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:
2003/00301

September 11, 2003

Mr. Lawrence C. Evans
Portland District
Corps of Engineers
CENWP-OP-GP (Mr. Dominic Yballe)
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation on the South Inlet Slough Tide Gate and Road Repair, Siuslaw River Basin, Lane County, Oregon (Corps No. 200100999)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the South Inlet Slough tide gate and road repair, Siuslaw River Basin, Lane County, Oregon. NOAA Fisheries concludes in this Opinion that the proposed action is not likely to jeopardize Oregon Coast coho salmon (*Oncorhynchus kisutch*). As required by section 7 of the ESA, NOAA Fisheries included reasonable and prudent measures with non-discretionary terms and conditions that NOAA Fisheries believes are necessary to avoid or minimize the effects of incidental take associated with this action.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and its implementing regulations (50 CFR 600).

Please direct any questions regarding this letter to Robert Anderson of my staff in the Oregon Habitat Branch at 503.231.2226.

Sincerely,

for Michael R Course

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological Opinion

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

South Inlet Slough Tide Gate and Road Repair
Siuslaw River Basin, Lane County, Oregon
(Corps No. 200100999)

Agency:	U.S. Army Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	September 11, 2003
Issued by:	for Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2002/00301**

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with U.S. Fish and Wildlife Service and NOAA's National Marine Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The 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. 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)).

The proposed action is issuance of permits to the Lane County Department of Public Works (County) by the U.S. Army Corps of Engineers (Corps) under section 404 of the Clean Water Act and under section 10 of the Rivers and Harbors Act to replace and move a tide gate, and repair a 65-foot section of road on Inlet Creek and South Inlet Slough. The administrative record for this consultation is on file at the Oregon Habitat Branch office of NOAA Fisheries.

1.1 Background and Consultation History

On March 24, 2003, NOAA Fisheries received a letter from the Corps requesting consultation pursuant to section 7(a)(2) of the ESA and EFH consultation pursuant to section 305(b)(2) of the MSA for the issuance of permits to the Lane County Department of Public Works (County) by the U.S. Army Corps of Engineers (Corps) under section 404 of the Clean Water Act and under section 10 of the Rivers and Harbors Act to replace and move a tide gate, and repair a 65-foot section of road on Inlet Creek and South Inlet Slough. Submitted with the letter was a draft biological assessment (BA) describing the proposed action and its effects. In the draft BA, the Corps determined that the proposed action was likely to adversely affect OC coho salmon, an ESA-listed species, and requested formal consultation. OC coho salmon were listed as threatened under the ESA on August 10, 1998 (63 FR 42587), and protective regulations were issued on July 10, 2000 (65 FR 42422). NOAA Fisheries responded to the Corps with a letter of nonconcurrence on April 28, 2003, indicating that the consultation could not be completed until additional information was provided. On August 19, 2003, NOAA Fisheries received all of

information requested in our April 28, 2003, letter, except for hydraulic information on operations of the proposed tide gate.

1.2 Proposed Action

The proposed action is issuance of permits to the Lane County Department of Public Works (County) by the U.S. Army Corps of Engineers (Corps) under section 404 of the Clean Water Act and under section 10 of the Rivers and Harbors Act to replace and move a tide gate, and repair a 65-foot section of road on Inlet Creek and South Inlet Slough. Specific elements of the proposed action are described below.

1.2.1 Tide Gate

The applicant proposes to place a squash-pipe culvert in the historical channel of Inlet Creek that is approximately 100 feet (ft) east of an existing tide gate and culvert. The new culvert would measure 95 inches in width by 67 inches in height and would be 47 ft long with a side-hinged tide gate. Fifteen cubic yards (cy) of riprap would be used around the tide gate and culvert to construct rock aprons.

1.2.2 Road Repair

The existing tide gate and culvert would be removed and the original road prism would be restored. Sixty-five linear ft (approximately 2500 ft^2) of streambank would be shaped and filled with 550 cy of fill (class 400 riprap). The streambank would be graded to a 1.5:1 slope. To restore the road prism, an existing scour pool at the inlet of the existing culvert would be filled. The County would place two or three pieces of large wood in the rock revetment to increase habitat complexity.

