UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

AUG 5 2002

A.R. No. 151422SWR96AR51

Lieutenant Colonel Michael McCormick
U.S. Army Corps of Engineers
San Francisco District
333 Market Street
San Francisco, California 94105-2197

RE: File Number 22152N - Third Amendment of the Biological Opinion for the Letter of Permission Procedure, Gravel Mining and Excavation Activities Within Humboldt County (LOP 96-1)

Dear Colonel McCormick:

Enclosed is the third amendment to the May 1, 2000, Biological and Conference Opinion (Opinion) for the Letter of Permission Procedure for Gravel Mining and Excavation Activities within Humboldt County, California (LOP 96-1), (first amendment dated September 6, 2000; second amendment dated July 5, 2001). On June 27, 2002, the National Marine Fisheries Service (NOAA Fisheries) received your request to amend the Opinion and Incidental Take Statement (ITS) for the LOP 96-1 procedure (letter from C. Fong, U.S. Army Corps of Engineers (Corps), to R. McInnis, NOAA Fisheries, dated June 25, 2002). The enclosed amendment responds to your request to extend the duration of the proposed action, and to change the proposed action by eliminating the Security East gravel bar site on the Hoopa Valley Indian Reservation. The enclosed amendment supplements the Opinion prepared in 2000 with new information and analysis of effects of the proposed action. The amendment concludes that continuation of LOP 96-1 for one additional mining season is not likely to jeopardize the continued existence of Southern Oregon/Northern California Coast (SONCC) coho salmon, Central California (CC) Chinook salmon, or Northern California steelhead, or destroy or adversely modify SONCC coho salmon designated critical habitat.

The enclosed amendment responds to the second extension of LOP 96-1 by the Corps. Because a 1-year proposed action and associated consultation do not address the long term effects of the proposed action, NOAA Fisheries will not consult on another 1-year proposed action for gravel mining and associated activities in Humboldt County. Before the 2003 mining season, NOAA Fisheries expects the Corps to issue a 5-year proposed action for gravel mining and associated activities in Humboldt County. NOAA Fisheries has 135 days to complete formal section 7

consultation [50 CFR § 402.14(e)]. The 135-day time period for formal consultation begins after NOAA Fisheries has accepted a final Biological Assessment (BA) from the action agency. In order to avoid delays in the 2003 mining season, a final BA should be accepted by NOAA Fisheries prior to December 15, 2002.

Preliminary results of our analysis of the effect of gravel mining on salmonid habitat indicate that a minimum 1-foot vertical offset from the low flow water surface elevation may not be adequate to protect listed salmonids on some mining sites in Humboldt County. NOAA Fisheries is in the process of refining these analyses and integrating them into a scientific report. We will circulate that report for review over the next few months and finalize it before November 15, 2002. NOAA Fisheries expects to utilize the findings and results of this report to analyze the effects of gravel mining in Humboldt County over the next 5 years. NOAA Fisheries also anticipates that the Corps will consider the findings and results of this report in the next LOP and final BA.

Regarding the Corps' comment on time extensions to the end of the mining season on October 15, LOP 96-1 states that regrading must be completed, and that gravel extraction ceases by October 15, unless an extension is granted by the Corps. In addition, the terms and conditions of our 2000 Opinion and its amendments state that time extensions to the operating season require prior approval by NOAA Fisheries before an extension is authorized by the Corps.

Additional monitoring requirements have been included as terms and conditions of the amended ITS, in order to continue to measure the implementation and effectiveness of project minimization measures of LOP 96-1, and to track changes in channel morphology and habitat quality. Other new terms and conditions of the amended ITS include project design features, and additional reporting requirements. The terms and conditions of the enclosed ITS are expected to be included as a requirement of the Corps' annual Letter of Modification which is issued to applicants utilizing the LOP procedure, so that all applicants are aware of the new requirements. Although the third amendment is a supplement to the 2000 Opinion, the enclosed ITS is inclusive, thus the Corps should attach the enclosed ITS, and not previous documents, to the annual Letter of Modification.

If you have any questions please call Ms. Leslie Wolff of the Arcata Field Office at (707) 825-5172.

Sincerely,

Rodney R. McInnis
Acting Regional Administrator

Enclosure

cc: Calvin Fong, U.S. Army Corps of Engineers
Jane Hicks, U.S. Army Corps of Engineers
Kelley Reid, U.S. Army Corps of Engineers
Carl Harral, California Department of Fish and Game
Randy Brown, U.S. Fish and Wildlife Service
Kirk Girard, County of Humboldt Planning Department
Doug Jager, CHERT
Randy Klein, CHERT
Bill Trush, CHERT
Andre Lehre, CHERT

Endangered Species Act - Section 7 Consultation

Amendment Three

to the Biological and Conference Opinion

Letter of Permission Procedure
Gravel Mining and Excavation Activities
within Humboldt County, CA
LOP 96-1

Action Agency
U.S. Army Corps of Engineers
San Francisco District

Consultation Conducted by
National Marine Fisheries Service,
Southwest Region

Date Issued: AUG 15 2002

TABLE OF CONTENTS

Consultation History

As described in the May 1, 2000, Opinion, National Marine Fisheries Service (NOAA Fisheries) originally issued a July 17, 1997 biological opinion on the LOP 96-1 procedure. Subsequently, the Corps requested that consultation be reinitiated (July 23, 1999, letter and information packet, from C. Fong, Corps, to W. Hogarth, NOAA Fisheries) based on designation of critical habitat, and the listing of additional salmonid species. This request resulted in the May 1, 2000, Opinion.

The Corps then requested (June 27, 2000 letter from C. Fong, Corps, to R. McInnis, NOAA Fisheries) that the Opinion be amended to add an additional mining site, to better describe an existing mining site, and to clarify terms and conditions of the ITS. The Opinion was amended (September 6, 2000 letter from R. Lent, NOAA Fisheries, to C. Fong, Corps), which included an amended ITS.

Although we expected that the Corps would issue a new LOP procedure for gravel mining activities, on June 29, 2001 the Corps extended the expiration date of LOP 96-1 to October 31, 2001, and requested an amendment to the duration of the 2000 Opinion. As described in LOP 96-1, the Corps included the option of extending the LOP authorization for up to one year past the original August 19, 2001 expiration date. The Corps utilized the extension option in order to provide continuity to the permitting process through the 2001 gravel mining season. NOAA Fisheries responded to the first extension of LOP 96-1 with our second amendment (dated July 5, 2001) to the 2000 Opinion. Our second amendment analyzed the extended duration of the proposed action, and the addition of two mining sites to the action area.

NOAA Fisheries began working with the Corps, other agencies, and Humboldt County gravel operators and their consultants during the winter of 2001-2002 on a replacement LOP procedure (draft LOP 02-1) for 2002 through 2007. On April 2, 2002 the Corps issued a public notice for the draft LOP 2002-1 for gravel mining activities in Humboldt County. LOP 2002-1 was intended to supercede LOP 96-1, which has been used by the Corps to authorize gravel mining activities between 1996 and 2001. The public comment period for the draft LOP 2002-1 ended May 2, 2002, and shortly thereafter it was apparent that many issues regarding the proposed action could not be resolved prior to the 2002 mining season. Following discussions with the Humboldt County gravel operators, NOAA Fisheries, and the U.S. Fish and Wildlife Service (USFWS), the Corps decided to further extend LOP 96-1 (Public Notice File Number 22152N, June 12, 2002) in order to provide an authorization process for the 2002 gravel mining season, and to allow additional time to resolve issues regarding the draft LOP 2002-1. In the June 12, 2002 public notice for extension of LOP 96-1, the Corps stated that they anticipate that LOP 2002-1 will be implemented prior to the 2003 gravel extraction season.

NOAA Fisheries also expects that a new LOP will be implemented prior to the 2003 gravel extraction season. In a May 1, 2002 letter, NOAA Fisheries provided the Corps comments on the draft LOP 2002-1, and many of the comments addressed critical issues of the proposed action. As suggested in the May 1, 2002 letter, NOAA Fisheries met with the Corps on May 14, 2002 to discuss the comments. At this meeting the Corps agreed to provide NOAA Fisheries the

opportunity to review and comment on the Corps' next draft of LOP 2002-1, prior to the issuance of a public notice for a final proposed action.

In its June 25, 2002 letter, the Corps requested that NOAA Fisheries amend its 2000 Opinion once again, in response to the further extension in duration of LOP 96-1, and eliminate the Security East gravel bar site. Although the end of the gravel mining season is October 15, with extensions possible based on weather and approval by NOAA Fisheries, the Corps has extended LOP 96-1 until December 31, 2002 in order to encompass post-extraction activities, such as the preparation and submitting of reports required by LOP 96-1 for the 2002 season.

