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:
2001/01174

July 23, 2003

Mr. Lawrence C. Evans
U.S. Army Corps of Engineers
Attn: Teena Monical
Regulatory Branch, CENWP-CO-GP
PO Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Ayres Bar Gravel Extraction Project on the Willamette River, River Mile 178, Lane County, Oregon (Corps No. 199500234)

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 effects of the proposed Ayres Bar Gravel Extraction Project on the Willamette River, at River Mile 178 in Lane County, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*). As required by section 7 of the ESA, NOAA Fisheries also includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact 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 implementing regulations at 50 C.F.R. Part 600.

If you have any questions regarding this consultation, please contact Anne Mullan of my staff in the Oregon Habitat Branch at 503.231.6267.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Jeff Ziller, ODFW
Randy Hledik, Wildish Sand & Gravel
James Wildish, Wildish Sand & Gravel

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

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

Ayres Bar Gravel Extraction on the Willamette River,
River Mile 178, Lane County, Oregon
(Corps No. 199500234)

Agency: U.S. Army Corps of Engineers

Consultation Conducted By: NOAA's National Marine Fisheries Service, Northwest Region

Date Issued: July 23, 2003

Issued by: F.(Michael R Crouse
D. Robert Lohn
Regional Administrator

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1. INTRODUCTION

1.1 Background

On October 16, 2001, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a letter from the U.S. Army Corps of Engineers (Corps) requesting informal consultation pursuant to the Endangered Species Act (ESA) for the two-year extension of a permit under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act for Wildish Sand and Gravel Company at Ayres Bar, River Mile 178 of the Willamette River near Eugene, in Lane County, Oregon. On November 30, 2001, NOAA Fisheries received a letter from the Corps revising the determination of effect and requesting formal consultation for Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*). A biological assessment (BA) was submitted with this letter describing the proposed action and potential effects that may result from the gravel removal project. At a meeting with the Corps on February 11, 2002, and at a site visit on February 27, 2002, NOAA Fisheries obtained details on gravel removal and a possible downstream egress channel. At a September 2002 meeting, Randy Hledik of the company discussed methods for opening a downstream connection to reduce entrapment after high water events. This biological opinion (Opinion) is based on the information presented in the BA and during the consultation process.

The stated purpose of the permit extension is to remove up to 250,000 cubic yards at the company's operations on Ayres Bar over the five years following permit renewal. In the BA, the Corps determined the proposed action was likely to adversely affect Upper Willamette River (UWR) chinook salmon *(Oncorhynchus tshawytscha*), an ESA-listed species. UWR chinook salmon were listed as threatened under the ESA on March 24, 1999 (64 FR 14308) and protective regulations were issued on July 10, 2000 (65 FR 42422). This biological opinion (Opinion) considers the potential effects of the proposed action on Upper Willamette chinook salmon.

1.2 Proposed Actions

Commercial gravel removal is proposed for Ayres Bar between river miles (RM) 177 and 178 of the Willamette River near Eugene, Oregon in Lane County. The pit is in the floodplain approximately one-half mile north of the Beltline Road-Willamette Bridge on the east side of the Willamette River, three miles upstream (south) of the confluence of the McKenzie and Willamette Rivers. As proposed, a berm of at least 30 feet width will be maintained around the excavation site, with an inside slope of 4:1. Trucks will approach the site using a graveled construction road from the neighboring gravel operations. The trucks cross the slough from the east on a gravel surface access road.

Wildish Sand and Gravel Company had a permit from the Corps to remove up to 250,000 cubic yards annually from Ayres Bar that expired October 31, 2001. Approximately 285,000 cubic yards total has been removed since the expired permit was issued in 1995 (Table 1). The applicant's requested five year extension to the permit would allow removal of an additional 250,000 cubic yards. Gravel would continue to be stockpiled near the pit and removed by trucks with timing dependent on market conditions. Excavation does not take place annually, but is based on previous removal rates and stockpiled inventory. The applicant expects to complete excavating the remaining material at the end of five years, within limits of the previous permit. Approximately 25,000 cubic yards of excavated material was stockpiled at the site in April 2002 (R. Hledik, Wildish Sand and Gravel, personal communication with A. Mullan, NOAA Fisheries, April 23, 2002 email).