1.2.3 In-water work

In-water construction activities associated with removal and installation of tide gates, excavation of streambed materials, and road repair would occur in two phases. The first phase would include installing the new culvert and tide gate, and shaping the stream channel in the immediate, creek-side vicinity of the tide gate and culvert. The second phase would include removing the existing tide gate and culvert, filling the scour pool, incorporating of 2 or 3 pieces of large woody debris in the former scour pool, and restoring the road to its original prism. All in-water work, defined as all work below top-of-bank, would occur within an in-water work window between July 1 and September 15.

1.2.4 Conservation Measures

The applicant has proposed conservation measures in the following categories (see BA for details): (1) In-water timing restriction (July through September 15); (2) placement of all fill at low tide; (3) re-seeding and replanting of disturbed areas; (4) erosion and pollution control; (5) hazardous materials; (6) equipment use measures; and (7) habitat remediation. NOAA Fisheries regards the conservation measures included in the consultation request as intended to minimize adverse effects to OC coho salmon and their habitats, and considers them to be part of the proposed action.

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area (project area) involved in the proposed action (50 CFR 402.02). Effects at the project site may extend upstream or downstream based on the potential for impairing upstream and downstream fish passage, injury to or killing of OC coho salmon, fish passage barrier (tide gate), placement of riprap, placement of large woody debris, and temporary increases in suspended sediments and turbidity. For this consultation, the action area includes all habitats accessible to OC coho salmon within 500 ft upstream or downstream of the confluence of Inlet Creek and South Slough, including the channel migration zone (CMZ).

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

This Opinion considers the potential effects of the proposed action on OC coho salmon, which occur in the action area.

2.1.1 Biological Information

Life history of OC coho salmon are represented in Table 1. Spawning, incubation, rearing, and migration occur throughout accessible reaches of the watershed.

Table 1. OC Coho Salmon Life History Timing in the Siuslaw River Basin (Weitkamp 1995, Steelquist 1992, ODFW 2002). Light Shading Represents Low-Level Abundance, Dark Shading Represents Peak Abundance.

	J	F	M	A	M	J	J	A	S	O	N	D
River Entry												
Spawning												
Incubation-Intragravel Development												
Juvenile Freshwater Rearing												
Juvenile Migration												
Juvenile Residence in Estuary												

Estimated escapement of coho salmon in coastal Oregon was about 1.4 million fish in the early 1900s, with harvest of nearly 400,000 fish (Weitkamp *et al.* 1995). Abundance of wild OC coho salmon declined during the period from about 1965 to 1975 (Nickelson *et al.* 1992). Lichatowich (1989) concluded that production potential, based on stock recruit models, for OC coho salmon in coastal Oregon rivers was only about 800,000 fish due to a decline with a reduction in habitat capacity of nearly 50%. Recent estimates of wild spawner abundance in this evolutionarily significant unit (ESU) have ranged from 16,500 adults in 1990 to 60,000 adults in 1996, and nearly 238,700 adult coho in 2002 (ODFW 2003). Estimated spawning populations for naturally-produced coho salmon in the Siuslaw River basin averaged 8533 adults from 1990 through 2002. These results are summarized in Table 2.

Table 2. Estimated Spawning Populations for Naturally-Produced Coho Salmon in the Siuslaw River Basin (Jacobs *et al.* 2001, ODFW 2003)

Year	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Estimated Siuslaw River Basin Population	2685	3740	3440	4428	3205	6089	7625	668	1089	2724	6767	11024	57448

Based on survey data collected by ODFW, estimated densities of juvenile OC coho salmon in the Siuslaw River basin range from 0.00 fish m^{-2} to 1.76 fish m^{-2} (Rodgers 2000). Juvenile OC coho salmon rear year-round and migrate in the mainstem and tributaries of the Siuslaw River, including the tributaries and mainstem of Inlet Creek. Adult OC coho salmon spawn in the

tributaries of Inlet Creek. Juvenile OC coho salmon (0+ and 1+ age classes) likely use low salinity estuarine habitats in South Slough for rearing, smoltification, and migration.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402.02 (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 and when appropriate combines them with the Habitat Approach (NOAA Fisheries 1999): (1) Consider the biological requirements of the listed 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 (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. 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.
The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on essential habitat features). The second part focuses on the species itself. It describes the action's effects on individual fish, or populations, or both, and places these effects in the context of the evolutionarily significant unit (ESU) as a whole. Ultimately, the analysis seeks to answer the question of whether the proposed action is likely to jeopardize a listed species' continued existence.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon 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 to 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 biological requirements are population characteristics necessary for OC coho salmon to survive and recover to naturally-reproducing population levels, 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 actions that affect freshwater habitat, NOAA Fisheries usually describes the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). PFC is defined as the sustained presence of natural, habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NOAA Fisheries 1999). PFC, then, constitutes the habitat component of a species' biological requirements. OC coho salmon survival in the wild depends on the proper functioning of ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse effects of current practices. For this consultation, the biological requirements are improved habitat characteristics that would function to support successful adult migration, juvenile rearing, upstream and downstream migration, and smoltification.