The 2000 Opinion contains an analysis of the effects of the proposed action from May 1, 2000 through May 1, 2001, due to the original expiration of the LOP 96-1 procedure on August 19, 2001, (the middle of the gravel mining season), and also due to expected additional information on the effects of gravel mining on listed salmonid species, and their habitat. Additional information, i.e., ongoing reviews by the Corps, contractors, and NOAA Fisheries internal analysis, was still being compiled during preparation of the second amendment. Although some of the additional information is now available for preparation of this third amendment, NOAA Fisheries is still waiting for other additional information. When there is a gap in the information base, NOAA Fisheries will formulate a biological opinion providing the benefit of the doubt to the species concerned with respect to such gaps in the information base [H.R. Conf. Rep. No. 697, 96th Cong., 2nd Sess. 12 (1979)]. Additional information shows that implementation of LOP 96-1 has the potential for effects to listed salmonids that were not analyzed in the 2000 Opinion. Continuation of LOP 96-1 until December 31, 2002 changes the project description, and effects of the action sections of the 2000 Opinion, as described in the following sections of this amendment. Additionally, there have been changes to the status of the species and environmental baseline since the second amendment, which are described below.

Project Description

Extension

The Corps is proposing to increase the project duration by one additional mining season. Project duration is one component of the effects analysis described in the 2000 Opinion. Additional information is utilized in this amendment to more fully analyze and understand the potential for effects from the extension of project duration. This increase in the potential for effects is explained in the "Effects of the Action" section of this amendment.

Change in the Action Area

In its June 25, 2002 letter, the Corps stated that the proposed action remains the same as for the 2001 gravel mining season with the exception of Security East Bar, which is not proposed for authorization by LOP 96-1 during the 2002 mining season. Security East Bar is located within the Hoopa Valley Indian Reservation, near the town of Hoopa, on the Trinity River. The Hoopa

Valley Tribe has applied for an individual permit from the Corps for Security East Bar. Security East Bar is removed from the proposed action for this amendment. Otherwise, the action area has not changed.

Extraction Methodologies That Could Be Implemented in 2002

LOP 96-1 describes gravel bar skimming and dry trenching as gravel extraction methodologies, however LOP 96-1 also states that other methods of excavation may be approved by the Corps. Other gravel extraction methods previously recommended by the County of Humboldt Extraction Review Team (CHERT), and authorized by LOP 96-1, include wetland pits, alcoves and "horseshoe" shaped skims. NOAA Fisheries expects that all of these gravel extraction techniques, i.e., bar skimming, dry trenching, wetland pits, horseshoe shaped skims, and alcove extractions could be implemented during the 2002 mining season. All extraction designs must still undergo the annual CHERT review and recommendation process.

Wetland pits are irregularly shaped excavations (to avoid riparian vegetation) located on the 3-to-7 year floodplain surface. An excavator digs out the sediment below the water table and leaves the sides of the pit sloped. Wetland pits allow for gravel extraction away from frequently inundated gravel bar surfaces, and most salmonid habitat features. Wetland pits were used on the Mad River in the early 1990s, prior to LOP 96-1, and have since filled in with sediment. As authorized by LOP 96-1, wetland pits were used on the Mad River and the Van Duzen River during the 2001 mining season, and may be used on these rivers, as well as other rivers, in 2002. The wetland pits excavated in 2001 range from having little ground water in them, to being filled with ground water and/or river water. Wetland pits will only fill with sediment during high flow events, on the order of every 3-to-7 years, and typically over a multi-year period.

As stated above, horseshoe shaped skims have been recommended by CHERT and authorized by LOP 96-1. However, locating the extraction area at a higher elevation on the bar surface, and excavating these horseshoe shaped skims to a greater depth, is an experimental gravel extraction method. Horseshoe shaped deep skims have been recommended by NOAA Fisheries and CHERT for implementation during the 2002 mining season. This method extracts gravel from the downstream portion of gravel bars, with large horizontal and vertical offsets from the low flow channel, and an opening to the channel at the most downstream end of the excavation. These areas are excavated to a depth above the water table, with steeper (3:1) slopes on the sides, and gentler (6:1) slopes at the head of the excavation. The large horizontal and vertical offsets remove the excavation area away from frequent flow inundation and are intended to minimize effects to listed salmonid species by disconnecting the mined surface from frequent flow inundation. Due to less frequent flow inundation, horseshoe shaped deep skims may take larger flow events to replenish than traditional skim designs depending on the unaltered bar height between the excavation and the stream.

Alcove extractions may also be authorized by LOP 96-1 during the 2002 mining season. This type of extraction is located on the downstream end of gravel bars, where naturally occurring alcoves form and may provide velocity refuge for juvenile salmonids during high flows, and

potential thermal refuge for juvenile salmonids during the summer season. Alcove extractions are irregularly shaped to avoid disturbance of riparian vegetation, and are open to the low flow channel on the downstream end to avoid stranding salmonids. Alcoves are extracted to a depth either above or below the water table, and are small in area, and volume extracted, relative to other extraction methods.

Gravel bar skimming and dry trenching are described in the 2000 Opinion. Gravel bar skimming is expected to be authorized by LOP 96-1 for many sites within the action area. Based on CHERT and interagency preliminary site visits, dry trenching is expected to be used more extensively in 2002 than in previous years of LOP 96-1. The dry trenching method of extraction may be shallow and stay above the water table, or deep and extend below the water table.

Biological Monitoring Requirements of LOP 96-1

The biological monitoring requirements of LOP 96-1, as described in the 2000 Opinion, were completed after three years of project implementation. The physical monitoring (e.g., cross sections and aerial photos) are on-going requirements of LOP 96-1. Cross sections, aerial photos, and pre- and post-extraction site visits will continue to be used to monitor compliance, and in some cases, may be used to monitor the effectiveness of project design features at minimizing the incidental take of listed salmonids.

Status of the Species

This amendment addresses the following Federally listed species, and designated critical habitat:

- Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*): threatened; 62 FR 24588 (May 6, 1997). Designated critical habitat: 64 FR 24049 (May 5, 1999).

- California Coastal (CC) Chinook salmon (*O. tshawytscha*): threatened; 64 FR 50394 (September 16, 1999).

- Northern California (NC) steelhead (*O. mykiss*): threatened; 65 FR 36074 (June 7, 2000).

All three species and designated critical habitat for SONCC coho salmon are found within the action area, except the Trinity River, where only SONCC coho salmon and SONCC coho salmon designated critical habitat are present.

Changes in Critical Habitat Designation

On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing the February 16, 2000, critical habitat designation for 19 ESUs of salmon and steelhead, which included the critical habitat designation for the California

Coastal (CC) Chinook salmon ESU. These critical habitat designations have been vacated until a more thorough economic analysis of the designation can be completed by NOAA Fisheries. Although there is no longer designated critical habitat for CC Chinook salmon, NOAA Fisheries will still consider whether take resulting from harm due to habitat modification is likely to occur, and whether that take of CC Chinook salmon would be likely to jeopardize the continued existence of the listed species. Thus, NOAA Fisheries will continue to analyze habitat impacts from proposed actions, and develop terms and conditions that minimize take by reducing habitat impacts. Critical habitat has not been designated for NC steelhead.

Environmental Baseline

The environmental baseline for the action area was described in the 2000 Opinion. Described below are changes to the environmental baseline since issuance of the 2000 Opinion.

Lower Van Duzen River

Bar skimming has been used as an extraction technique at the Leland Rock site, adjacent to the lower Van Duzen River, during many seasons of implementation of LOP 96-1. Bar skimming was utilized during the 2000 mining season, and the 2000-2001 winter flows provided very little gravel replenishment to the skimmed bars. In the spring of 2001, a reduction in channel confinement, resulting in shallow inundation of previously skimmed bars, and braided channel conditions were observed by NOAA Fisheries and CHERT both upstream and downstream of the Highway 101 Bridge at the Leland Rock site. Although the area downstream of the bridge is a delta formed at the confluence of the Van Duzen and Eel rivers, NOAA Fisheries thinks that the existing conditions, found both upstream and downstream of the bridge at this site, have likely been exacerbated by bar skimming. In response to the conditions found at the site in 2001, NOAA Fisheries recommended that a dry trench be utilized downstream of the bridge as the extraction technique for that mining season, and that a trench be designed to accommodate adult salmonid migration. Instead, bar skimming adjacent to the Eel River, upstream of the Van Duzen confluence, and a wetland pit extraction upstream of the bridge were authorized by the Corps for the 2001 mining season.

During November of 2001, NOAA Fisheries observed the loss of channel confinement, gravel bar inundation, and braided channel conditions during rising fall flows, and the stranding of 133 adult Chinook salmon that were caught at, and could not migrate through, shallow riffle locations at the Leland Rock gravel extraction site. Aggraded channel conditions, shallow riffles, and adult fish passage problems have been recognized previously. In November of 1996, stranding resulted in the mortality of 30 adult Chinook in the lower Van Duzen River (S. Downie, CDFG, pers. comm. 2002). However, bar skimming in this aggraded channel reach may have increased the potential for adult salmonid passage problems by further reducing gravel bar heights and decreasing channel confinement. The potential for stranding of adult Chinook salmon at this site was not fully analyzed in the 2000 Opinion.