Table 1. Recent Extraction Volumes at Ayres Bar.
Source: Wildish Sand and Gravel

Fiscal year (April - March)	Cubic yards extracted
1995-1996	75,000
1996-1997	40,000
1997-1998	50,000
1998-1999	50,000
1999-2000	40,000
2000-2001	30,000
TOTAL	**285,000**

The gravel pit is approximately 1300 by 300 feet in area and 20 feet deep. The berm separating it from the river on the west side is vegetated with willow and cottonwood. Gravel is removed from the pit using a front-end loader or scraper that operates in the standing water that remains after high flows, or is fed by groundwater. The existing permit conditions specify that the depth of excavation shall be no deeper than 20 feet, or 365 feet National Geodetic Vertical Datum (NGVD). Gravel stored on site may not be washed on the project site. The 30 feet minimum-width berm will be maintained, with repair of the berm requiring a separate permit. No equipment will be operated in the flowing stream. To mitigate fish stranding, a channel approximately two feet wide will be opened at the downstream end of the pit using gravel extraction equipment. During a site visit in February 2002, the downstream end of the pit was within 50 feet of being connected.

The applicant proposes to work at times when the water level in the pit is lower than the river level, indicating primarily groundwater connections, and beginning no earlier than April. Fish can enter the gravel pit both upstream and downstream when high water connects the pit to the river and may be trapped when the downstream backwater channel is not connected. Excavation of the narrow egress channel would allow fish to leave at the downstream end.

Work in the pit would take place outside the Oregon Department of Fish and Wildlife (ODFW) designated in-water work period, July 1 to August 31 (ODFW 2000). Measures will be implemented to prevent turbidity from exceeding 10% above natural stream turbidity as a result of the project. Turbidity in excess of the standard for a limited duration would be allowed if these measures are implemented:

1. Prevention of offsite soil movement by filter bags, sediment fences, and berms.
2. Cover of stockpiles by impervious material when unattended or during rain.
3. Sediment traps or catch basins to settle solids in water entering ditches or waterways.

Chemicals, petroleum products and other deleterious materials will be prevented from entering the river as required in the original permit. After each removal season, the applicant will provide the Corps with photographs of the entire area, statements listing the amount of material removed, and a diagram showing the dimensions of the pit.

The existing permit required an approved mitigation plan to be completed within one year of the expiration of the permit, with any additional excavation limited to that needed to maintain the mitigation. Payment of seven cents/cubic yard was also required for subsequent aggregate removal. While 285,000 cubic yards were removed in the last six years of mining, the proposal to continue is based on an expectation of another 250,000 cubic yards without increasing area or depths below those specified in the permit. A draft reclamation plan was provided showing excavation of the upstream, southern end to match the pond depth, potentially creating a connection to the pond. Other possibilities shown were connecting to an adjacent slough if property boundaries allow, and fully connecting the downstream backwater. A final reclamation plan remains to be specified. The plan to mitigate lost habitat elements will be developed by applicant in cooperation with NOAA Fisheries.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

The UWR chinook salmon evolutionarily significant unit (ESU) includes native spring-run populations above Willamette Falls and in the Clackamas River. In the past, it included sizable numbers of spawning salmon in the Santiam River, the Middle Fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek.

The total run sizes reported for UWR spring chinook since 1970 have ranged from 30,000 to 130,000, with the 2000 to 2002 runs in the range of 60,000 to 80,000. In 2002, fishery counts showed a rate of 77% for marked fish through June. Hence, approximately 23% of the 2002 forecasted run size of 74,000 results, or approximately 17,000 were natural spawners in the Willamette basin (ODFW 2002). Marking of hatchery releases with an adipose fin clip reached 100%, beginning with those released in 1998 (S. King, ODFW, personal communication with A. Mullan, NOAA Fisheries, 28 October 2002, email). This enables the catch and release fishery to identify and keep only hatchery fish.

Historically, the Middle Fork Willamette, which splits off from the Coast Fork at river mile 187, (11 miles above the gravel extraction site) was one of the major natural production areas for spring chinook in the Upper Willamette basin. Mattson (1948) estimated the spring chinook run of the Middle Fork subbasin to be 2550 fish in 1947, accounting for 21% of the spawning population above Willamette Falls. Following dam construction, naturally-produced fish were believed to be a small percentage of the returning adults in the Middle Fork Willamette. In 1993, ODFW began outplanting excess adult hatchery spring chinook above the Corps of Engineers facilities in the Middle Fork Willamette subbasin, beginning above the Hills Creek reservoir with between 177 to 796 fish in the mid-1990s. Since 1998, hatchery spring chinook were outplanted above the Fall Creek Reservoir, in Little Fall Creek and in the north fork of the Middle Fork Willamette (G. Taylor, COE, personal communication with A. Mullan, NOAA Fisheries, 9 August 2002, email).