Essential habitat features for juvenile rearing (growth and development) areas include adequate water quality, water quantity, water velocity, cover and shelter, dietary and spatial resources, riparian vegetation, and safe passage to upstream and downstream habitats. Essential habitat features for juvenile migration corridors include adequate water quality, water quantity, water velocity, cover and shelter, dietary resources, riparian vegetation and space. Essential habitat features for adult migration corridors include adequate water quality, water quantity, water velocity, cover and shelter, riparian vegetation and space.

2.1.4 Environmental Baseline

In step two of NOAA Fisheries' analysis, it evaluates the relevance of the environmental baseline in the action area. Regulations implementing section 7 of the ESA (50 CFR 402.02) define the environmental baseline as the past and present effects of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated effects of all proposed Federal projects in the action area that have undergone section 7 consultation, and the effects of state and private actions that are contemporaneous with the consultation in progress.

Land uses in the action area include rural-residential, commercial-industrial, agricultural, recreational, and commercial forestry. Riparian areas and stream channels in the action area have been damaged by activities related to these land uses throughout the watershed (FEMAT 1993, Botkin *et al.* 1995, OCSRI 1997). Habitat changes that have contributed to the decline of OC coho in the action area include: (1) Reduced biological, chemical, and physical connectivity between streams, riparian areas, flood plains, and uplands; (2) elevated fine sediment yields; (3) reduced in-stream large woody debris; (4) loss or degradation of riparian vegetation; (5) altered stream channel morphology; (6) altered base and peak stream flows; and (7) fish passage impediments.

NOAA Fisheries concludes that not all of the biological requirements of the listed species within the action area are being met under current conditions. Based on the best available information on the status of OC coho salmon, including population status, trends, and genetics, and the environmental baseline conditions within the action area, significant improvement in habitat conditions is needed to meet the biological requirements of OC coho salmon for survival and recovery.

2.1.5 Analysis of Effects

In step three of NOAA Fisheries' jeopardy analysis, it evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery if those actions go forward.

Water Quality - Total Suspended Solids and Turbidity

Turbidity is defined as a measurement of relative clarity due to an increase in dissolved or suspended, undissolved particles (measured as total suspended sediment or TSS). At moderate levels, turbidity can reduce primary and secondary productivity and, at high levels, has the potential to interfere with feeding and to injure and kill adult and juvenile fish (Spence *et al.* 1996, Bjornn and Reiser 1991). Other effects on fish behavior, such as gill flaring and feeding changes, can occur in response to pulses of suspended sediment (Berg and Northcote 1985). Fine, redeposited sediments can also reduce incubation success and interstitial rearing space for juvenile salmonids (Bjornn and Reiser 1991). Salmonid fishes may move laterally and downstream to avoid turbid plumes (Sigler *et al.* 1984, Lloyd 1987, Servizi and Martens 1991). Juvenile salmonid fishes tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish must traverse these streams along migration routes (Lloyd *et al.* 1987). A potential positive effect of increased turbudity is providing refuge and cover from predation. Fish that remain in turbid waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In habitats with intense predation pressure, this provides a beneficial trade-off of enhanced survival in exchange for physical effects such as reduced growth.

Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonid fishes have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with floods, and are adapted to such exposures. Adult and larger juvenile salmonid fishes appear to be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, chronic exposure can cause physiological stress that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

Increases in TSS can adversely affect filter-feeding macroinvertebrates and fish feeding. At concentrations of 53 to 92 ppm (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1983).

The proposed installation and removal of the tide gates and culverts without work-area isolation measures is likely to increase turbidity downstream. Although salmon are adapted to short-term pulses of sediment that typically coincide with high rainfall or increased stream flows from snow melt, salmon are not adapted to waters that are chronically turbid. Sediment generated from construction would occur at a time of year when there is little or no rainfall and during low stream flows when off-channel habitat, ephemeral streams, and flood plain habitat is unavailable to salmon as refugia from waters high in suspended sediment. Salmon rearing in the action area during construction may also be exposed to other stress factors such as elevated water temperatures that in combination with increases in turbidity, during a time of year when refugia is limited or unavaulable, is likely to increase physiological stress and may temporarily displace rearing juveniles from the action area.