The mortality of 133 adult Chinook in the Van Duzen River may represent loss of 10% of the spawning population of the Van Duzen River in 2001. Observations by CDFG indicate that approximately 1200 adult Chinook successfully migrated up the Van Duzen River in 2001 to spawn (Scott Downie, CDFG, personal communication). Although we do not have current Chinook salmon population estimates for the Van Duzen River, large numbers of adult Chinook were reported in the Eel River, in the Van Duzen River and its tributary Yager Creek, and in the Mattole River (Scott Downie, CDFG, personal communication), as well as in the Mad River and Redwood Creek (Michael Sparkman, CDFG, personal communication) during 2001.

Lower Mad River

Greater width-to-depth ratio has been observed by NOAA Fisheries at the gravel mining sites on the Mad River, compared with sites where gravel mining does not occur. Although the report that Knuuti (2001) prepared as proceedings for the Seventh Federal Interagency Sedimentation Conference contains preliminary information on geomorphic relationships and the sediment budget of the Mad River, his conclusions regarding the greater width-to-depth ratio in the gravel mining reach of the Mad River are not preliminary (Knuuti, personal communication 2002). He describes the lower Mad River as follows:

> "Our analysis of these relationships also indicated that the river has several extensive sections (primarily where the gravel operators mine) where the channel is much wider and shallower than other sections of the river and much wider and shallower than would be expected in a stable system. While we did not place much emphasis on the results of the meander radius of curvature to meander wavelength relationship we did consider the channel's high width to depth ratio to be significant. The extremely high width:depth ratio in sections of the lower Mad River is a primary result of gravel mining techniques."

The above description of the width-to-depth ratio in the gravel mining reach of the Mad River is included here to document the current condition of this portion of the action area.

In addition, bar skimming was implemented at Christie Bar on the Mad River in June and July of 2002 (prior to issuance of a Corps permit, or this amendment and the attached ITS). CHERT issued a recommendation for a narrow and long skim design in response to the braided channel conditions found at the site, in an attempt to accommodate mining while decreasing the potential for additional channel braiding. The skim is adjacent to the low flow channel, extends farther up and down the gravel bar than usual, and is narrower than usual. The description of this gravel extraction is included in this section to describe the environmental baseline of the lower Mad River, and to document the braided channel conditions found at this site. The high width-to-depth ratio and braided channel conditions found on the Mad River indicate that gravel extraction methods that tend to aggravate these conditions should be minimized.

Additional information on Chinook salmon spawning is also available for the Mad River from CDFG spawning survey field notes. On November 5, 2000, CDFG conducted a visual Chinook salmon spawning population estimate survey in the Mad River from Mad River Hatchery to Blue

Lake Bridge, and from Blue Lake Bridge to Highway 101. From Mad River Hatchery to Blue Lake Bridge, 40 redds were observed, and from Blue Lake Bridge to Highway 101, 102 redds were observed. On December 6, 2000, 13 redds were observed from Essex (located between Blue Lake Bridge and Highway 101) to Highway 101.

In summary, continued operations in 2000 may have contributed to maintenance of high width-to-depth ratios and braided channel conditions in the gravel mining reach of the Mad River, and lack of channel confinement and adult fish passage problems in the lower Van Duzen River. The 2000 Opinion summarizes the environmental baseline for the entire action area.

Effects of the Action

The location of the majority of mined gravel bars and extraction operations in Humboldt County are in alluvial reaches of mainstem rivers, or immediately downstream from the confluence of tributaries, and can affect spawning migration, redd survival, juvenile rearing, and smolt outmigration. Additional information (e.g., Knuuti 2001; Laird et al 2000) has provided a better understanding of the effects of gravel mining activities on geomorphic features and listed salmonid species since issuance of the 2000 Opinion. In particular, a better understanding of the effects of: (1) increased width-to-depth ratio; (2) gravel bars becoming inundated at lower flows due to loss of channel confinement after skimming; (3) hydraulic control provided by gravel bars confining the channel, which is necessary to create and maintain pools and riffles; and (4) increase in fine sediment introduced from previously skimmed surfaces during the months of November and December, on listed salmonids are discussed below. The effects of new extraction methods, and the incorporation of other new information, are also presented below.

Mortality During Active Mining Operations

The 2000 Opinion described that heavy equipment is allowed in the wetted, low flow channel only to construct and remove channel crossings, and that the use of heavy equipment in the low flow channel may result in the death of few juvenile salmonids due to the implementation of project design features. In order to better understand how channel crossings are constructed and removed, and the potential effects of these activities to listed salmonids, NOAA Fisheries observed channel crossing construction and removal over the past few years. NOAA Fisheries observed that heavy equipment may need to cross the channel more than once per construction and removal of each channel crossing.

In addition, CDFG has observed Chinook salmon redds built under, or very near to, channel crossing locations on the Mad River in September and October of 2001 (J. Froland, CDFG, pers. comm. 2001). Temporary channel crossings are typically built at riffle locations, which are also locations where Chinook salmon build redds and spawn (spawning activity may begin as early as September, and peaks during November and December). Redds located near channel crossings may be subjected to a pulse of fine sediment from crossing removal. Due to the cover at temporary bridges, Chinook salmon may be attracted to spawn under or near the temporary

bridges, and redds may experience direct crushing during crossing removal. Food for juvenile salmonids is also more abundant in riffle locations, and juvenile salmonids use riffles and the areas upstream and downstream of riffles extensively, increasing the risk of temporary displacement or crushing. More restrictive timing and location of crossings would minimize the potential effects of channel crossings on juvenile salmonids, and to Chinook redds constructed in the early fall months.

Disruption of Holding and Migration Patterns by Heavy Equipment Noise and Vibration Disturbance

In addition to the information presented on this topic in the 2000 Opinion, fish (young-of-year steelhead in particular) were recently observed during the day in the vicinity of operating heavy equipment (used to install a summer dam), although increased numbers were observed in the same vicinity during the day in the absence of operating equipment (D. Ashton, NOAA Fisheries, pers. comm. 2002). This observation suggests that operation of heavy equipment used to construct channel crossings, or heavy equipment used to skim gravel bars adjacent to the low flow channel, (especially early in the mining season) may have an effect on juvenile salmonids, young-of-year in particular, not previously analyzed in the 2000 Opinion. The potential for temporary displacement of juveniles exists from the disturbance caused during heavy equipment operation. Whether or not the habitat that juveniles may be displaced into is less favorable than the habitat that they were utilizing prior to disturbance is unknown at this time.

Salmonid Stranding on Extraction Bars

An increased risk, above natural levels, of stranding of juvenile and adult salmonids on gravel bars may be associated with extraction methodology. The risk of stranding for adults occurs during fall spawning migration during increasing flows where bars are inundated at lower flows due to decreased bar height as a result of skimming. Stranding of juveniles occurs during receding flows, and is associated with residual bar features resulting from mining using wetland pits, horseshoe shaped deep skims, trenching and bar skimming. Wetland pits minimize the risk of juvenile stranding by their location on the 3-to-7 year floodplain, so that inundation of these pits only occurs during large, winter flow events, and most likely not on an annual basis. NOAA Fisheries expects that wetland pits will be utilized on the 3-to7-year floodplain to minimize potential juvenile stranding.

Horseshoe shaped deep skims minimize the risk of stranding by being open to the river channel on the downstream end of the extraction. Trenches also minimize the risk of stranding by being opened to the river channel after excavation, in all but one location. A closed trench was utilized at Larabee gravel bar on the Eel River, near the town of Scotia, in 2001, and is proposed again for 2002. Larabee is a low elevation, mid-channel bar that is inundated shortly after flows begin to rise, and typically stays inundated throughout the winter, providing connection between the trench and the river. This trench was monitored last winter by the applicant, and due to the low elevation of the-mid channel bar, the trench was found to be consistently inundated, and

salmonid stranding was not found at the site. A site-specific monitoring, and fish rescue plan, for trenches minimizes the risk of adult and juvenile salmonid stranding.

Bar skimming allows inundation of the skimmed area more frequently and at lower river stage heights, resulting in an increase in the width-to-depth ratio of the channel, which results in an increase in the area where mainly juvenile, but possibly adult, salmonid stranding may occur. The increased risk of adult and juvenile salmonid stranding in the fall, associated with an increase in width-to-depth ratio, is minimized by grooming and grading the skimmed gravel bars to provide a free draining surface back towards the river thalweg. However, the final grade of the gravel bar must have enough slope in the downstream, or towards the river, direction to actually provide for this free drainage, and must be free of depressions. LOP 96-1 requires bars to be left in a free draining condition, but does not specify what slope percentage is adequate to provide for free drainage. CHERT bar-specific recommendations have specified in what direction the finished skim surface is to be sloped, but also have not specified the percentage of slope required for a free draining surface.