Fish in this ESU are distinct from those of adjacent ESUs in life history and marine distribution. The life history of chinook salmon in the UWR ESU includes traits from both ocean- and stream-type development strategies. Coded wire tag (CWT) recoveries indicate that the fish travel to the marine waters off British Columbia and Alaska. More Willamette fish are recovered in Alaskan waters than fish from the Lower Columbia River ESU. UWR chinook salmon mature in their fourth or fifth years. Historically, 5-year-old fish dominated the spawning migration runs, but recently, most fish have matured at age 4. The timing of the spawning migration is limited by Willamette Falls. High flows in the spring allow access to the upper Willamette basin, whereas low flows in the summer and autumn prevent later-migrating fish from ascending the falls. The low flows may serve as an isolating mechanism, separating this ESU from others nearby.

The Willamette River once had extensive rearing habitat for juveniles in the numerous side channels. Such off-channel areas serve as refugia and over-wintering habitat for UWR chinook salmon. Human activities have affected the salmonid populations in the Willamette River drainage. The Willamette River, once a highly braided river system, has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat by as much as 75%. In addition, the construction of 37 dams in the basin has blocked access to over 400 miles of stream and river spawning habitat. The dams also alter the temperature regime of the Willamette and its tributaries, affecting the timing and development of naturally-spawned eggs and fry. Water quality is affected by development and other economic activities. Agricultural and urban land uses on the valley floor, as well as timber harvesting in the Cascade and Coast ranges, contribute to increased erosion and sediment load in Willamette River basin streams and rivers. Finally, since at least the 1920s, the Willamette River has suffered municipal and industrial pollution.

Hatchery production in the basin began in the late nineteenth century. Eggs were transported throughout the basin, resulting in current populations that are relatively homogeneous genetically, although still distinct from those of surrounding ESUs. Hatchery production continues in the Willamette River, with an average of 8.4 million smolts and fingerlings released each year into the main river or its tributaries between 1975 and 1994. Hatcheries are currently responsible for most production in the basin.

Harvest on this ESU is high, both in the ocean and in river. The total in river harvest below the falls from 1991 through 1995 averaged 33%, and was much higher before then. Ocean harvest was estimated as between 19-33% since 1982. ODFW (1998) indicates that total (marine and freshwater) harvest rates on UWR spring-run stocks were reduced considerably for the 1991 through 1993 brood years, to an average of 21%. Before full marking of hatchery fish with an adipose fin clip, harvest occurred on both wild and hatchery fish. Current regulations allow only marked fish to be retained.

For the UWR chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 1.01 to 0.63, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

In 2003, the Biological Review Team (BRT) convened by NOAA Fisheries provided updates on the status of listed salmon ESUs, using recent spawner abundance and hatchery fractions from marking studies (BRT 2003). Their report provides some updated information on this ESU. All spring chinook in the ESU, except those entering the Clackamas River, must pass Willamette Falls.

The BRT reviewed data of seven historical spring chinook populations. For the Middle Fork Willamette they noted that survey results from 2002 showed 64 redds in 17 miles of the mainstem Middle Fork with 77% of carcasses fin-clipped, and 171 redds in 13.3 miles of the Fall Creek tributary, with 39% of carcasses fin-clipped. They noted that the fin-clip recovery fractions tend to underestimate hatchery spawners for spring chinook. While lacking an assessment of the ratio of hatchery-origin to wild-origin chinook passing the falls, the hatchery-origin fish were described as dominating the runs (BRT 2003).

The basis for a large number of spring chinook released in the Upper Willamette is for mitigation for the loss of habitat above Federal dams. While harvest retention is only allowed for hatchery marked fish, take of natural spawners from hooking mortality and non-compliance also occurs. Overall, the hatchery production is considered a potential risk, because it masks the productivity of natural population, inter-breeding between hatchery and natural fish poses potential genetic risks and the incidental take from the fishery promoted by the hatchery production can increase adult mortality. The Middle Fork population was not considered self-sustaining, and the current to historical habitat ratio reported was 46 for the Middle Fork.

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 C.F.R. Part 402 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps: (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; (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. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the 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.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA 7(a)(2) to listed species is to define the biological requirements of the species 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 UWR chinook salmon for ESA protection and also considers new data available that are relevant to the determination (Myers et al. 1998).

The relevant biological requirements are those necessary for UWR chinook salmon to survive and recover to naturally reproducing population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful rearing and migration. Although escapement of UWR chinook salmon into the Upper Willamette River basin has slightly increased in past decade, the longer term trend is decline. The status of the UWR chinook salmon, based on their risk of extinction, has not significantly improved since the species was listed.

