fish migrating between the streams and oceans. In addition to the many dams blocking fish movement, other types of human-made barriers block access to freshwater spawning and rearing habitat for salmon. For example, Marion County has jurisdiction over 32 culverts that were identified by the Oregon Department of Fish and Wildlife (ODFW) as being medium priority for replacement to provide fish passage.

When a population grows and land is cleared for agricultural or urban development, the amount of impervious surface increases. Impervious surfaces affect the amount of water that seeps into the ground and washes into streams; they also affect how quickly the water gets there (Paul and Meyer 2001). When trees are removed, the evapotranspiration rate declines, and more water reaches the streams quickly as surface runoff. When land is covered with pavement or buildings, the area available for rainwater and snowmelt to seep into the ground and replenish the groundwater is drastically reduced; in many urban areas it is virtually eliminated. The natural movement of water through the ground to usual discharge points such as springs and streams is altered. Instead, the natural flow is replaced by storm sewers or by more concentrated entrance points of water into the ground.

Changing the timing and amount of water run-off can lead to too much water going directly into streams in the rainy months of winter instead of soaking into the ground. Consequently, there is not enough water in the ground to slowly release into streams in the dry months of summer. Too much water in the winter can cause fish habitat to be scoured by unnaturally swift currents; not enough water in streams in the summer leads to water temperatures too high to support fish. Studies show that when impervious surfaces such as pavement and buildings cover between five percent to eight percent of a watershed, the health of streams and the fish in them declines, despite stormwater controls. In the south Puget Sound area, most urban watersheds are 20 to 40 percent covered with hard surfaces, altering stream flows, water temperatures, and in-stream habitat for everything from insects to fish. In contrast, Marion County is more rural with the major cities being Salem, Keizer and Woodburn. Woodburn is one of the fastest growing areas of the state. Despite this, the conversion of many watersheds in Marion County from forestland

to agricultural has reduced evapotranspiration rates, increased the size of peak flows, shortened the duration of the peaks, and reduced summer flows.

Fertilizers, pesticides, petroleum products and other industrial, agricultural, and urban contaminants have degraded water quality in Marion County. There are eleven streams in Marion County that have been designated as water quality limited by the Oregon Department of Environmental Quality in accordance with the Clean Water Act of 1972. The streams on the 303(d) list have been listed because of repeated exceedances of water temperature, dissolved oxygen, fecal coliform and E. coli, dieldrin, DDT, arsenic, copper, lead, zinc, iron, and manganese.

The introduction of non-native species has been known to profoundly affect ecosystems by disrupting food webs and displacing native species. Because of a lack of natural predators or competitors, these introduced species can spread rapidly. A number of tenacious and insidious non-native species have invaded Oregon's streams, wetlands and riparian habitats.

Current RRMP activities affect peak and base flows in streams as a result of the permanent removal of vegetation, earth-clearing work and hydraulic modification work. Runoff of pollutants from roadways and accidental spills in work areas affects water quality indicators, including chemical contamination. Lack of sufficient erosion control measures can leave exposed soil susceptible to the erosive forces of flowing water. Excess sediment loading into receiving waterbodies and streams can impair gills of fish, smother eggs, embed spawning gravels, disrupt feeding and growth patterns of juveniles, delay upstream migration of adults, and scour nutrients from the stream substrate. Maintenance activities near streams disturb fish, causing them to temporarily abandon suitable habitat. The long-term or permanent removal of riparian vegetation can result in degraded water quality (*e.g.*, increased water temperature).

Hatcheries

For more than 100 years, hatcheries in the Pacific Northwest have been used to replace natural production lost as a result of hydropower and other development, not to protect and rebuild natural populations. As a result, most salmon populations in this region are primarily hatchery fish. In 1987, for example, 95% of the coho, 70% of the spring-run chinook, 80% of the summer-run chinook, 50% of the fall-run chinook, and 70% of the steelhead returning to the Columbia River basin originated in hatcheries (CBFWA 1990).

While hatcheries certainly have contributed greatly to the overall numbers of salmon, only recently has the effect of hatcheries on native wild populations been demonstrated. In many cases, these effects have been substantial. For example, production of hatchery fish, among other factors, has contributed to the 90% reduction in wild coho salmon runs in the lower Columbia River over the past 30 years (NMFS 2000a).

NOAA Fisheries has identified four primary categories of risk that hatcheries can pose on wild-run salmon and steelhead: (1) Ecological effects, (2) genetic effects, (3) overharvest effects, and (4) masking effects (NMFS 2000a). Ecologically, hatchery fish can increase predation on,

displace, and/or compete with wild fish. These effects are likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods during which they may prey on or compete with wild fish. Hatchery fish may also transmit hatchery-borne diseases, and hatcheries themselves may release diseases into stream via water effluents.