Water Quality - Potential Spills

Operation of heavy equipment requires the use of fuel, lubricants, coolants, *etc.*, which if spilled into a waterbody could injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain harmful polycyclic aromatic hydrocarbons. The proposed action includes a spill containment and control plan; however, the Corps provided no details of the plan and therefore its potential effectiveness cannot be evaluated.

Road Repair - Streambank Modification

Natural riparian and stream processes can be affected by streambank hardening (*e.g.*, riprap, rock revetments) (Bolton and Shellberg 2001). Bank hardening not only modifies the streambed and bank but, as its primary purpose, stops natural processes that maintain a functioning riparian stream system. Potential effects of bank hardening on riverine processes include stream channel simplification, altered hydraulic processes, constrainment of stream channels (reduced sinuosity), loss of native sediment recruitment, and elimination of shallow-water habitat.

As erosive forces affect different areas in a stream, and bank hardening occurs in response, the stream eventually may attain a continuous fixed alignment lacking habitat complexity (USACE 1977). Bank hardening may shift erosion points either upstream, due to headcutting, or downstream, due to transfer of stream energy. Bank hardening can also increase stream velocities, contributing to channel incision and streambank failure.

Although riprap can provide some habitat features used by salmonids, such as inter-rock space, increasing evidence shows that in comparison to natural banks, fish densities at rock riprap banks are reduced (Schmetterling 2001). This is true even when compared to actively eroding cut banks (Michny and Deibel 1986, Schaffter *et al.* 1983). The use of riprap either results in site characteristics that limit suitability for fish at various life stages (Beamer and Henderson 1998, Peters *et al.* 1998, Li *et al.* 1984, North *et al.* 2002), or perpetuates detrimental conditions that may restrict or limit fish production (Beamer and Henderson 1998, Li *et al.* 1984). Even when rock may contribute to habitat structure within an alluvial stream system, the beneficial biological response is of limited duration with greater variability (Schmetterling 2001, Beamer and Henderson 1998, Peters *et al.* 1998, Andrus *et al.* 2000). The use of riprap can disrupt flows, reduce food delivery and create difficult swimming for smaller fish (Michny and Deibel 1986, Schaffter *et al.* 1983). These effects can reduce the suitability of the habitat for salmonids, and reduce the likelihood that adverse effects from riprap can be mitigated over time.

The proposed inclusion of large wood in the stabilized bank likely would partially offset the potential adverse effects from streambank alteration.

Tide Gate Operations

The proposed operations for the new tide gate would not increase or decrease the length of time that fish passage can occur during a given tidal cycle, but likely would increase the success of fish passage during a given tidal cycle relative to existing conditions.

The County provided few specifications on existing or new tide gate operations, therefore potential effectiveness cannot be thoroughly evaluated. Based on the data used to model hypothetical operations, NOAA Fisheries estimates that the proposed tide gate would meet NOAA's draft tide gate criteria (NOAA Fisheries 2003; copy in file) approximately 44% of the time for a given tidal cycle when water elevations are less than +2 ft. Model assumptions include: (1) Real-time tides at Siuslaw River at Florence for a 28-day period for August, 2003; (2) tributary inflow of 5 cubic feet per second (cfs); (3) the new culvert is designed with efficient hydraulic transitions; (4) the tide gate would maintain an opening of approximately 90° to the axis of the culvert during a given tidal cycle when water elevations are less than +2 ft; and (5) culvert velocities would not exceed 1.5 cfs.

The tide gate would be operated to close at a water elevation of +2 ft preventing access for migrating and rearing OC coho salmon to rearing and spawning habitat until a lowering the tide allows the tide gate to open, permitting passage. In the hypothetical model run described above, fish could pass for a period of approximately 8 hours per 24-hour cycle. The 8 hours would occur in two 4-hour blocks of time, with unpredictable effects on fish survival at the individual and population scales.