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,[1] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). PFC, then, constitutes the habitat component of a species' biological requirements. Upper Willamette River spring chinook survival in the wild depends upon 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 and holding, spawning, incubation, migration, over-wintering, juvenile out-migration, and smoltification. Essential habitat features of migration and juvenile rearing areas are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food; (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 C.F.R. 226). The essential features this proposed project may affect are: (1) Substrate; (2) water quality; (3) water temperature; (4) cover/shelter; (5) food; (6) riparian vegetation, and (7) safe passage conditions.

2.1.4 Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or its habitat and ecosystem within the action

[1] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

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 involved in the action (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect affects may occur throughout the watershed where actions described in this opinion lead to additional activities or affect ecological functions contributing to stream degradation.

For this consultation, the action area includes the gravel mining pit, the streambanks of the Willamette River from just above the upstream limit of the proposed action, and downstream to its confluence with the McKenzie River. The action area serves as rearing habitat for juveniles and a migration corridor for both adult and juvenile salmonids. Peak juvenile migration periods for chinook are in the spring, with abundant populations found through June (personal communication, N. Taylor, ODFW to A. Mullan, NOAA Fisheries, email September 23, 2002). Adults use the mainstem for migration, while juveniles use the mainstem and tributaries for rearing and migration.

The Willamette River has been dramatically simplified through channelization and dredging, reducing the braided features that provided shoreline rearing habitat. The dams upstream of this area are on the Middle Fork and Coast Fork of the Willamette. As well as blocking access, they alter the flow and temperature regime affecting the timing of development of naturally-spawned eggs and fry. Further, the dams entrain sediment from the upper reaches. Agricultural and urban land uses and timber harvesting in these watershed increase erosion and sediment load in basin streams and rivers.

Comparing the sediment load pre- and post-reservoir construction in a research report, Laenen (1995) noted that samples post-reservoir were composed of finer material, with an increase in average suspended sediment percent finer than 62 micrometers from 62% to 85% for the Willamette River at Salem.   He also calculated the percent of total sediment load as bedload for annual high flow exceedence probability of 50%, or two-year events. He showed only 4% for the station downstream near the McKenzie confluence, and 1.7% at the Coast Fork Willamette River near Goshen (upstream of the site), but 18% for the Willamette downstream at Harrisburg, at river mile 161. He noted that annual sediment loads are likely to have decreased along with the reduced peak streamflows post-reservoir and dam construction. These lower peak flows prevent meandering, bank undercutting, and deposition of materials mid-river, leaving a ‘single thread’ river with few islands or off-channel areas, as seen in the Upper Willamette and lower McKenzie in the vicinity of the area (Andrus *et al.* 2000). This also limits the variability in substrate size in the main channel, which reduces spawning and rearing opportunities.

The Willamette Restoration Initiative also noted that dams changed erosion processes in the Willamette by trapping sediment, which may have been replaced by increased erosion downstream of dams. Because of the concentration of flows into a single channel, the erosive power increased, contributing to bank erosion and loss of riparian vegetation during flood events. They also note that this has led to reduced channel complexity, with a diminished capacity to support native fish, absorb the impacts of erosion and flooding, and filter contaminants. The effects of changes to river channel complexity can be seen in the reaches between Eugene and Corvallis, where an estimated 84% of channel area has been lost (WRI 2001).

Gravel production in Oregon rose between 1940 and 1990 (Spence *et al.* 1996); however, gravel mining activity peaked during the 1960s and early 1970s with construction of the Green Peter and Foster dams (OWRRI 1995). The majority of river gravel mining occurs in the Willamette Valley. Between 1967 and 1994, over 50,000,000 cubic yards were permitted for removal in the Willamette Valley (OWRRI 1995).

Floodplain gravel mines in the vicinity of the action area were covered in the 1996 flood. Some of the mine owners subsequently placed riprap along their banks. The area mined at Ayres Bar is across from a lengthy riprapped bank.

Dedrick Slough joins the Willamette River just south of Ayres Bar area. Excavation of high spots in the Slough will allow increased seasonal connectivity in conjunction with restoration work done in the Delta Ponds area to the south, scheduled for completion by the City of Eugene in conjunction with the Army Corps of Engineers in 2003. One goal of the Delta Ponds restoration project is to reconnect the previously mined pond system to the Willamette River for fish passage and juvenile UWR chinook salmon rearing.