Genetically, hatchery fish can affect the genetic variability of native fish via interbreeding, either intentionally or accidentally. Interbreeding can also result from the introduction of native stocks from other areas. Theoretically, interbred fish are less adapted to, or productive within, the unique local habitats where the original native stock evolved.

In many areas, hatchery fish provide increased fishery opportunities. When wild fish mix with hatchery stock, fishing pressure can lead to overharvest of smaller or weaker wild stocks. Further, when migrating adult hatchery and wild fish mix on the spawning grounds, the health of the wild runs and the condition of the habitat's ability to support runs can be overestimated, because the hatchery fish mask surveyors' ability to discern actual wild run conditions.

Recent hatchery reforms include supplementation and reintroduction programs conducted to minimize adverse genetic, ecological, and demographic effects on naturally-produced salmonids. Monitoring and evaluation programs have been designed to identify the ecological and genetic effects of hatchery programs listed fish. The role of hatcheries in the future of Washington's salmonids is presently unclear; it will depend on the values people place on fish production and biological diversity. Clearly, conservation of biological diversity is gaining support, and the future role of hatcheries may shift toward judicial use of hatcheries to meet these goals rather than opposing them.

Harvest

Non-Indian fisheries began in about 1830 with the arrival of European settlers; by 1861, commercial fishing was an important economic activity that developed with the advent of canning technologies. The early commercial fishery used gill nets, seines hauled from shore, traps, and fish wheels. Later, purse seines and trolling (using hook and line) fisheries developed. Recreational (sport fishing) began in the late 1800s, occurring primarily in tributary locations (NMFS 2000a).

Whereas freshwater fisheries in Oregon were declining during the first half of the twentieth century, primarily due to high harvest rates, ocean fisheries were growing, particularly after World War II. This trend occurred up and down the West Coast as fisheries with new gear types leapfrogged over the others to gain first access to the migrating salmon runs. Large, mixed-stock fisheries in the ocean gradually supplanted the freshwater fisheries, which were increasingly restricted or eliminated to protect spawning escapements. By 1949, the only freshwater commercial gear types remaining were gill nets, dip nets, and hoop nets (NMFS 2000a). This leapfrogging by various fisheries and gear types resulted in conflicts about harvest allocation and the displacement of one fishery by another. Ocean trolling peaked in the 1950s;

recreational fishing peaked in the 1970s. The ocean harvest has declined since the early 1980s as a result of declining fish populations and increased harvest restrictions.

The capacity of salmonids to produce more adults than are needed for spawning offers the potential for sustainable harvest of naturally-produced (versus hatchery-produced) fish. This potential can be realized only if two basic management requirements are met: (1) Enough adults return to spawn and perpetuate the ru; and (2) the productive capacity of the habitat is maintained. Catches may fluctuate in response to such variables as ocean productivity cycles, periods of drought, and natural disturbance events. However, as long as the two management requirements are met, fishing can be sustained indefinitely. Unfortunately, both prerequisites for sustainable harvest have been violated routinely in the past. The lack of coordinated management across jurisdictions, combined with competitive economic pressures to increase catches or to sustain them in periods of lower production, resulted in harvests that were too high and escapements that were too low. At the same time, habitat has been increasingly degraded, reducing the capacity of the salmon stocks to produce numbers in excess of their spawning escapement requirements.

For years, the response to declining catches was hatchery construction to produce more fish. Because hatcheries require fewer adults to sustain their production, harvest rates in the fisheries were allowed to remain high, or even increase, further exacerbating the effects of overfishing on the naturally-produced (non-hatchery) runs mixed in the same fisheries. More recently, harvest managers have instituted reforms including weak stock, abundance based, harvest rate, and escapement-goal management.

Natural Conditions

Changes in the abundance of salmonid populations are substantially affected by changes in the freshwater and marine environments. For example, large-scale climatic regimes, such as El Niño, affect changes in ocean productivity. Much of the Pacific Coast was subject to a series of very dry years during the first part of the 1990s. In more recent years, severe flooding has adversely affected some stocks.

Salmon and steelhead are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation may also contribute to significant natural mortality, although the levels of predation are largely unknown. In general, salmonids are prey for pelagic fishes, birds, and marine mammals, including harbor seals, and killer whales. There have been recent concerns that the rebound of seal and sea lion populations, following their protection under the Marine Mammal Protection Act of 1972, has resulted in substantial mortality for salmonids.

A key factor substantially affecting many West Coast stocks has been the general pattern of a 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood. The pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult

life stage. Time-series of survival rate information for UWR spring chinook, Lewis River fall-run chinook, and Skagit fall-run chinook salmon show highly variable or declining trends in early ocean survival, with very low survival rates in recent years (NMFS 2000a).

Recent evidence suggests that marine survival of salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Cramer *et al.* 1999). This phenomenon has been referred to as the Pacific Decadal Oscillation. Ocean conditions that affect the productivity of Oregon salmonid populations appear to have been in a low phase of the cycle for some time and to have been an important contributor to the decline of many stocks. The survival and recovery of these species will depend on their ability to persist through periods of low natural survival.