Water temperature is likely to increase in Inlet Creek during high tide when the tide gate is closed, which will create a confined and relatively static body of water. Water temperature is a function of both external factors, such as solar radiation, air temperature, precipitation and base flows, and internal factors such as width-to-depth ratios, groundwater inputs, and hyporheic exchange (Poole and Berman 2001). The proposed tide gate could affect both sets of factors. Interruption of the natural flow regime with a tide gate would allow water to pool and become static in an open landscape fully exposed to solar radiation where it would otherwise continue flowing and remain connected with the river system. Preliminary results from temperature monitoring of sloughs with tide gates in Washington state indicate water temperatures are likely to increase throughout the year and can exceed lethal conditions (25°C) (EPA 2003) (NOAA Fisheries 2003).

Elevated water temperatures can increase the rate at which energy is consumed for standard metabolism (Fry 1971), and can cause depletion of energy reserves owing to increased respiratory demands, protein coagulation, and enzyme inhibition in adult salmon (Idler and Clemens 1959, Gilhousen 1980). When ripe adult female salmonids are exposed to temperatures beyond the range of 13.3°C to 15.6°C, pre-spawning adult mortality increases, and the survival of eggs to the eyed stage decreases (McCullough 1999).

Juvenile salmon exposed to constant water temperatures greater than 18°C are highly susceptible to disease, such as *Chondrococcus columnaris.* Susceptibility to disease is a function of concentration of columnaris organisms, length of exposure, and temperature (EPA 2001b) as well as age of individual (increased age, increased resistance). Contagion of *C. columanaris* has been suspected during passage of salmon through fish ladders (Pacha 1961), and increased incidence may be a result of the creation of slow-moving waters (Snieszko 1964). Coho salmon exposed to *C. columnaris* had a rapidly increasing rate of infection with increase in water temperatures above 12.2°C (Fryer and Pilcher 1974). For coho salmon, infection frequency was low at 12.2°C (3%), but was 49% at 15°C, and rapidly jumped to 100% at water temperatures greater than 20.6°C.

Operations of the proposed tide gate likely would lead to habitat effects similar to those described above during high tides. The effects of increases in water temperature are likely to increase physiological stress and may displace rearing juveniles. Increases in water temperature likely would decrease dissolved oxygen concentrations, compounding the effects on rearing juveniles. Adult OC coho salmon may be affected, but likely would move quickly through the area to natal streams to spawn minimizing the probability of adverse effects.

Juvenile salmon are likely to avoid waters with elevated temperatures and low dissolved oxygen concentrations. However, twice daily exposure to significant increases in temperature and decreases in dissolved oxygen concentrations when the tide gate closes, and near-instantaneous increases in salinity gradients when the tide gate opens may cause disorientation and

displacement of rearing salmon. This may reduce fitness and survival. While effects of avoiding areas with high water temperatures and low dissolved oxygen are unquantifiable, the tributaries that feed Inlet Creek likely would provide refugia for rearing OC coho salmon from adverse water quality, provided these tributaries have sufficient flows to meet the biological and behavioral requirements of the fish.

2.1.6 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."

NOAA Fisheries is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occurs. The action area includes significant tracts of private and state lands. Land use on these non-federal lands include rural development, agricultural, and commercial forestry. Chemical fertilizers or pesticides are used on many of these lands, but no specific information is available regarding their use. Furthermore, NOAA Fisheries generally does not consider the rules governing timber harvests, agricultural practices, and rural development on non-federal lands within Oregon to be sufficiently protective of watershed, riparian, and stream habitat functions to support the survival and recovery of listed species. Therefore, these habitat functions likely are at risk due to future activities on non-federal forest lands within the basin.

Non-federal activities within the state are expected to increase due to a projected 34% increase in human population by the year 2024 in Oregon (Oregon Department of Administrative Services 1999). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises.

2.1.7 Conclusion

After reviewing the best available scientific and commercial information available regarding the current status of the OC coho salmon ESU considered in this consultation, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, NOAA Fisheries concludes that the action, as proposed, is not likely to jeopardize the continued existence of OC coho salmon.

Our conclusion is based on the following considerations: (1) All in-water work will occur when adult OC coho salmon are unlikely to be present in the action area; (2) all in-water work will occur when the tide is low, minimizing the likelihood that juvenile OC coho salmon abundance would be high in the action area; (3) taken together, these conservation measures applied to each part of the project will ensure that any short-term effects to aquatic habitat conditions will be

minor and timed to occur at times that are least sensitive for the species' life-cycle; and (4) the effects of this action not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.8 Reinitiation of Consultation

As provided in 50 CFR 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) The amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending conclusion of the reinitiated consultation.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

2.2.1 Amount or Extent of Take

NOAA Fisheries anticipates that the proposed action covered by this Opinion is reasonably certain to result in incidental take of listed species due to changes in water quality, and in-water

construction. Effects of actions such as on the listed species these are unquantifiable in the short term, but are expected to be limited to harm in the form of habitat modification.