Oregon's Department of Environmental Quality (ODEQ), in consultation with the U.S. Environmental Protection Agency (EPA), is responsible for maintaining the Clean Water Act 303(d) list of steam segments that do not meet water quality standards, and for developing implementation plans (using Total Maximum Daily Loads goals) necessary to achieve those standards. The Willamette River between the McKenzie and Coast/Mid Forks is listed as water quality limited[2] for temperatures because 36% of summer values exceed the rearing temperature criteria of 64° F. It is also 303(d) listed for toxics, specifically mercury (ODEQ 2002).

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[2] DEQ compiles the 303 (d) list using existing scientific data and best professional judgment to assess water quality and determine which waterbodies should be listed. If available data indicates a waterbody is not meeting water quality standards, and the data meets listing guidelines, then DEQ must assume that the stream is *water quality limited*.

2.1.5 Analysis of Effects

Direct effects result from the agency action and may include effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. 402.02). Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action.

The direct and indirect effects resulting from the action covered by this permit could include: (1) Loss of riparian functions; (2) increases in turbidity pursuant to the mining activities; (3) disruption of species life stage functions due to in-water work; (4) introduction of pollutants into waterbodies; (5) increased predation on juvenile salmonids; (6) modification of stream morphology; and (7) entrapment of juvenile salmonids.

2.1.5.1 Direct Effects of the Proposed Action

Front-end loader or scrapers are used for excavation at this site. Some of the adverse impacts to fish and habitat noted by the NOAA Fisheries National Gravel Extraction Policy (1996) authors included loss or degradation of juvenile rearing habitat; channel widening, shallowing, and ponding; loss of hydrologic and channel stability; loss of pool/riffle structure; increased turbidity and sediment transport; increased bank erosion and/or stream bed downcutting; and loss or degradation of riparian habitat.

<u>Loss of riparian functions</u>
Riparian habitats are one of the most ecologically-productive and diverse terrestrial environments. Vegetation in riparian areas influences channel processes by stabilizing bank lines through root reinforcement, providing and retaining large woody debris (LWD), providing organic material inputs (*e.g.,* leaf litter), terrestrial organisms that are preyed upon by fish, and providing shade that regulates light and temperature regimes (Kondolf *et al.* 1996, Gregory *et al.* 1991). In addition, riparian vegetation and LWD can provide low velocity shelter habitat for fish during periods of flooding. Instream LWD provides similar habitat at all flow levels, as well as shelter from predators, habitat for prey species, and the sediment storage and channel stability attributes described above (Spence *et al.* 1996). The manipulation of vegetation and LWD associated with excavation and stockpiling in riparian areas and in stream channels can change their characteristics in ways which would tend to adversely affect fish. Short-term effects on vegetation include the destruction or removal of vegetation and LWD; temporary burial by stockpiled material; temporary displacement of LWD; and trimming, mowing, and scraping of

vegetation. Long-term effects include permanent, or near-permanent, displacement of habitat for vegetation through paving, armoring, or maintenance of utility corridors. Revegetation of areas disturbed by construction activities will maintain or improve habitat conditions within the action area by potentially increasing plant densities in degraded areas over time. While the floodplain gravel pit reduces riparian vegetation, in high flows the pit may provide some velocity refuge functions (Schnitzer *et al.* 1999).

Turbidity

At moderate levels, turbidity can adversely affect primary and secondary productivity. At high levels, turbidity can injure and kill adult and juvenile fish. Turbidity might also interfere with feeding (Spence *et al.* 1996). 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). Local increases of turbidity during in-water work will likely displace fish in the project area and disrupt normal behavior.

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. Adult and larger juvenile salmonids 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, 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).

Elevated total suspended solids (TSS) conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the season, frequency and the duration of the exposure. Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (Scannell 1988, Servizi and Martens 1991).

Fish that remain in turbid, or elevated TSS, waters can experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In systems with intense predation pressure, this provides a beneficial trade-off as enhanced survival at the cost of potential physical effects, like reduced growth. Turbidity levels of about 23 Nephalometric Turbidity Units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993).

Direct mortality from turbidity associated with proposed activities is unlikely because the turbidity should be local and brief, and because the work site will be isolated from the river during the mining period due to lower water levels in the pit than in the river.

Disruption of life stage functions
Based on migratory and rearing timing, it is likely that adult and juvenile life stages are present in the action area when activities would be carried out. In larger rivers, chinook fry are expected to migrate at the edges of the river, rather than in the high velocity water near the center of the channel. At night chinook have been found to move inshore to quiet water over sandy substrates or into pools and settle to the bottom, but returning to occupy the same riffle and glide areas that they had occupied on the previous day (Healey, in Groot and Margolis 1991). This type of fish movement back and forth may be affected when high water connects the pit to the river, but excavation will take place when the pit is at lower water levels than the river and so should not affect fish movement at other times.