Environmental Baseline Summary

Notwithstanding improvements in hatchery, harvest and habitat management practices, environmental conditions in the action area are still generally poor with respect to salmonid survival in a number of their life stages. In fact, for many stocks, survival must improve by an order of magnitude in order for the ESUs to survive and recover. Smolt-to-adult return rates in 1998 for SR spring/summer-run chinook, for example, were less than one-half of one percent – about one-tenth the rate needed for sustainability (NMFS 2000a). The continuous and cumulative reduction in habitat productive capacity has influenced the ability of the four threatened species within Marion County to recover by reducing population resiliency and lowering survival rates. Past road maintenance practices have contributed to the decline in habitat quality and availability, and the intent of the RRMP is to contribute to the improvement of some habitat components of the environmental baseline.

2.1.5 Analysis of Effects

NOAA Fisheries' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline"(50 CFR 402.02). Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).

The RRMP is a conservative program consisting of specific approaches to conducting routine road maintenance activities to ensure that road maintenance activities protect salmonids. Marion County is using the RRMP to effectively change their road maintenance activities to meet the ecological needs of listed salmonids, to the extent that routine road maintenance activities affect those needs. Nevertheless, road maintenance activities might affect elements of the environment in ways that have implications for listed salmonids.

A complete application package for qualification under 4(d) Limit (10)(i) includes a number of required items, including a detailed description of the program, training, tracking and reporting, and an affirmative conclusion that the program is substantially similar to and at least as

protective as ODOT's program in its implementation. The application package for Limit 10(i) does not require a description of the manner in which the RRMP activities may affect listed species because if the program is substantially similar to ODOT's program, then the effects should be similar to ODOT's. Therefore, Marion County has not analyzed the effect of their RRMP on listed salmonids and their habitat, but presented information in Attachment 1 of their submittal to support their conclusion that their RRMP is substantially similar to ODOT's.

The intent of the RRMP is to avoid and minimize effects to listed salmonids and their habitat where possible, but the program is not expected to completely avoid effects. The effects of routine road maintenance activities are highly repetitive and predictable. A modified version of NOAA Fisheries' Matrix of Pathways and Indicators (MPI) is used to determine the effects of the RRMP on listed salmonids for this Opinion. The MPI identifies six conceptual pathways (*e.g.*, water quality, channel condition) of 18 habitat condition indicators (water temperature, width/depth ratio) for determining the effect of an action. This information is presented in Table 2 and addresses effects related to implementation of the RRMP. Activity-specific effects are also discussed below.

2.1.5.1 Clearing, Drilling, Excavating, Filling, Grading, Grubbing, Cleaning, Grinding, and Cutting

These activities include all work necessary to maintain roadways, streambanks, roadside ditches, culverts, catch basins, inlets, and detention/retention basins. In the Marion County RRMP, these activities are covered under surface work, shoulder blading/rebuilding, culvert/inlet repair and cleaning, ditch cleaning, and erosion repair. This type of work is likely to have beneficial effects; cleaning out sediment and debris from drainage systems provides benefits to salmon habitat by preventing pollutants and sediments entrapped in stormwater facilities from entering surface or groundwater. There remains a possiblity that these activities can also have adverse water quality impacts, directly affecting aquatic species. These impacts occur through the generation of sediments and side casting of windborne dust and paint particles. Clearing ditches, culverts, and drainage systems and grading shoulders can dislodge sediments and expose soils, allowing an increase of sediment transport during storm events. Because stormwater conveyance systems often discharge into salmon habitat, the resultant temporary increase of sediment loads can adversely affect water quality in fish-bearing waters. Excess sediment loading and turbidity levels can clog gills of fish, smother eggs, embed spawning gravels, disrupt feeding and growth patterns of juveniles, delay up-stream migration of adults, and scour nutrients from the stream substrate (Burton *et al.* 1990).

Reported influences of increased suspended sediment and turbidity on fish range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates (Gregory and Levings 1988), and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and reduce survival (Bell 1991) and reduce cover for juvenile salmonids (Bjornn and Reiser 1991). Of key importance in considering the detrimental

effects of TSS on fish are the frequency and the duration of the exposure (not just the TSS concentration).

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987).

Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. When turbidity is localized and brief, there is a low probability of direct mortality because the fish should be aware and agile enough to avoid any equipment used to repair the slope. However, research indicates that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991). Newly-emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985).

Earth-disturbing and cleaning activities near streams can disturb fish and cause them to abandon suitable habitat. These activities can result in noise levels above ambient conditions or increase light at night. Detour routes may result in concentrated traffic volumes and increased access to aquatic habitat that may affect salmon downstream. The use of gas and diesel powered equipment creates a potential for accidental spills of substances toxic to fish. Removal of riparian vegetation associated with grading at storm outfalls and during the removal of debris can affect prey resources, reduce cover habitat, reduce large wood recruitment, increase sedimentation, and increase water temperature.