Elevated Turbidity/Sediment

The introduction of sediment entrained from a skimmed gravel bar surface may have more influence on Chinook spawning than was previously considered in the 2000 Opinion. Reduction in channel confinement as a result of gravel bar skimming results in inundation of a skimmed bar at lower and earlier flows. In the absence of gravel extraction, gravel bars would be expected to rebuild their height through sediment deposition until a mature bar height is reached, and mature gravel bars would be expected to have a coarse surface armor layer with some riparian vegetation. Gravel bar skimming that removes the coarse surface armor layer and reduces bar height early in the season, before sediment deposition recurs, will increase the frequency of gravel bar inundation during typical November and December flows, and provide a source of fine sediment for downstream transport. When skimmed gravel bars are overtopped prematurely, fine sediment is introduced into the stream flow at lower flows than the storm flows that carry a significant amount of fine sediment. In addition, November and December is the time of peak spawning for Chinook salmon. Sediment entrained from skimmed gravel bars during this time period has the potential to affect Chinook spawning success as described in the "Impacts to Spawning Habitat" section below.

The published daily suspended sediment load estimations by the USGS on the Mad River, Eel River, Van Duzen River, and the South Fork Eel River show a significant increase in slope near the flow that is exceeded approximately 35% of the time in the historic record of daily flows for each river. Figure 1 shows the suspended sediment data for the Mad River and Figure 2 shows the flow frequency of the historic record of daily average flows for the Mad River. A normalized plot of the flow duration curves for the five rivers of Humboldt County (the Mad, Eel, Van Duzen, and South Fork Eel rivers) demonstrate similar hydorlogic behjavior (Figure 3). The Trinity River has more days with stream flow less than the average flow of record, likely due to regulated flow releases. Like the other rivers, the Trinity River suspended sediment data shows a significant increase near the 30 to 40% exceedance flow, based on the USGS recorded suspended

sediment data. All rivers in the action area show an increase in sediment load around the 35% exceedance flow. Once the stream flow has reached the 35 to 40% exceedance flow, the extra

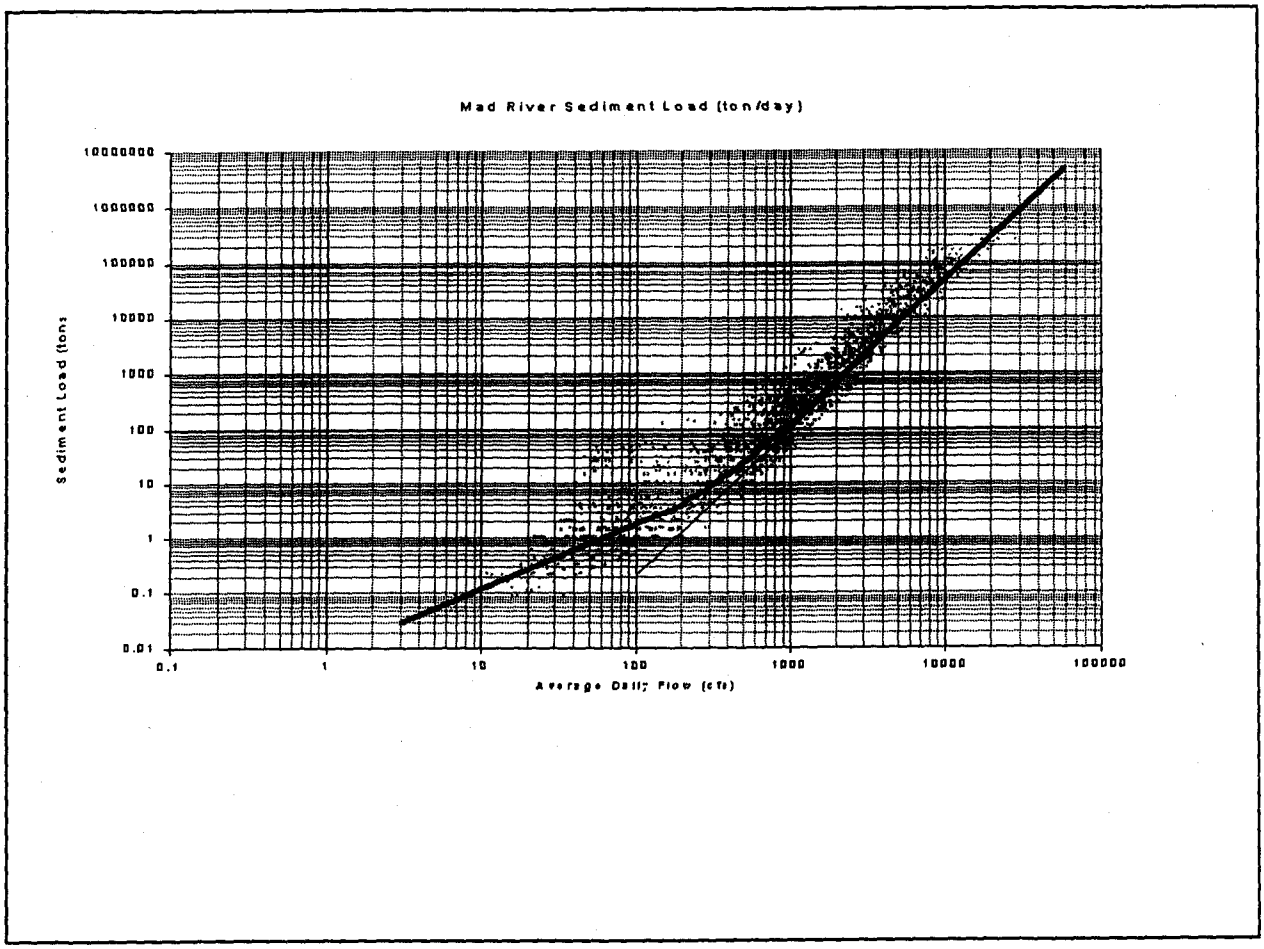

Figure 1 The stream flow where suspended sediment load significantly increases is at the point where the slope steepens on the curve. Because the plot is a logarithmic relationship, an increase in slope implies a significant increase in the y-axis variable. The slope of the curve becomes steep and constant between 900-1000 cfs. At this point any increase in flow causes a significant increase in the suspended sediment load. This is also the flow of significant bed material movement in the recorded bedload measurements on the Mad River near Arcata. (*Suspended sediment data from http://webserver.cr.usgs.gov/sediment/, the daily average flow data is from http://waterdata.usgs.gov/ca/nwis/discharge/?site_no=1148100*)

volume of sediment mobilized from the skimmed bars will be a much smaller percentage of the total sediment, resulting in a reduced effect than if the sediment was mobilized at a lower flow.