Pollution
Operation of the excavators requires the use of fuel, lubricants, and other petroleum products, which, if spilled into the bed or channel of a water body or into the riparian zone of a waterbody during construction could injure or kill aquatic organisms. Dredging and excavation activities have the potential to resuspended bedded contaminants or unearth buried contaminants adhered to sediment and soil particles. Once delivered into the waterbody, those contaminants act a new sources to benthic invertebrates and fish. The suspended, contaminated particles can resettle onto a new site, affecting a previously undisturbed benthic population, or be taken up directly or indirectly by fish. However, upland contained areas should produce little runoff because no washing is done at the site and the mined material is removed for use directly due to the clean nature of the deposit.

Predation
Juvenile chinook salmon use backwater areas during their outmigration (Parente and Smith 1981). The presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior and resulting in less growth (Dunsmoor et al. 1991). When a salmon stock suffers from low abundance, predation can contribute significantly to its extinction (Larkin 1979). Further, providing temporary respite from predation may help to increase Pacific salmon populations (Larkin 1979). Piscivorous fish use four major predatory strategies: Run down prey; ambush prey; habituate prey to a non-aggressive illusion; or stalk prey (Hobson 1979). Ambush predation is probably the most common strategy. Predators lie in wait, then dart out at the prey in an explosive rush (Gerking 1994). Predators may use sheltered areas that provide slack water to ambush prey fish in faster currents (Bell 1991).

2.1.5.2 Indirect Effects

Morphological channel changes
Because floodplain pits can become part of the active channel on a time scale of decades, they can be considered as being potentially instream. In cases where large upstream reservoirs can completely control even large floods (such as the 100-year flood), floodplain mining could be

considered geomorphically isolated from the active channel because the risk of avulsion is greatly reduced (Kondolf 1994). Gravel removed from the proposed pit will change sediment delivery during the high water connections (OWRRI 1995).

Bank and substrate stability influence structural elements of instream habitat such as pool depth, channel roughness, and bank slope. Because these structural habitat elements are related to key factors in the distribution of water velocity and the amount of overhead cover, changes in the type and structure of substrate and banks can affect predation risk, energy expenditure, invertebrate production, and feeding efficiency. Excavation, stockpiling, and vegetation manipulation within the riparian area may change the substrate or gradient of the water body and/or to destabilize the banks of water bodies. Stockpiled excavated material, if not removed from stream beds or banks, could also affect stream morphology, as could vegetation and LWD manipulation which destabilizes stream beds and banks. Reclamation is intended to mitigate these effects by minimizing their potential.

If removal of sediment is in excess of flux away from upstream transport, gravel delivery to downstream areas will be reduced, and may result in channel degradation. Other effects arise from flow pattern changes due to the modifications to the riverbed and excess suspended sediment. Land access and material storage could adversely affect riparian zones and some bank protection works are likely to influence riparian systems beyond the immediate work area (OWRRI 1995).

The pit may be captured as part of the active channel if the berm were breached, but with the depth restricted to 20 feet, similar to the river depth in the area, this could mimic a natural channel in the river. Protection of the upstream buffer area reduces this possibility. However, if this occurs as part of a post-mining reclamation plan, the old pit may become a valuable side-channel habitat. In a review on the effects of flooding on gravel pits during the 100-year event of 1996, sites where floodwater backed in from the downstream end generally were least damaged (Schnitzer *et al.* 1999). The opposite bank is extensively hardened, and concrete rubble just has been placed upstream of this site, modifying the flow path and floodplain connectivity. Channel connections to shallow backwater habitats created by periodic flooding and upwelling groundwater are reduced in the area by similar bank treatments, making the reclamation of this site as habitat highly desirable.

<u>Entrapment</u>

Because the floodplain pit intersects the water table for at least part of the year, it functions as an open-water pond (Kondolf *et al.* 2001). Ponded water may strand or entrap fish carried into the pit from the main channel during high water events. Bayley (2001) reported radiotagging study results that showed four- to seven-inch fish take refuge in freshwater channels in the floodplain during flooding with potential for trapping and predation. Gravel excavation pond conditions include eutrophication, high temperatures, and predation from Northern pike minnows, osprey, and eagles. Large wood is important to provide cover for protection from predation and shade in the ponds. Bayley also noted that many egresses are proposed for average hydrological conditions from November 1 to June 1, or for 50% connected at mean levels, but that salmonids did not use the egress at low water levels. Later work (Bayley 2003) described the importance of channel features which are periodically inundated, particularly those with dimensions similar to river pools at low water.