On balance, the RRMP addresses these issues through activity-specific and general BMPs (see section 2.1.6, below).

Table 2. The effect of routine road maintenance activities on indicators of the health of salmon habitat in Marion County.

PATHWAY	INDICATOR	EFFECT ON IMPLEMENTATION OF THE MARION COUNTY RRMP ON THE ENVIRONMENTAL BASELINE
Water Quality	Temperature	Removal of vegetation that can be associated with some maintenance activities may result in localized increases in water temperature. Efforts will be made to minimize the loss of vegetation close to streams, and mature trees removed will be replaced at a 2:1 ratio within the same watershed. Implementation of the RRMP should not result in an increase in stream temperatures over the long-term, and may contribute to a reduction in temperatures.
	Dissolved Oxygen	Increased turbidity can result from some maintenance activities that require in-water work. Increased turbidity can cause a decrease in dissolved oxygen. Increases in turbidity are expected to be localized and of short duration. Furthermore, appropriate repairs of unstable areas can decrease the input of sediment to streams, and help maintain appropriate dissolved oxygen concentrations.
	pH	Any work with green concrete will be isolated from streams and wetlands. Consequently, no impacts to pH are expected.
	Nutrients, Toxicity and Turbidity	Short-term increases in turbidity and nutrients will result from routine road maintenance activities such as erosion repair, culvert and inlet cleaning, and other earth-moving activities. However, the RRMP addresses erosion control and the implementation of the BMPs is designed to reduce the amount of turbidity associated with routine road maintenance activities. Accidental spills of fuel from maintenance equipment may have lethal or sub-lethal impacts on fish, and BMPs address limiting exposure to spills.
Habitat Access	Physical Barriers	Implementation will result in improved fish passage because of attention to passage criteria during routine culvert cleaning, and because of implementation of the fish passage program to repair or replace culverts on ODFW's medium priority list.
Flow Hydrology	Peak Flow Variation and Duration	Marion County does not expect to increase the area of impervious surface associated with this program, and consequently affects to peak flow would be minimal. Better ditching practices including removal of sediment buildup and improved design may result in increased infiltration of stormwater, which would minimize impacts to peak flow events.
	Base Flow Conditions	Minor beneficial effects may result from increased infiltration associated with better ditching practices.
	Drainage Network	No new development or added capacity will result from implementation of this program, so no increase to the drainage network is anticipated.
Habitat Elements	Substrate	No long term impacts to substrate are expected.

PATHWAY	INDICATOR	EFFECT ON IMPLEMENTATION OF THE MARION COUNTY RRMP ON THE ENVIRONMENTAL BASELINE
	Large Wood	Some large wood may be removed from river channels to clear culverts or remove debris from bridge piers. Marion County will attempt to leave the wood in the river system when possible. For example, they will dislodge the wood from the bridge pier and place it downstream from the bridge, if doing so will not impact another bridge structure or culvert. Removal of trees along the right-of-way can reduce large wood recruitment. Mature trees that are removed will be replaced at a 2:1 ratio within the same watershed, and vegetated buffer strips will be left along all stream.
	Off Channel Habitat	The formation of off-channel habitat adjacent to bridges and culverts or in close proximity to a road can compromise the integrity of these structures, and therefore would be filled. This is expected to be localized and rare.
	Refugia	No effects to habitat refugia are expected.
	Pool Frequency, Depth and Quality	Pools may be affected when they are proximal to bridge piers, and the pool compromises the safety of the bridge. Marion County would typically add riprap to the pool. This is expected to be extremely localized.
Riparian Condition	Riparian Structure	Trees can be removed to provide access to a bridge or culvert, or if they pose a danger to the traveling public. All mature trees removed will be replaced with native trees within the same watershed. Vegetated buffer strips will be maintained along all streams; the width of the buffer will vary depending on the size of the stream.
	Stream Crossings/km	No new stream crossings are included in the RRMP.
Channel Condition and Dynamics	Streambank Condition	Erosion repairs along streambanks occur when the road and the stream are in close proximity, and erosion along the streambank threatens the integrity of the road. Erosion repairs usually involve riprap, and result in the loss of natural streambank function. To minimize negative effects, repairs will include bioengineering and fish friendly designs, where practical for stability and safety.
	Channel Morphology	In some situations, roadways constrain channel morphology. The RRMP will not alter the existing condition, and in some cases may further constrain channel changes when the channel moves toward a road or structure.
	Floodplain Connectivity	County roads typically parallel streams, and are within the floodplain of these channels. This disrupts normal floodplain function. However, the RRMP does not include the construction of new roads, so the existing condition will be maintained.
	Wetland Storage and Alterations	Wetlands that function as roadside ditches will be disturbed during ditch cleaning activities. However, proper design of ditches minimizes the need for frequent cleaning, and allows for the growth of native vegetation.