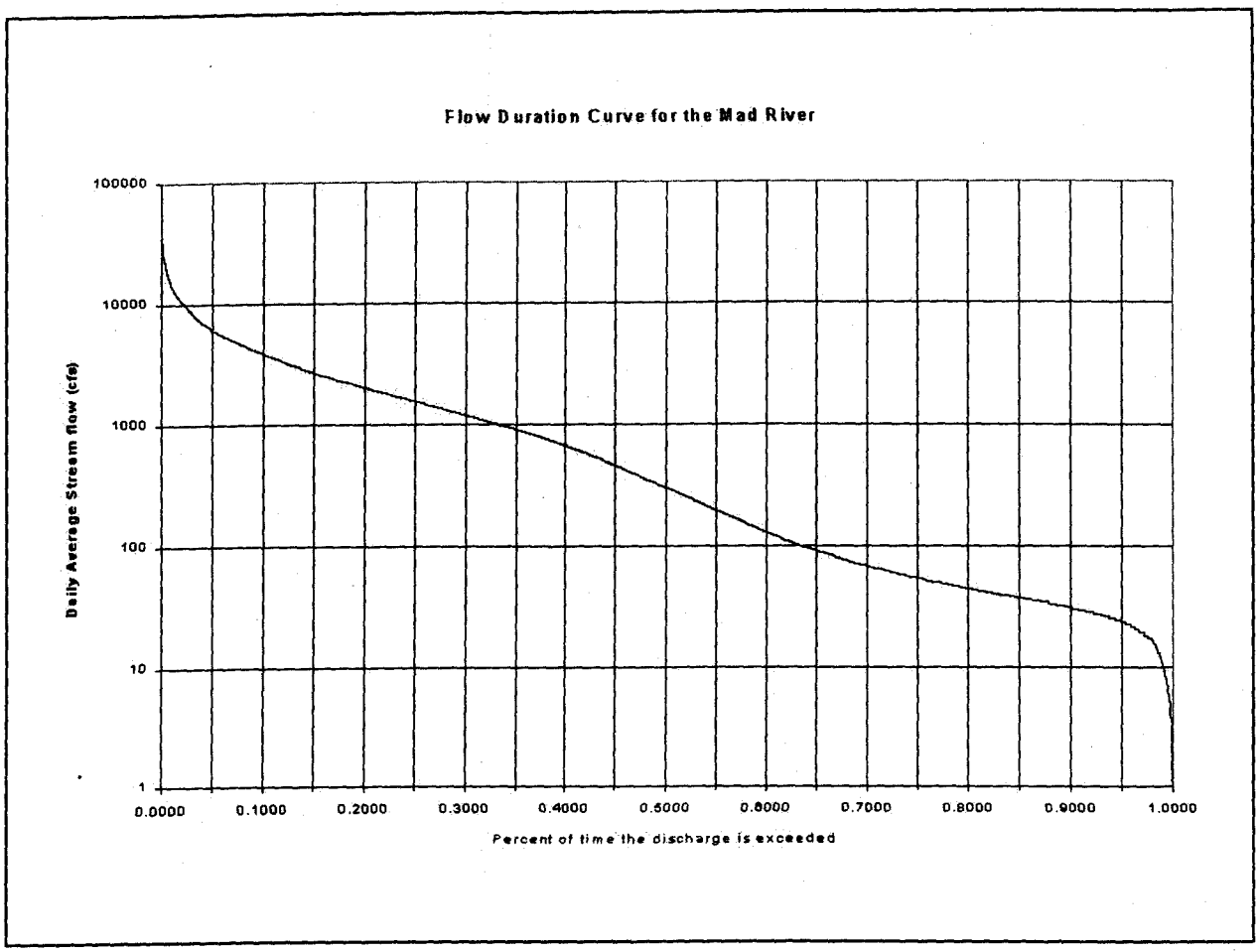

Figure 2 Stream flow of 950 cfs on the Mad River is exceeded 35% of the time in the 40 years of the historic record of daily average flows. (The average flow for the Mad River is 1427 cfs and is exceeded about 30% of the time.)

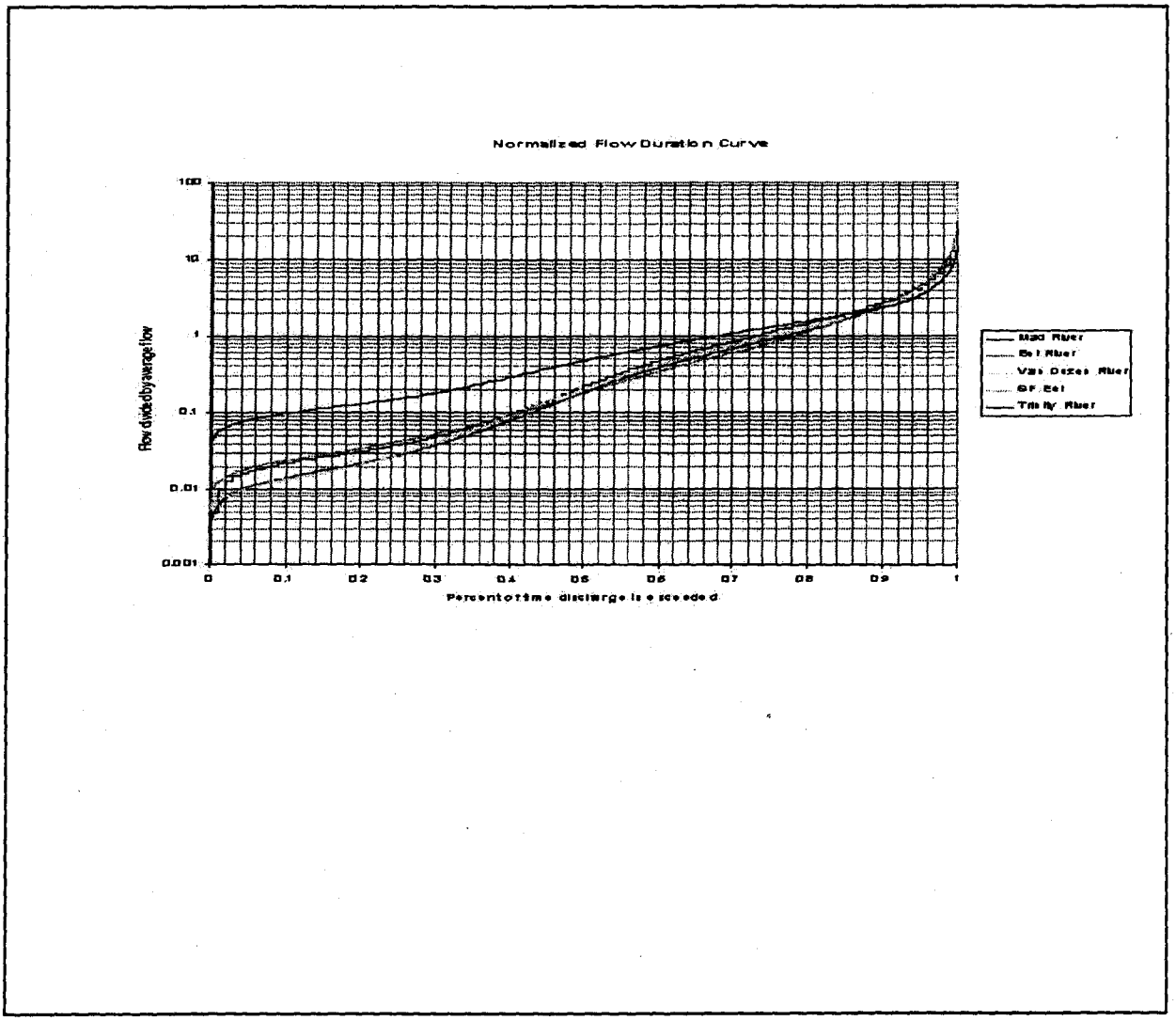

Figure 3 Normalized flow duration curve for Humboldt County Stream using USGS records of historic daily flows.

Impacts to Spawning Habitat

Chinook salmon redds located in the action area may be adversely affected in a number of ways by gravel mining activities. Impacts evident after one season of mining to spawning habitat can occur by a deposition of fine sediment onto spawning substrate or the redd itself, by the disturbance of redds caused by channel crossing location and removal, by changes to substrate size, and by increased redd scour due to increased bed mobility through loss of surface armor and fining of substrate over time. Long term impacts to salmonid habitat from gravel mining occur by reducing the size of geomorphic features, such as alternate bars, or by preventing the mature

development of geomorphic features that form fundamental channel elements (Trush et al 2000). Geomorphic channel features drive sediment sorting processes that create and maintain salmonid spawning beds, rearing pools, diverse aquatic food base and feeding opportunities, and holding habitat. The long term loss of spawning habitat by repeated bar skimming is minimized by the short duration of the extended proposed action.

Sediment removal by bar skimming typically exposes smaller sediment sizes on bar surfaces that will be inundated during lower discharges, due to reduction of bar height and associated reduction of channel confinement. The intrusion of fine sediment into spawning substrate fills pore spaces, which decreases hydraulic conductivity of the gravel, thus reducing the supply of oxygenated water to incubating eggs (Kondolf and Williams 1999). In addition, particle sizes that reduce embryo survival and impede emergence have been defined as those less than 9.5mm (Tappel and Bjornn 1983). Bar skimming and grading methods typically excavate the coarse surface layer, reducing surface particle sizes and armoring, and reducing bar elevations by several feet lower than mature bar surfaces. This disturbance increases the availability of a source of fine sediment within the active channel that is available for mobilization by relatively low discharges during the critical early winter Chinook salmon spawning season.

As described in the previous section, plotting the suspended sediment data that is available at a gage, versus average daily streamflow, (or when available, instantaneous streamflow) an inflection point on the graph is obvious (Figure 1). This inflection point indicates where the rate of suspended sediment concentration increases rapidly with increasing flow. For the Mad River gage near Arcata, the first recorded bed material measurement roughly coincides with the inflection point of the recorded suspended sediment load. This indicates that the point of increased suspended sediment load, discussed in the previous section, is also the point when bed material is mobilized. This is likely due to increased flow entraining the finest bed material from pools or interstitial spaces in the coarse bed of the low flow channel, causing a sudden increase in the suspended sediment load.

Additionally, Rantz (1964) completed a study for the rivers of the North Coast Range to determine what the minimum flow should be to maximize spawning habitat. For the Mad River the optimum flow was estimated at 1200 cfs in the Rantz study. This flow corresponds well with the development of the top of the silt band on the Mad River at about 900-1000 cfs in the spring of 2002, with the flow of a significant increase in suspended sediment movement (35% exceedence flow), and with the first flow (1000 cfs) in which bed material was noted in the gaged record.

Impacts to Migratory, Rearing and Holding Habitat

Gravel extraction has the potential to impact migratory, rearing and holding habitat in many ways, as discussed in the 2000 Opinion. In particular, gravel bar skimming increases the width-to-depth ratio of river channels, decreases channel confinement during rising fall and early winter flows, and changes the hydraulic function of gravel bars to create and maintain pools and riffles. Increased width-to-depth ratio in the gravel mining reach of the Mad River, and decreased

channel confinement in the Van Duzen River are described in the "Environmental Baseline" section of this amendment.