Reclamation effects

If the area is left in a state that mimics natural conditions, allowing high water events to access the reclaimed area, but not avoiding channel capture, floodplain habitat could be improved. Given the reduction from altered hydrology and channelization, reclamation of this site presents an opportunity. The final design of the reclamation will determine the effectiveness of this approach. A reclamation plan will require some time to complete and be approved, consequently the permit will initially allow excavation over the following two years while the plan is finalized.

2.1.5.3 Cumulative Effects

Cumulative effects are defined in 50 C.F.R. 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." Other activities within the watershed have the potential to impact fish and habitat within the action area. 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.

Non-federal activities within the action area are expected to increase with a projected 34 percent increase in human population over the next 25 years in Oregon (Oregon Department of Administrative Services 1999). 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.

2.1.6 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. NOAA Fisheries has determined that, when the effects of the proposed Ayres Bar Excavation Project 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 UWR chinook salmon. NOAA Fisheries used the best available scientific and commercial data to apply its jeopardy analysis when analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. If juvenile UWR chinook salmon are present in the pit during excavation activities, some direct mortality could result from stranding or from direct contact with equipment. The level of direct mortality is expected to be minimal and would not result in jeopardy.

These conclusions are based on the following considerations: (1) The addition of an egress channel will minimize potential for entrainment; (2) the proposed riparian buffer will reduce potential for riparian vegetation losses; (3) downstream movement of sediment into the Willamette River is expected to be minimal because of the timing and method of excavation; (4) the proposed reclamation plan, when approved and implemented, will allow natural functions of the river to restore habitat values; and (5) the proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired 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.

2.1.7 Conservation Recommendation

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of proposed actions on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. NOAA Fisheries has no additional conservation recommendations regarding the action addressed in this Opinion.

2.1.8 Reinitiation of Consultation

Reinitiation of consultation is required if: (1) The action is modified in a way that causes an effect on the listed species that was not previously considered in the BA and this Opinion; (2) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or, (3) a new species is listed or critical habitat is designated that may be affected by the action (50 C.F.R. 402.16).

2.2 Incidental Take Statement

Section 9 and rules promulgated under section 4(d) of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. “Harm” is further defined 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, and sheltering. “Harass” is defined as actions that create the likelihood of injuring listed species by annoying it to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. "Incidental take" is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

2.2.1 Amount of Extent of Take

NOAA Fisheries anticipates that certain site-specific activities associated with gravel extraction and alcove opening called for by this proposed action are reasonably certain to result in incidental take of UWR spring chinook salmon. UWR spring chinook salmon may be adversely affected during the gravel extraction, but the negative effects are expected to be short-term and local. 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 itself. In instances such as this, NOAA Fisheries designates the expected level of take as unquantifiable.

Based on the information provided, NOAA Fisheries anticipates that an unquantifiable but low level of incidental take can occur as a result of the action covered by this Opinion. In the accompanying Opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species. The extent of the take is limited to UWR chinook salmon in the Willamette River and to the associated riparian and aquatic habitats in the action area as defined in section 2.1.4 of this Opinion.

2.2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order 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 applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms added to the document authorizing this action, 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 the following reasonable and prudent measures are necessary and appropriate to minimize the likelihood of take of listed fish resulting from implementation of this Opinion.

The Corps shall:

1. Minimize the likelihood of incidental take from removing gravel by ensuring that the work area is isolated from flowing water, and ensuring work is timed to avoid harming vulnerable salmonid life stages

2. Minimize the likelihood of incidental take associated with impacts to riparian and instream habitats by avoiding or replacing lost riparian and instream functions.

3. Monitor the effectiveness of the proposed action in achieving the stated purpose and the effectiveness of conservation measures in minimizing incidental take and report annually to NOAA Fisheries.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (in-water work), the Corps shall ensure that:

    a. All work within the gravel pit that could potentially contribute sediment or toxicants to downstream fish-bearing systems will be monitored to maintain turbidity below the ODEQ required limits of no more than one hour of turbidity at 10% above background.

    b. During gravel removal the work area is well isolated from the active flowing stream behind the 30-foot-wide berm, to maximize the potential for sediment entrainment, other than at the downstream alcove.

    c. Pollution and Erosion Control Plan. A Pollution and Erosion Control Plan will be prepared and carried out to prevent pollution related to operations. The plan must be available for inspection on request by Corps or NMFS.

        i. Plan Contents. The Pollution and Erosion Control Plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

            (1) Practices to prevent erosion and sedimentation associated with access roads, haul roads, equipment and material storage sites, fueling operations and staging areas.