2.1.5.2 Channelization or Ditching

Regular channelization or ditching maintenance in or adjacent to watercourses and streams is required to remove built-up sediments, debris or blockages, and to maintain capacity. Channelization and ditching can result in the alteration or loss of salmon habitat through the removal of snags and trees that could function as future large wood. These activities may also degrade hydrogeomorphology, wetlands, riparian vegetation, erosion/deposition balance, soils and water quality, and may affect the creation of critical off- channel habitat. Instream gravel bars can move due to changes in hydrodynamics, resulting in fewer meanders and reduced quantities of gravel for spawning habitat. Juvenile fish that may be rearing in the vicinity would most likely be displaced during maintenance work. The effects to salmonids of increased sediment disturbance, riparian vegetation modification, spills of toxic substances from gas- and diesel-powered equipment, and increased noise are expected to be similar to those described in the earthworks section, above.

2.1.5.3 Removal of Large Wood

Large wood that has accumulated in channels or riparian areas will be removed only when and where there is a safety hazard, such as debris build-up against bridge abutments. Removal activities can cause an increase in turbidity, sediment, gravel, rocks, nutrients, bacteria, heavy metals, petroleum hydrocarbons, synthetic organics and other solids. Excess sediment loading and high turbidity levels can impact redds by smothering eggs with fine sediments, reducing water circulation, and decreasing oxygen availability. Removal of large wood can affect all life history stages of salmonids as a result of excess sediment loading and high turbidity levels. Fish could be impacted by sub-lethal conditions, including the disruption of feeding, attenuated growth patterns of juveniles, or delaying the upstream migration of adults. The large wood removal may also change a stream's hydrology, with effects similar to those identified in the preceding sections, and result in a loss of cover and microhabitat availability for fish.

2.1.5.4 Work Area Isolation, Temporary Water Diversions and Fish Exclusion

Road maintenance activities frequently require work within streams that contain salmonids. Some of these activities require a site to be temporarily dewatered. Although work area isolation techniques can temporarily prevent usage of the work area by listed salmonids, these techniques also decrease or avoid the exposure of listed fish to the effects of construction activities in the work area. In fact, in such cases, work area isolation and fish removal will be necessary. Road maintenance activities that may require fish exclusion actions include work on open drainage systems, watercourses and streams (*e.g.*, sediment removal), culvert repairs, bridges, and emergency slide/washout repairs.

Work area isolation is a conservation measure intended to reduce the exposure of listed fish adverse effects of erosion and runoff on aquatic life. However, diversions, isolation, and exclusion can significantly impact listed fish in the area. Water diversion and temporary

structure work creates a physical barrier to migrating salmon. Maintenance work on diversion structures could result in increases in sediment disturbance, riparian vegetation modification, spills of toxic substances from gas- and diesel-powered equipment, and increased noise are similar to those described in the earthworks section, above, resulting in similar effects to salmonids as identified in the preceding sections. Additionally, improper placement of equipment in or around riparian habitat may erode streambanks.

Electrofishing is one means of fish capture. It is employed when other methods prove ineffective and may not be recommended in all situations. Its use will be determined through permit requirements and/or site conditions. This protocol is based on NOAA Fisheries' Guidelines for Electrofishing Waters Containing Salmonids Under the Endangered Species Act (NMFS 2000b). Although the practice is potentially hard on fish, electrofishing is intended to locate residual fish in the isolated work area to further reduce the potential for, or extent of, incidental take.

Electrofishing is a process by which an electrical current is passed through water containing fish in order to stun them—thus making them easy to capture. It can cause a suite of effects ranging from simple harassment to actually killing the fish. The amount of unintentional mortality attributable to electrofishing may vary widely depending on the equipment used, the settings on the equipment, and the expertise of the technician. Electrofishing can have severe effects on adult salmonids and can include the direct and indirect effects of exposure to an electric field, capture by netting, holding captured fish in aerated tanks, and the effects of handling associated with transferring the fish back to the river. Physical injuries from electrofishing include internal hemorrhaging, spinal misalignment, or fractured vertebrae.

The primary contributing factors to stress and death from fish exclusion activities are excessive doses of anesthetic, improper electrofishing techniques, differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. It is also common that re-introduction of the stream to a newly-constructed project will temporarily increase turbidity downstream.

2.1.5.5 Vegetation Management

Marion County's Vegetation Management Program employs a number of techniques to accomplish their vegetation management goals including mechanical, cultural, and chemical treatments. The purposes of vegetation management are to provide a safe road system, free of sight-hindering brush and limbs, maintain adequate drainage in ditches, and control of noxious weeds. Careful evaluation of effects to watersheds and the environment is part of the decision matrix for choosing an appropriate technique. Activities include suppressing non-desirable vegetation and enhancing desirable vegetation. Short- and long-term vegetation modifications may occur during routine maintenance of open and closed drainage systems, watercourses and streams, stream crossings, bridges, emergency washout repairs, and removal of danger trees along roadways. The removal of vegetation adjacent to watercourses or streams may impact

water quality and various habitat elements. Vegetation removal may contribute to a decrease in stream sinuosity and complexity, resulting in the degradation of hydrogeomorphology. It can also decrease refuge and rearing habitat for macroinvertebrates, and increase the water temperature in the immediate area.