Adult salmonid migration begins as early as September, and continues into the winter months. Chinook spawning begins as early as September and peaks in November and December. During the fall and early winter months gravel bars have not had time to replenish, and rebuild bar height, from the previous season of mining. A minimum depth over riffles at flows that fish use for spawning and migration needs to be maintained in order to allow for adult passage and spawning success. In addition, the depth of confined flow should protect the channel pool maintenance hydraulics, which may be greater than the depth needed for migration and spawning alone. A confined channel in the fall and early winter months is needed to minimize effects to spawning, migration, rearing and holding habitat.

CC Chinook salmon, NC steelhead, and SONCC coho salmon rear in the lower river systems where gravel extraction occurs. Chinook salmon use the lower river reaches in the vicinity of gravel extraction for rearing more extensively than the other listed salmonid species. Due to their life history requirements, Chinook salmon must increase in size and weight during juvenile rearing before out-migration in June in order to survive once they reach the ocean. The gravel extraction method of skimming alternate (point) and mid-channel bars prevents the natural sedimentation processes (i.e., sediment deposition, and the associated increase in bar height over time) from confining the channel. A channel confined by gravel bar height provides the hydraulic control necessary to create and maintain pools and riffles, reduces the increase in fine sediment delivered from mined surfaces during fall and early winter flows, and provides the necessary width-to-depth ratio to maintain greater channel depths for a given flow. By "disconnecting" a traditionally skimmed gravel bar from frequent flow innundation, many of the effects of gravel bar skimming can be minimized.

Vertical buffers (or setting of skim floor elevations), and head of bar buffers can be used to protect channel confinement and the hydraulic control provided by a confined channel, which is necessary to create and maintain pools and riffles. Pools provide habitat for adult holding, and juvenile rearing and feeding. Riffles provide habitat for juvenile feeding, and adult spawning. As already discussed, adequate water depth over riffles is necessary for adult migration. Loss of channel confinement and the associated impacts to rearing, holding, and migratory habitat can occur after one season of mining operations. Additionally, long term impacts to salmonid habitat from gravel mining occurs by reducing the size of geomorphic features, such as alternate bars, or by preventing the mature development of geomorphic features that form fundamental channel elements (Trush et al 2000). Geomorphic channel features drive sediment sorting processes that create and maintain salmonid spawning beds, rearing pools, diverse aquatic food base and feeding opportunities, and holding habitat.

Loss of Large Woody Debris (LWD)

As described in the 2000 Opinion, LWD plays an important role in providing habitat for listed salmonid species. Although LWD deposited on gravel bars by high flows may not be in contact

with the low flow channel, it provides important velocity refuge for salmonids during initial high flow events when gravel bars are inundated. LWD accumulations on gravel bars are relatively unstable in that they are mobilized at discharges approaching bankful (Abbe and Montgomery 1996), at which time the bed material is also being transported. However, prior to this discharge, the deposited LWD provides important velocity refuge for juvenile salmonids. In addition, LWD on gravel bars is an important source of LWD recruitment into the channel, where it provides habitat diversity for adult and juvenile salmonids. During site visits throughout the year, NOAA Fisheries has observed that most of the LWD deposited on gravel mining sites is cut and removed from the gravel bars.

Summary of Effects to Listed Species and Critical Habitat

Gravel mining results in changes to channel form and function, and these changes affect habitat function for salmonids as described above. These channel and habitat changes occur at two different time-scales: (1) impacts which occur at the time of, or shortly after mining, and are evident after one season of mining operations, and (2) impacts which occur over many years, and include simplification of habitat and loss or reduction of fundamental geomorphic features. Project effects relative to SONCC coho salmon, CC Chinook salmon, and NC steelhead freshwater life history stages (i.e. spawning, migration, rearing and holding) are discussed in the above sections, and summarized below.

Spawning

Impacts evident after one season of mining operations to Chinook salmon spawning habitat include the introduction of fine sediment onto spawning substrate, or the redd itself, in November and December. Fine sediment from one additional season of gravel mining could incrementally decrease the quality and quantity of Chinook salmon spawning habitat, which could lead to a reduction in Chinook spawning success.

Migration

Gravel bar skimming reduces bar heights which are needed to confine the channel during rising fall and early winter flows. Reduced bar height, and reduced channel confinement, occur after one season of mining operations, and may decrease the quality of adult salmonid migratory habitat at riffle locations.

Rearing and Holding

Channel confinement and the hydraulic control provided by a confined channel, is necessary to create and maintain pools and riffles. Pools provide habitat for adult holding, and juvenile rearing and feeding. Riffles provide habitat for juvenile rearing and feeding. Reduction in channel confinement and an increase in width-to-depth ratio occur after one season of mining operations. LWD also provides rearing and holding habitat, and a reduction in LWD is also expected to occur after one season of mining operations. NOAA Fisheries expects that a reduction in the quantity and quality of rearing and holding habitat may occur due to the extended duration of one additional mining season.

Project design features minimize some of the effects of the proposed action on listed salmonid species. However, even with the inclusion of project design features, NOAA Fisheries expects harm to listed salmonids from the effects that result in a decrease in the quantity and quality of spawning, migratory, rearing, and holding habitat. Increased width-to-depth ratio, loss of channel confinement in fall and early winter, reduction in the hydraulic control provided by gravel bars necessary to create and maintain pools and riffles, an increase in fine sediment introduced from skimmed surfaces during the critical Chinook spawning season of November and December, and loss of LWD recruitment, can all occur after one season of mining operations. The long-term habitat impacts caused by gravel mining include decreased pool depths, increased low-flow channel widths, reduced sinuosity and channel confinement, reduced sediment sorting processes, channel margin simplification, and reduced sediment delivery to downstream habitats. NOAA Fisheries expects that long-term impacts would result after many seasons of gravel mining operations.

Some individuals may be injured or killed during mining operations, or harmed by the resultant effects of gravel mining on habitat. However, the effects to listed salmonids from the short duration of the proposed action (year 2002 mining operations only) is not expected to rise to a population level effect and is not anticipated to reach the level where a reduction in the likelihood of both the survival and recovery of listed salmonids, at the Evolutionarily Significant Unit (ESU) scale, occurs. Also due to the short duration of the proposed action, it is not anticipated that SONCC coho salmon designated critical habitat will be adversely modified or destroyed.

Conclusion

Based on our review during the amendment process, NOAA Fisheries concludes that LOP 96-1 for gravel mining operations during 2002 is still not likely to jeopardize the continued existence of Southern Oregon/Northern California (SONCC) coho salmon, Central California (CC) Chinook salmon, or Northern California (NC) steelhead, or destroy or adversely modify SONCC coho salmon designated critical habitat.

July 2002 Amended Incidental Take Statement for the May 1, 2000 Biological Opinion

Take is defined as harass, harm, pursue, hunt, shoot, kill, trap, capture or collect, or attempt to engage in any such conduct of listed species of fish or wildlife without a special exemption. NOAA Fisheries further defines "harm" as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or an applicant. 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the NOAA Fisheries as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

A. Amount or Extent of the Take

NOAA Fisheries anticipates that gravel mining operations under LOP 96-1 during the year 2002 will result in take of listed salmonids. This will primarily be in the form of harm to salmonids by impairing essential behavior patterns as a result of reductions in the quality or quantity of their habitat. NOAA Fisheries anticipates that the number of individuals harmed will be low. In addition, NOAA Fisheries anticipates that a small number of juveniles may be killed, injured, or harassed during construction and removal of temporary stream channel crossings.

The take of listed salmonids will be difficult to detect because finding a dead or injured salmonid is unlikely as the species occurs in habitat that makes such detection difficult. The impacts of gravel mining under LOP 96-1 will result in changes to the quality and quantity of salmonid habitat. These changes in the quantity and quality of salmonid habitat are expected to correspond to injury to or reductions in survival of salmonids by interfering with essential behaviors such as spawning, rearing, feeding, migrating, and sheltering. Because the expected impacts to salmonid habitat correspond with these impaired behavior patterns, NOAA Fisheries is describing the amount or extent of take anticipated from the proposed action in terms of limitations on habitat impacts. The NOAA Fisheries expects that physical habitat impacts will be: consistent with the areas described in Table 1 below, compliant with the project design features of LOP 96-1 and

this incidental take statement, and within the expected effects of gravel mining operations as described in the 2000 Opinion, and this amendment.

Table 1. For each river, gravel bar sites are listed from the most upstream site to the most downstream site, and are not necessarily contiguous. This list of gravel bars includes all of the known sites that have been authorized by LOP 96-1. The length of each site is measured along the center line of the stream, adjacent to each bar. Data was provided by Humboldt County Planning Division (April 26, 2000), except for the Cook's Valley site and the Fort Seward site where data was provided by the Corps (June 27, 2000), and the McKnight site, where data was provided by the Corps (June 25, 2001). Christie Bar is included in Table 1 only for potential mining plans that may begin implementation after issuance of this ITS.