(2) A description of any hazardous products or materials that will be used in the operations, including procedures for inventory, storage, handling, and monitoring.
(3) A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.
(4) Practices to prevent construction debris from dropping into any stream or water body, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

2. To implement reasonable and prudent measure #2 (riparian and instream habitats), the Corps shall ensure that:

a. Gravel removal completed under this consultation is authorized for 2003 and 2004 only, with any further excavation to occur after the reclamation plan is approved (see f. below).
b. A channel opening of sufficient depth and width to provide egress to the downstream backwater area shall be created before excavation begins.
c. Material removed during gravel extraction will only be placed in locations on site where it cannot enter sensitive aquatic resources.
d. No existing trees within 150 feet of the edge of bank will be removed.
e. Any woody debris moved during gravel extraction or channel excavation will be re-deposited onsite.
f. A draft reclamation plan is submitted by September 1, 2004, for approval by NOAA Fisheries, that includes the following information:
i. A description of actions that will be taken to
(1) Protect and improve water quality and fish habitat in the upper Willamette River
(2) create diverse and complex wetland and open water habitat in the project area;
(3) control non-native, predaceous fish populations;
(4) restore riparian and shallow water habitats areas
ii. The name and address of the party(s) responsible for meeting each component of the reclamation plan.
iii. Performance standards for determining compliance.
iv. Any other pertinent requirements such as financial assurances, real estate assurances, monitoring programs, and the provisions for short and long-term maintenance of the reclaimed site.

v. A provision for Corps certification that all action necessary to carry out each component of the restoration or mitigation plan is completed, and that the performance standards are achieved.

3. To implement reasonable and prudent measure #3 (monitoring and reporting), the Corps shall ensure that:

a. Within 30 days of completing the project, the Corps will submit a monitoring report to NOAA Fisheries describing the success meeting their permit conditions. This report will consist of the following information.

i. Project identification.

(1) Project name.

(2) Starting and ending dates of work completed for this project.

(3) Corps contact person.

(4) Monitoring reports shall be submitted to:
NOAA Fisheries
Oregon Habitat Branch, Habitat Division
Attn: 2001/01174
525 NE Oregon Street, Suite 500
Portland, OR 97232-2778

ii. A report of any capture and release activity must include:

(1) The name and address of the supervising fish biologist.

(2) Methods used to isolate the work area and minimize disturbances to ESA-listed species.

(3) Stream conditions before and following placement and removal of barriers.

(4) The means of fish removal.

(5) The number of fish removed by species.

(6) The location and condition of all fish released.

(7) Any incidence of observed injury or mortality.

iii. Photographic documentation of environmental conditions at the project site and compensatory mitigation site(s) (if any) before, during and after project completion.

(1) Photographs will include general project location views and close-ups showing details of the project area and project, including pre- and post construction.

(2) Each photograph will be labeled with the date, time, photo point, project name, the name of the photographer, and a comment describing the photograph's subject.

(3) Relevant habitat conditions include characteristics of channels, streambanks, riparian vegetation, flows, water quality, and other

visually discernable environmental conditions at the project area, and upstream and downstream of the project.

b. NOTICE. If a dead, injured, or sick endangered or threatened species specimen is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling sick or injured specimens to ensure effective treatmen,t and in handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. The finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

3. MAGNUSON-STEVENS ACT

3.1 Background

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

3.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: '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 (50CFR600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- 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;
- NOAA Fisheries shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall 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 the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.3 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus 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 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), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.4 Proposed Actions

The proposed actions are detailed above in section 1.2. The action area is defined as the gravel mining pit, and the streambanks of the Willamette River from just above the upstream limit of the proposed action to the downstream confluence with the McKenzie River. This area has been designated as EFH for various life stages of chinook and coho salmon.

3.5 Effects of Proposed Action

As described in detail in section 2.1.5, Analysis of Effects, the proposed activities will result in detrimental short- and long-term adverse effects to a variety of habitat parameters. These impacts include short-term impacts from potential entrapment and turbidity, and long-term potential adverse effects of changes in streambank stability.

3.6 Conclusion

NOAA Fisheries believes that the proposed action will adversely affect the EFH for chinook and coho salmon.

3.7 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. The conservation measures proposed for the project by the Corps, all reasonable and prudent measures and the terms and conditions contained in sections 2.2.2 and 2.2.3, respectively, are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.8 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts 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.

3.9 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).

4. LITERATURE CITED

Section 7(a)(2) of the ESA requires biological opinions to be based on the best scientific and commercial data available. This section identifies the data used in developing this Opinion.

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