2.1.5.6 Pesticide, Herbicide and Fertilizer Applications

Marion County's Vegetation Management Program allows for the application of chemicals (herbicides), and describes the manner and location in which applications may occur. BMPs are included in the RRMP to ensure that the choice to use herbicides as part of the vegetation management program is done appropriately. NOAA Fisheries does not believe that there is currently sufficient information available to ensure that such chemical applications are not creating sublethal affects to listed species. NOAA Fisheries is currently working with Federal agencies on an appropriate monitoring regimen to investigate the fate and transport of chemicals applied during a variety of activities. The monitoring intensity is beyond the scope of the RRMP. Because pesticide (including herbicides) and fertilizer use and monitoring is beyond the scope of the proposed action, the effects of any such use by Marion County are not analyzed here. The limitation of the extension of the prohibition on take in this Limit 10(i) RRMP does not extend to the use of pesticides or fertilizers at this time (50 CFR Part 223.203(b)(10)(v).

2.1.5.7 Addition of Impervious Surfaces

Generally, significant increases in impervious surface area within the right-of-way do not fall under the definition of maintenance. Projects that increase impervious surface area are usually part of roadway Capital Improvement Plans (CIPs), and typically are Federally funded or permitted. Roadway CIPs are not addressed by the RRMP and are not covered by this consultation. The Federal nexus requires a separate ESA section 7 consultation. Under some circumstances, however, maintenance activities add impervious surface for safety reasons, rather than to add capacity. New impervious surfaces associated with maintenance work can result in increased levels of heavy metals, hydrocarbons, and other pollutants. Impervious surfaces can also increase water temperature by reducing shaded conditions, and by increasing solar exposure to surface water that would otherwise infiltrate or remain shaded beneath vegetation. New impervious surfaces near streams can cause impacts to riparian vegetation, resulting in reduced cover for fish, a reduction in prey species, increased water temperature, and water quality degradation. RRMP actions that increase flows, such as increases in impervious surfaces, can disturb gravel in salmon or steelhead redds and can also agitate or dislodge developing young and cause their damage or loss. Similarly, actions that reduce subsurface or surface flows, reduce shade, deposit silt in streams, or otherwise reduce the velocity, temperature, or oxygen concentration of surface water as it cycles through a redd can adversely affect the survival, timing, and size of emerging fry.

Increases in impervious surface within the RRMP would be associated with small increases in shoulder width at a few locations. Most shoulder work is only replacement of the existing

shoulders with no new width added. The RRMP addresses the need to minimize the loss of vegetation as well as the addition of rock or pavement along road shoulders.

2.1.5.8 Dust Abatement

Dust abatement practices help to stabilize gravel roads to reduce damage and maintenance costs. Depending on the type of road treated, application of dust palliatives creates a hard, compact surface that resists potholing, rutting and loss of aggregate. Dust abatement applications are not required for all gravel roads in Marion County. It is done when requested or required to reduce the air quality hazard and improve safety.

Dust suppression involves the application of a dust palliative to non-paved road surfaces to temporarily stabilize surface soils, leading to a reduction in dust. Sometimes the county applies the palliative, but more commonly, private contractors apply dust palliatives to county roads for residents wishing to reduce the amount of dust produced.

In preparation for the palliative application, roads are graded and roughed up to allow for greater penetration. The normal application rate is 0.5 gallons per square yard of road. Lignosulfonates and magnesium chloride are used as palliatives by Marion County, because they are effective and have low potential to affect the environment. Both are natural products that have very low reactivity and toxicity, and bind well to soils. Marion County implements numerous BMPs to reduce the risk of the palliatives reaching surface water.

If high concentrations of lignosulfonate reached a stream, there would be an increase in the biological oxygen demand, and oxygen saturation in the water would decline. Salts such as magnesium chloride can disrupt normal stream chemistry and cause deleterious effects to aquatic organisms. These scenarios are unlikely in Marion County because of the application rates used and the BMPs that are being implemented.

2.1.6 Integrated Minimization Measures

Marion County's RRMP incorporates best management practices (BMPs) into their routine maintenance activities with the goal of avoiding and minimizing effects on salmonids and their habitat. The Salmon Recovery Mapping Project allows the county to direct activities to protect location-specific sites. The Sensitive Area Maps depict the relevant biological and natural resource data, and the Environmentally Sensitive Zone Maps are designed to provide county field staff with the information necessary to carry out the best management practices. Conservation outcomes of the RRMP fall into the following general categories: Sediment collection, worksite pollutant containment, blockage removal, restoration of flow velocities and volumes, removal of fish passage barriers, revegetation, and infiltration.