Stream	Length (feet)	Gravel Bar Site Name
Lower Eel	3646	McCann to Scotia Bars (near the town of Scotia)
	4160	McCann to Scotia Bars
	8340	McCann to Scotia Bars
	8398	McCann to Scotia Bars
	4844	McCann to Scotia Bars
	7900	Dyerville, or South Fork Bar
	2830	Hauck Bar
	1117	Hansen Bar
	1754	Upper Sandy Prairie Bar
	3507	Canevari - Sandy Prairie Bar
	2160	Lower Sandy Prairie Bar
	3413	Warswick Bar
	2807	Singley Bar (downstream of Fernbridge)
Lower Mad	2786	Guynup Bar (near the town of Blue Lake)
	965	Emmerson Bar
	2550	Emmerson Bar
	278	Blue Lake Bar
	4270	Blue Lake Bar
	3345	Christie Bar
	2021	Johnson Bar
	2219	Essex Bar
	3327	Johnson-Spini Bar
	1503	Johnson-Spini Bar (near Hwy 299 bridge)
South Fork Eel	3000	Cooks Valley (at the Humboldt/Mendocino County line)
	1218	Tooby Park/Garberville
	2097	Randall Sand and Gravel/Tooby Park/Garberville

	1854	Wallen/Johnson Redway Bar (near the town of Redway)
Lower Van Duzen	2304	Pacific Lumber Bar (near the town of Carlotta)
	661	Thomas Bess Ranch
	15506	Van Duzen Ranch
	1890	Leland Rock Gravel Bar
	755	Hauck Bar (at confluence with the Eel River)
Larabee Creek	1292	Charles Bar (in Larabee Valley)
North Fork Mattole	4909	Cook Bar (at confluence with mainstem Mattole River)
Lower Trinity	2000	McKnight Bar (near the town of Willow Creek)
	4497	Willow Creek (near the town of Willow Creek)
	834	Klamath River Aggregate (near the town of Hoopa)
Middle Eel	2000	Fort Seward, at approximate river mile 68

Anticipated incidental take will be exceeded if gravel mining operations extend beyond the areas described in Table 1 above, are not in compliance with the project design features of LOP 96-1, or the terms and conditions of this incidental take statement, or if effects of gravel mining operations are exceeded or different than the expected effects described in the 2000 Opinion or this amendment.

B. Effect of the Take

In the accompanying Opinion, the NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to SONCC coho salmon, CC chinook salmon or NC steelhead, or in destruction or adverse modification of SONCC coho salmon designated critical habitat.

C. Reasonable and Prudent Measures

The NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon, CC chinook salmon and NC steelhead.

The Corps shall:

1. Ensure that channel form and function are retained, thereby minimizing declines in the quality or quantity of salmonid habitat.

2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 96-1 procedure.
3. Ensure that measures that minimize impacts to listed salmonids are reviewed and approved by NOAA Fisheries and other involved agencies before implementation.
4. Track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites.

D. Terms and Conditions

The Corps, and its permittees, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

RPM 1. Ensure that channel form and function are retained, thereby minimizing declines in the quality or quantity of salmonid habitat.

a. All projects authorized under LOP 96-1 must continue to undergo the annual comprehensive hydrologic and geomorphic review, with associated recommendations, provided by CHERT.

b. Ensure that extraction quantities do not exceed the long term average annual sustained yield, based on estimates of mean annual recruitment, as utilized by CHERT.

c. Ensure that copies of all pre- and post-extraction information, including cross sections and aerial photos for 2002 shall be provided to NOAA Fisheries, and that a mutually agreeable date shall be scheduled between CHERT, the Corps and NOAA Fisheries for site reviews, or a five working day notice of when the site review is scheduled to occur shall be provided to NOAA Fisheries.

d. Ensure that a reasonable effort is made to provide vertical, rather than oblique, air photos for spring pre-extraction design purposes and that copies of these air photos are received by NOAA Fisheries for review of extraction planning during 2002.

RPM 2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 96-1 procedure.

a. Provide for channel confinement by utilizing the silt band, where available and appropriate, in designing the vertical offset, and by ensuring that permittees are aware that a one foot vertical offset from the low flow water surface elevation is a minimum value, and that a larger vertical offset is

often necessary to provide for channel confinement that protects spawning, migration, and pool maintenance hydraulics. Relevant indicators, such as an analysis of riffle crest elevations, thalweg, and water surface elevations, and adjacent habitat types, shall be used during design of the skim floor elevation, or vertical offset.

b. Consideration shall be given to protection of hydraulic processes that create and maintain pools and riffles during the CHERT review and recommendation process. Protect gravel bar function by minimizing extraction on the upstream one-third of gravel bars, and by maintaining channel confinement necessary to protect pool maintenance processes.

c. Implement a change in the season of channel crossing construction and removal in order to minimize impacts to juvenile salmonids, and early fall adult spawning salmonids, and their redds. Channel crossing construction shall not begin until June 15 for all rivers throughout the action area, except the Trinity River, where channel crossing construction can begin June 1. Channel crossing removal shall be completed by September 15 for the Mad River to protect any early redds from increased fine sediment, and to minimize the attraction to spawn near, or under temporary bridges. Channel crossing removal shall be completed by October 15 for all other river systems. Consideration shall be given to channel crossings located at riffles in order to minimize impacts to spawning sites and juvenile salmonids. The middle of riffles may provide the best location for temporary crossings, but crossing location shall be determined on a site specific basis. The proposed location, and reasoning used to determine how the crossing location minimizes effects to salmonids, shall be included in the CHERT recommendation.

d. Where possible and safe, a person shall wade the stream ahead of heavy equipment crossing the wetted low-flow channel for temporary channel crossing construction and removal in an attempt to scare any rearing juvenile salmonids out of the crossing area. In addition, minimize the amount of time heavy equipment is in the wetted low-flow channel by limiting the number of heavy equipment crossings per each installation and removal. A maximum of two crossings per installation or removal shall be allowed, although one crossing where possible is preferred. Heavy equipment shall not be used in the wetted, low flow channel except for channel crossing installation and removal.

e. Ensure that this ITS is attached to all Letters of Modification issued under LOP 96-1 to aid in compliance with terms and conditions by the applicants.

RPM 3. Ensure that measures that minimize impacts to salmonids are reviewed and approved by NOAA Fisheries and other involved agencies before implementation.

a. Ensure that prior approval is granted by NOAA Fisheries for extensions to the June 1-October 15 season for gravel extraction operations.

b. Ensure that culvert requests and information describing the need for culverts are provided to NOAA Fisheries for review and approval of salmonid impact minimization measures, and that culverts allow upstream and downstream fish passage.

c. Ensure that NOAA Fisheries reviews and approves requests for fisheries enhancement projects that modify excavation procedures before being authorized by the Corps.

RPM 4. Begin to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites.

a. Ensure that applicants perform the habitat mapping, described in Attachment 1. NOAA Fisheries will consider changes to this protocol based on individual river characteristics on a site specific basis. Any changes to the protocol must be approved by NOAA Fisheries.

b. Riffle crest elevations, as measured at the thalweg, and tied to the survey datum are required adjacent to, and upstream and downstream of each gravel mining site. Riffle crest elevations, with water depth, shall be measured within the gravel extraction reach (or zone), and distances upstream and downstream of the gravel extraction area equal to half the gravel extraction reach. If gravel mining sites are contiguous, then riffle crests shall be measured throughout the contiguous mining reach. Riffle crest information shall be submitted to NOAA Fisheries, Attention Irma Lagomarsino, at the address listed in item "g" below.

c. Redd surveys consisting of visual observation shall be conducted every other week from October 1 through December 30. Redd surveys shall be conducted within the gravel extraction reach (or zone), and distances upstream and downstream of the gravel extraction area equal to half the gravel extraction reach. If gravel mining sites are contiguous, then the redd survey shall be conducted throughout the contiguous mining reach. The location of redds shall be mapped on aerial photos. Flagging or other visual identification shall be used to mark location of redds on the ground so follow-up surveys can determine persistence and identification of new

redds. If stream conditions do not allow for effective or safe surveys, then the conditions of the stream shall be recorded (turbidity and flow) and surveys shall resume as soon as conditions improve. A redd survey report shall be submitted by January 15, 2003 and shall contain the following items:

i) Date and time of survey; name of surveyor(s)
ii) Stream and weather conditions at time of survey
iii) Number of new redds observed, by location (geographic coordinates and marked on aerial photos); habitat call for location of redds (e.g., pool tail crest, riffle crest)
iv) Number of old redds persisting and location
v) Number of fish observed, by species, per redd location, and fish condition observed
vi) size of redd, and depth over redd (if fish are present, this information should be estimated to minimize disturbance)

d. Snorkel surveys of wetland pits shall be required to monitor and assess juvenile stranding after high flows that inundate the wetland pit have receded. A monitoring plan that assesses salmonid stranding, which includes a fish rescue plan, if it is needed, shall be submitted as part of the mining plan when wetland pits are used as the extraction methodology.

e. A monitoring plan that assesses salmonid stranding, which includes a fish rescue plan, if it is needed, shall be submitted as part of the mining plan when trenching is used as the extraction methodology.

f. NOAA Fisheries shall be provided color copies of all air photos, and all electronic copies of cross sections submitted under the entire implementation of LOP 96-1, by August 30, 2002, for our analysis purposes. Although NOAA Fisheries has sporadically received copies of air photos, we do not have a complete data set of air photos, or electronic cross sections. Electronic cross sections shall be provided in the ASCII electronic format as required by LOP 96-1, and shall be complete cross sections, from end point to end point.

g. Ensure that all required monitoring is completed and that monitoring reports are provided to NOAA Fisheries. Reports shall be submitted to:

Irma Lagomarsino
Supervisor Arcata Field Office
National Marine Fisheries Service
1655 Heindon Road
Arcata, CA 95521

Reinitiation of Consultation

This concludes formal consultation on the actions and processes described in the LOP 96-1 procedure. 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 extent of incidental take is exceeded, or is expected to be exceeded; (2) new information reveals effects of the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR § 402.16). In instances where the amount of incidental take is exceeded, consultation shall be reinitiated immediately.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize 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 a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information.