Therefore, even though NOAA Fisheries expects some low level of incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species themselves. In instances such as this, NOAA Fisheries designates the expected level of take in terms of the extent of take allowed. NOAA Fisheries limits the area of allowable incidental take during construction to that aquatic area within 500 ft upstream or downstream of the tide gate and culvert replacements. Incidental take occurring beyond this area is not authorized by this consultation. Incidental take authorized under this Opinion does not cover operations of the tide gate when water elevations exceed +2 ft.

2.2.2 Reasonable and Prudent Measures

Reasonable and prudent measures are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(a)(2) to apply. The Corps has the continuing duty to regulate the activities covered in this incidental take statement. If the Corps fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require further consultation.

The following reasonable and prudent measures are necessary and appropriate to minimize take of listed fish resulting from implementation of the proposed action. The Corps shall ensure that:

1. Avoid or minimize incidental take from in-water and upland construction (*e.g.*, in-water and streambank work, clearing and grubbing, erosion and pollution control, handling of hazardous materials, habitat remediation) are minimized by ensuring that the proposed conservation measures for are fully implemented.

2. Avoid or minimize incidental take from operation of the tide gate by ensuring that adult and juvenile salmonids can complete upstream and downstream migrations and local movements.

3. Avoid or minimize incidental take from in-water construction, habitat enhancement, and fish removal and handling are minimized by ensuring that the in-water work is limited to the time when OC coho salmon are least abundant in the action area.

4. Avoid or minimize incidental take from the disturbance to streambank and riparian habitat features.

5. Complete a comprehensive monitoring and reporting program to ensure that use of the conservation measures are effective at avoiding and minimizing the likelihood of take from permitted activity.

2.2.3 Terms and Conditions

These measures should be incorporated into construction contracts and subcontracts to ensure that the work is carried out in the manner prescribed.

1. To implement reasonable and prudent measure #1 (conservation measures), the Corps shall ensure that conservation measures proposed as part of the project for in-water and upland construction are fully implemented, except as modified below.

    a. No petroleum products shall be stored within 150 ft of any waterbody.
    b. Refueling shall occur at least 150 ft from any waterbody.

2. To implement reasonable and prudent measure #2 (fish passage), the Corps shall ensure that:

    a. A side-hinged tide gate is installed on the culvert.
    b. The tide gate is installed with a latch or locking pin that maintains an opening of approximately 90° to the axis of the culvert until incoming tides are at an elevation of +2 ft or greater.
    c. The culvert shall have efficient hydraulic transitions (i.e., wing walls) installed on the inlet and outlet.

3. To implement reasonable and prudent measure #3 (in-water construction), the Corps shall ensure that:

    a. All work below top-of-bank is completed within the recommended in-water work period (July 1 through September 15). Any adjustments to the in-water work period must be approved in writing by NOAA Fisheries.

b. All in-water work, defined as all work below top-of-bank, shall occur when the tide is out, and is at its lowest elevation of the tidal cycle. No in-water work shall occur when the water elevation in South Slough exceeds +1 foot.

4. To implement reasonable and prudent measure #4 (minimization of disturbance to streambank and riparian habitats), the Corps shall ensure that:

   a. The alteration or disturbance of streambanks and existing riparian vegetation is minimized.
   b. Large wood is incorporated into the rock revetment in the area of the scour pool.
      i. Habitat enhancement shall include a minimum of three pieces of large wood to be placed in the scour pool/fill area.
      ii. Large wood shall measure at least 22 inches in diameter at breast height and 20 to 30 ft in length.
   c. Riparian plantings (*e.g.*, *Salix hookeriana*, coast willow; *Lonicera involucrata*, twinberry) are incorporated into the interstices of the rock revetment with a spacing of 2 ft on center.
   d. No herbicides are applied throughout the five-year planting establishment period.
   e. Plantings are self-established (*e.g.*, without watering) for at least three years, and are monitored for a minimum of five years with a required survival rate or plant cover of 80%.