<u>Sediment Collection</u>
Containment of sediment/pollutants maintains or restores the sediment collection process by removing sediments from many collection points in the drainage system (*e.g.*, catch basins,

maintenance holes, retention/detention facilities, pipes, inlets, and vaults). Proper maintenance of the roadway also protects against collapse or failure of the structure, which could result in significant sediment releases to aquatic habitat. The Erosion and Sediment Control Matrix in Appendix A of the RRMP outlines the options for sediment control based on the type of activity and its location in the landscape.

Worksite Pollutant Containment

Many RRMP BMPs involve containment of sediment and other pollutants at the worksite. Similar to collection and removal of sediments and other pollutants from the roadway, containing loose soils, sediment, and other pollutants on the worksite reduces the amount of pollutants that can reach aquatic habitat. A critical component of worksite pollutant containment in the RRMP is an effectiveness monitoring BMP.

Blockage Removal

The timely removal of drainage system blockages reduces the potential for sediment, turbidity, offsite erosion and debris to adversely affect fish habitat. Blockage removal also reduces the likelihood of system failure, which can have significant adverse habitat effects. BMPs used during this type of work achieve the same objectives as those identified in Sediment Collection and Worksite Pollutant Containment above.

Restoration of Flow Velocities and Volumes

Maintaining or restoring flow velocities and volumes required for health of aquatic habitat is an important conservation outcome that is spelled out in a number of maintenance categories involving drainage system maintenance. The RRMP requires appropriate system design for system repair or replacement, appropriate maintenance of existing systems, and removal of sediment or blockages.

Removal of Fish Passage Barriers

When performing stream crossing maintenance activities, the RRMP prescribes the removal of fish passage barriers. The Marion County RRMP also calls for replacing or retrofitting priority culverts to improve fish passage throughout the county. All fish passage work requires adherence to all Federal, state and local permit and regulatory requirements.

Revegetation

The RRMP specifies the need for revegetation of disturbed areas to reduce erosion and sediment transport. Revegetation provides biofiltration, shading, and bank stabilization in riparian areas. It also promotes macroinvertebrate population growth, lowers herbicide use, and suppresses non-desirable vegetation. The Marion County RRMP requires replanting with vegetation that is best suited for the site, with a preference for local genotype native plants.

Infiltration

The RRMP specified the maximization of opportunities for increased infiltration and biofiltration. Cleaning and maintaining roadway shoulders and grass-line ditches improves infiltration.

Training

The RRMP training program will provide crew members and supervisors appropriate training in when to use BMPs and recognizing problems with BMPs. The goals of the training program are:

1. To educate Marion County staff on the use of BMPs to restore salmonid populations.
2. To educate Marion County staff on the ESA.
3. To interest the staff so that they take ownership.
4. To continue to modify practices to enhance fish runs.
5. To develop standards and to establish what resources are needed
6. To establish consistency throughout the county.
7. To provide sufficient training and information so that staff can suggest improvements to the BMPs and other salmon recovery efforts.

Training will be recorded in a database, and formal training sessions will be performed by supervisory staff and consultants to ensure that staff understand the intent and the language of the BMPs. New maintenance staff will receive instruction on the RRMP as part of new employee orientation. Engineering staff will be responsible for instructing contractors on the appropriate use of BMPs. Appropriate staff will attend training around the state to increase their knowledge of fish passage, erosion control, hazardous materials spill response and handling, and the NPDES Phase II. As new information or tools are developed, they will be integrated into the training program, and covered at monthly departmental meetings.

Monitoring

The Environmental Specialist at Marion County, with appropriate staff support, is providing oversight for monitoring of the RRMP. This person will produce the biannual updates and work with the managers and supervisors to ensure that the annual reports are completed, and outstanding issues are resolved. This person will also complete comprehensive annual evaluations of BMP implementation and provide that document to NOAA Fisheries.

During BMP implementation, there will be field inspections of each major project to ensure compliance with the RRMP and relevant environmental regulations. The implementation of each category of BMPs will be inspected annually in the field. Any compliance problems will be resolved during or shortly after the inspection. The results of the inspections will be incorporated into the annual report. Complaints about routine road maintenance activities will be investigated immediately, addressed appropriately, and incorporated into the annual report.

Reports

NOAA Fisheries will receive an annual report from Marion County. The report will include a review of BMP implementation, adjustments to BMPs and training programs, and provide a reminder of the implementation process.

In addition, Marion County will produce division-specific annual reports by the heads of the operations and engineering sections. These internal reports will be submitted to NOAA Fisheries. The document will outline any unresolved problems that occurred during the year, and describe implementation problems that occurred on a regular basis. The report will address each of the BMPs individually. Management staff will meet annually to discuss the relevant implemtation issues and ways to address potential problems. New technologies, techniques, and design standrads will be presented at these meetings. The RRMP will be updated, as needed, at this time.