The NOAA Fisheries believes the following conservation measures are consistent with these obligations, and therefore should be implemented by the Corps:

1. The minimum skim floor should be set using one of the following methods. In the preferred method, the skim floor elevation should be marked at the waters edge throughout each mining area, when the stream flow at the gage of the stream reaches the flow that corresponds to a significant increase in suspended sediment load and the initiation of spawning sized bed material. The estimation of this flow is listed as the 35% exceedance flow in Table 2 below.

   If the applicant is unable to mark the waters edge when the stream flow is at the flows of Table 2, then the applicant can use a hydraulic model, such as HECRAS, using the current cross-sections in the extraction area, including a cross section at the riffle, to estimate the water surface elevation at the 35% exceedance flow.

   Other indicators can also be used to design the skim floor elevation, or vertical offset. Applicants and CHERT should use relevant indicators, such as an analysis of riffle crest elevations, thalweg, and water surface elevations, adjacent habitat types, and other relevant indicators during design of the skim floor elevation.

Table 2 - The flow in the table represents the flow in which a significant amount of suspended sediment begins to move (the upward inflection point on the suspended sediment vs. flow rate curve)

USGS Stream Gage	Flow Exceeded 35% of Time
Mad River near Arcata	950-1000 cfs
Lower Eel at Scotia	3500-3800 cfs
Van Duzen near Bridgeville	470-500 cfs
South Fork Eel near Miranda	850 -900 cfs
USGS Stream Gage	**Flow Exceeded 40% of time**
Trinity River at Hoopa	3000 - 4000 cfs

2. The Corps, in conjunction with NOAA Fisheries and other involved agencies, should begin to develop additional updated monitoring protocols, that begin to answer questions regarding changes in habitat quantity and quality in the vicinity of gravel extraction operations. An important relationship to begin to monitor is that between river stage and discharge that is required to overtop skimmed gravel bar surfaces.

3. The Corps should continue to work with NOAA Fisheries, and other involved agencies on a LOP procedure for 2003-2007.

4. Educational signing regarding the importance of LWD for salmonids should be placed at access roads owned, controlled, or utilized by the gravel operators. In addition, in order to protect LWD deposited on mined gravel bars, all access roads owned or controlled by gravel operators should be gated and locked to reduce access.

In order for NOAA Fisheries to be kept informed of the actions minimizing or avoiding effects or benefitting listed species or their habitats, NOAA Fisheries requests notification of the implementation of the conservation recommendations.

Attachment 1 - Salmonid Habitat Mapping Protocol

Trend monitoring of habitat shall identify the type, quantity, and quality of salmonid habitat present in the vicinity of and influenced by commercial gravel extraction, as well as monitor its availability over time. The hydraulic geometry of the active channel creates the habitat conditions which salmonids use throughout their freshwater life cycle (upstream spawning migration and holding; redd forming; and juvenile rearing and holding). Trend monitoring shall require a different approach than the previously used CDFG Habitat Level III typing technique (CDFG California Salmonid Stream Habitat Restoration Manual.) This monitoring is intended to describe and quantify available habitat present on the pre and post season extraction aerial photographs at each extraction site to determine trends in the salmonid habitat following both the periods of annual bed material movement and replenishment, and annual extraction. Habitat parameters shall be linked by NOAA Fisheries personnel to pre and post season cross-sections of extraction sites. NOAA Fisheries shall be provided copies of both the pre and post season cross sections, and aerial photographs.

To initiate the monitoring and prior to field observations, an experienced fisheries biologist shall examine the spring aerial photographs using a stereoscope and delineate locations of moderate to high quality rearing habitat for juvenile salmonids, and holding and spawning habitat for upstream migrating adults. Habitat units for 2+ steelhead shall be used as a surrogate for habitat use by other salmonids throughout the year. Habitat units shall be delineated on the photographs using polygons. Each polygon shall be assigned a tracking number, and the number shall be used to link field data to the aerial photograph. Specific habitat features to be described and measured shall include: habitat type, dimension, depth, velocity, substrate, etc. Dimensions are to be developed in conjunction with NOAA Fisheries personnel. Field data for each polygon shall be entered into a spreadsheet of an appropriate data base (NOAA Fisheries shall provide concurrence on the choice of data base). Cool water refuge shall be identified underwater, mapped and temperatures recorded. The area of each polygon shall be calculated in square feet, however, the dimension and shape of the habitat shall also be defined. The habitat data shall be entered into a spreadsheet or database program such as Excel or Access.

Both a hard and electronic copy of a report shall be provided to the Corps and to NOAA Fisheries by December 31. The report shall contain in the description of available habitats, species observed, a spreadsheet or database printout. Air photos with the delineated polygons and habitat details shall also be included.

Polygons identified from the aerial photos shall be field verified using underwater observations and measurements. In addition, field observations shall be conducted during late summer or early fall low flows periods.

References Cited

Abbe, T.A. and D.R. Montgomery. 1996. Large woody debris jams, channel hydraulics and habitat formation in large rivers. Regulated Rivers: Research and Management 12: 201-221.

Ashton, D. 2002. Personal Communication. Fisheries Biologist. National Marine Fisheries Service, Arcata, California.

Downie, S. 2001. Memo to CDFG staff on fish stranding in lower Van Duzen River, November 14, 2001. California Department of Fish and Game.

Downie, S. 2002. Personal Communication. Biologist. California Department of Fish and Game, Fortuna, California.

Froland, J. 2001. Personal Communication. Warden. California Department of Fish and Game. Arcata, California.

Kondolf, G. M. and Williams, J.G. 1999. Flushing flows: a review of concepts relevant to Clear Creek, California. Report to U.S. Fish and Wildlife Service, Red Bluff, California.

Knuuti, K. 2001. Assessing the geomorphic effects of instream gravel mining on the Mad River, Humboldt County, California. Proceedings of the Seventh Federal Interagency Sedimentation Conference, March 25 -29, 2001. Reno, Nevada.

Laird, A., R. Klein, S. McBain, and W. Trush. 2000. An evaluation of regulations, effects, and management of aggregate mining in northern and central coastal California.

Myers, J.M., R.G. Kope, G.J. Bryant, D.Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

Rantz, S.E. 1964. Stream hydrology related to the optimum discharge for king salmon spawning in the northern California coast ranges. Geological Survey Water Supply paper 1779-AA.

Sparkman, M.D. 2002. Steelhead Research and Monitoring Program. Annual report, 2000-2001. Juvenile steelhead downstream migration study in the Mad River, Humboldt County, California. Spring 2001. Department of Fish and Game, Northern California, North Coast Region.

Sparkman, M.D. 2002. Steelhead Research and Monitoring Program. Annual Report. Upper Redwood Creek juvenile salmonid downstream Migration study, 2000-2001. Project 2a5.

Sparkman, M.D. 2002. Personal Communication. Fisheries Biologist. Steelhead Research and Monitoring Program. California Department of Fish and Game. Arcata, California.

Tappel, P.D. and Bjornn, T.C. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. N. Am. J. Fish. Man. 3: 123-135.

Trush, W.J., McBain S.M., and Leopold, L.B., 2000. Attributes of an alluvial river and their relation to water policy and management. Proceedings of the National Academy of Sciences, v. 97, n. 22, pp. 11858-11863.

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Region
Protected Resources Division
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

FAX TRANSMISSION

NUMBER OF PAGES INCLUDING COVER: 34 DATE: 8/5/02

TO:

NAME: Kelley Reid

PHONE: _____

FAX: 707-443-7728

FROM:

NAME: **Shella Merritt** / Leslie Wolf
EMAIL: **Hershellar.Merritt@noaa.gov**
PHONE: **(562) 980-4020**

FAX: **(562) 980-4027**

SUBJECT/COMMENTS: _____