5. To implement reasonable and prudent measure #5 (monitoring), the Corps shall ensure that:

   a. To assess water quality effects associated with tide gate operations, a continuous temperature recorder is installed at the deepest point in the stream channel and as far upstream as possible from the culvert inlet.
      i. The temperature recorder shall be installed in a manner that it is secure and is not exposed during low tides.
      ii. Water temperature shall be measured continually for a period of 1 year following tide gate installation.
   b. Within 90 days, unless otherwise stated, following completion of construction activities, a report is provided to NOAA Fisheries that discusses:
      i. Implementation of conservation measures proposed by the County, including the success or failure of conservation measures, actions taken to correct any problems, and confirmation that the proposed tide gate and culvert was built as proposed.
      ii. Specific methods used to minimize sediment mobilization and increases in turbidity.

iii. Extent, duration, and frequency of any turbidity plumes related to project activities.
iv. Streambank and riparian conditions before and following in-water work.
v. Measures taken to isolate the in-water work area.
vi. Any observed injury and/or mortality of fish resulting from project implementation.
vii. Final design, location and methods used to place the wood, any damage to streambanks and riparian vegetation, and actions taken to correct any problems.
viii. The applicant provides photo-documentation to NOAA Fisheries of tide gate operations and of the freshwater area behind the tide gate in the period immediately after completion of the tide gate installation.
(1) A photo station shall be established at stations 11+00, 12+00, and 13+00 centerline.
(a) For the first week following tide gate installation, photographs shall be taken from each station during each high tide and low tide. Photographs shall be submitted by October 15, 2003.
(b) Thereafter, photographs shall be taken once every 2 weeks during low tide from the stations identified in 5 (f)(i) for a period of 1 year. Photographs shall be submitted to NOAA Fisheries on a monthly basis.
(c) Photographs do not need to be taken outside the hours of 0600 and 1800.

c. Water temperature shall be reported as daily minimum, daily maximum, and running 7-day average of the daily maximum for each week (*i.e.* per the protocol of the Oregon Department of Environmental Quality). A monitoring report shall be submitted to NOAA Fisheries no later than September 30, 2004.

d. Following the completion of plantings associated with the streambank, the Corps will provide NOAA Fisheries annually with a report by December 31 of a given year describing the success of plantings required under reasonable and prudent measure #4 (minimization of disturbance to streambank and riparian habitats). The report should focus on actions taken to ensure that plantings were done correctly and were successful at meeting the objective of 80% or higher survival rate or cover after five years, as well as indicate any replantings completed during the preceding 12-month period. The report shall include photo documentation. Once 80% or greater survival or cover has been documented for five consecutive years, this reporting requirement will be satisfied.

e. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must cease all construction activities and notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must

take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily. Construction shall proceed only after the County has received written authorization for NOAA Fisheries.

f. Monitoring reports are submitted to:

National Marine Fisheries Service
Oregon Habitat Branch, Habitat Conservation Division
Attn: 2003/00301
525 NE Oregon Street, Suite 500
Portland, OR 97232-2778

3. MAGNUSON-STEVENS ACT

3.1 Background

Pursuant to the MSA:

- 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 on EFH.

3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: Chinook (*O. tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies 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). EEH also has been designated for groundfish species and coastal pelagic species. The estuarine EFH composite includes those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation). Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1999), coastal pelagic species (PFMC 1999a), and Pacific salmon (PFMC 1999b). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes.

3.3 Proposed Action

The proposed action is detailed above in section 1.2 of this document. For this consultation, the action area includes all habitats accessible to OC coho salmon within 500 ft upstream and downstream of the confluence of Inlet Creek and South Slough, including the channel migration zone (CMZ). This area has been designated as EFH for various life stages of coastal pelagic species, groundfish species, and chinook and coho salmon (Table 3).

3.4 Effects of Proposed Action

The proposed action will adversely affect rearing and migration habitat of juvenile salmon, holding and migration habitat of adult salmon, benthic prey resources, and water quality (dissolved oxygen and temperature) for chinook and coho salmon.

3.5 Conclusion

The proposed action will adversely affect the EFH for coastal pelagic species, ground fish species, and chinook and coho salmon in the action area.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. NOAA Fisheries recommends the Corps implement the conservation recommendations and terms and conditions in the ESA consultation.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920G) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse effects of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The Corps must reinitiate EFH consultation with NOAA Fisheries if either action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

Table 3. Species With Designated EFH in the Estuarine EFH Composite in the State of Oregon

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes maliger*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhyncus tshawytcha*
Coho Salmon	*Oncorhyncus kisutch*

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