As an additional level of assurance, Limit 10 of the 4(d) rule (July 10, 2000, 65 FR 42422) authorizes NOAA Fisheries to periodically evaluate a qualified road maintenance program for its effectiveness in maintaining and achieving habitat function that provides for conservation of the listed salmonids. Whenever warranted, NOAA Fisheries will identify to Marion County ways in which the program needs to be altered or strengthened. Changes may be identified if the program is not protecting desired habitat functions, or where even with the habitat characteristics and functions originally targeted, habitat is not supporting population productivity levels needed to conserve the listed species. If Marion County does not make changes to respond adequately to the new information in the shortest amount of time feasible, but not longer than one year, NOAA Fisheries will publish notification in the Federal Register announcing its intention to withdraw the limit so that take prohibitions would then apply to the program as to all other activities not within a limit.

2.1.7 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as those effects of "future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation." This is step 4 in NOAA Fisheries' analysis process. Future federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. Therefore, these actions are not considered cumulative to the proposed action.

A number of reasonably foreseeable non-federal resource management strategies will affect listed ESUs and their habitat within the action area. Tribal, state, and local government actions are likely to be in the form of legislation, administrative rules, or policy initiatives. These actions may include changes to land use patterns and water use allocations, which can affect the intensity and location of these across the action area. Examples include water quality and pollution control, streamflow enhancement, watershed planning, environmental land use planning and zoning, and habitat conservation plans (NOAA Fisheries 2003a). A general description of the primary tribal, state and local programs is summarized in Chapter 5 of the Environmental Assessment for the RRMP (NOAA Fisheries 2003b).

Activities affecting listed salmonids activities within the action area are expected to increase with a projected increase in population. Thus, NOAA Fisheries assumes that future private and

state actions will continue within the action area, but at increasingly higher levels as population density climbs, thus affects to listed species are expected to increase.

2.1.8 Conclusion

The final step in NOAA Fisheries' approach to determine jeopardy is to determine whether the proposed action is likely to appreciably reduce the likelihood of species survival or recovery in the wild, or destroy or adversely modify designated critical habitat. NOAA Fisheries has determined that when the effects of the approval of Marion County's RRMP addressed in this Opinion are added to the environmental baseline and cumulative effects occurring in the action area, it is not likely to jeopardize the continued existence of listed salmonids, or destroy or adversely modify designated critical habitat.

These conclusions are based on the following considerations: (1) NOAA Fisheries will have continuing oversight authority of the RRMP as provided in the 4(d) Rule; (2) short-term effects of road maintenance will be minimized or avoided through the use of best management practices that are modified through time, as needed; (3) over the long term, benefits to habitat (particularly water quality) may result from implementation of best management practices; (4) best management practices will likely improve through regular internal discussions at Marion County which will result in better practices on the ground over the long term; (5) NOAA Fisheries will review the RRMP annual reports, and conduct a substantial review of the program after five years; and (7) the proposed approval is not likely to result in the impairment of properly functioning habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

These effects are reasonably certain to result in incidental take, but the extent of harm is likely to be minimized by specific measures included in the RRMP. Additionally, the RRMP's BMPs and NOAA Fisheries' oversight role shall provide for constant improvements to routine road maintenance practices in Marion County.

2.1.9 Reinitiation of Consultation

This concludes formal consultation on NOAA Fisheries' proposed qualification of the RRMP. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

Additional reinitiation requirements, including re-evaluation and modification requirements, are set forth in the RRMP and in Limit 10 of the 4(d) Rule (July 2000), which are incorporated herein.

2.2 Incidental Take Statement

Where NOAA Fisheries approves a 4(d) Limit, there is no take liability for threatened species, and so there is no need of a take exemption through ESA section 7(o).

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species

fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and the upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions.

3.3 Proposed Actions

The proposed action and action area are detailed above in Section 2.1 and 1.2 of this document. Routine road maintenance activities conducted in accordance with the RRMP are covered by this MSA consultation. The action area is defined as the streambed, streambank and riparian corridor of the Willamette River and all its tributaries within Marion County that are within the geographic boundaries of the chinook and coho salmon ESUs. This area has been designated as EFH for various life stages of chinook salmon and coho salmon.

3.4 Effects of Proposed Action

As described in detail in Section 2.1.5 of this Opinion, the proposed action may result in short-term adverse effects to a variety of habitat parameters. The RRMP identifies anticipated impacts to affected species likely to result from the proposed activities and the measures that are necessary and appropriate to minimize those impacts. These effects include delivery of sediments to streams through routine road maintenance activities, vegetation removal, loss of large wood, and hydraulic modifications.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect the EFH for the Pacific salmon species.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the RRMP will be implemented by Marion County approved under Limit No. 10(i). Furthermore, it believes that these measures are sufficient to address the adverse impacts to EFH described above.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

NOAA Fisheries must reinitiate EFH consultation with itself if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR. 600.920(l)).

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