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Staff Report:	April 23, 2004
Hearing Date:	May 13, 2004
Commission Action:	

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.:	**1-03-039**
APPLICANT (S):	**Clarence Westbrook and Harry Wetherell**
AGENT:	Frank Galea, Galea Wildlife Consulting
PROJECT LOCATION:	The upstream portion of the Woodruff Gravel Bar in the Smith River, 1.5 miles downstream from the Dr. Fine Bridge (US 101), in the Smith River Planning Area of Del Norte County. APNs 105-020-02, -03, & -21.
PROJECT DESCRIPTION:	Restore a historic deep-water pool by excavation of approximately 40,000 cubic yards of sand and gravel from the low-flow channel alongside upper Woodruff Gravel Bar in the Smith River. Approximately 5,000-10,000 cubic yards of the gravel removed to restore the pool would be used to fill in a dissection in the Woodruff Bar that is causing bar destabilization. The remainder of the aggregate removed would be sold to pay for the project and provide revenue to the Wetherell Ranch.
PLAN DESIGNATION:	RCA-1, General Resource Conservation Area.

ZONING:	RCA-2(e)(r), Designated Resource Conservation Area – Estuary, Riparian Vegetation.
LOCAL APPROVALS RECEIVED:	Del Norte County Use / Coastal Development Permit No. UP8969, renewed for five years on March 7, 2001.
OTHER APPROVALS RECEIVED:	State Lands Commission trust lands review; and California Department of Conservation - Office of Mine Reclamation reclamation plan review.
OTHER APPROVALS REQUIRED:	Del Norte County Use / Coastal Development Permit No. UP8969 annual mining plan authorization for 2004 season; California Department of Fish and Game Sec. 1603 Streambed Alteration Agreement; and U.S. Army Corps of Engineers Letter of Modification to Permit No. 28222N.
SUBSTANTIVE FILE DOCUMENTS:	*Smith River Gravel Study*, California Department of Water Resources, January, 1974; *Programmatic Mitigated Negative Declaration for Gravel Extraction on the Lower Smith River and Rowdy Creek*, County of Del Norte, July, 2000; *Biological Opinion – U.S. Army Corps of Engineers Letter of Permission Procedure to Permit Gravel Mining in Del Norte County, California*, National Marine Fisheries Service, September, 2003; *Public Notice – Letter of Permission Procedure to Permit Gravel Mining in Del Norte County, California*, U.S. Army Corps of Engineers, March 26, 2004; *2003 Gravel Extraction Salmonid Monitoring Surveys, Sultan, Huffman and Upper Woodruff Bars, Smith River, Del Norte County*, Galea Wildlife Consulting, January 25, 2002; and *Geomorphology and Hydrology Wetherell – Upper Woodruff Bar Salmon Habitat Restoration*, EGR & Associates, Inc. August 30, 2003.

SUMMARY OF STAFF RECOMMENDATION

Staff recommends that the Commission DENY the coastal development permit application for sand and gravel extraction on the basis that the proposed project is inconsistent with the Coastal Act.

The applicants seek authorization to conduct mineral extraction within the live waters of the Smith River, an environmentally sensitive area that provides aquatic habitat to a variety of fish and wildlife species and which could be easily disturbed or degraded by human activities and developments. The major issues raised by the application are: (a) whether the proposed development is consistent with Section 30236 of the Coastal Act which authorizes channelization, damming, or other substantial alterations of rivers and streams only for certain limited purposes, including developments where the primary function is the improvement of fish and wildlife habitat; and (b) whether the proposed development is consistent with Section 30233 of the Coastal Act which limits the allowable uses for the dredging and filling of open coastal waters, wetlands, and estuaries only for certain limited purposes including restoration purposes; (c) whether the mining and restoration as proposed is consistent with Section 30253 of the Act and would assure geologic stability and structural integrity and neither create nor contribute significantly to erosion, geologic instability, or destruction of the project site or surrounding area geologic stability; and (d) whether the proposed diversion of river water into a 48″ culvert during project construction would have significant adverse impacts on recreational boating on the river inconsistent with the public access policies of the Coastal Act.

Because of the low rainfall over the last four years and the lack of large precipitation events that result in flood-stage sediment-mobilizing flows, very little replenishment of sand and gravel materials has occurred along the lower Smith River gravel bars, including the subject Woodruff Bar site. As a result of this lack of replenishment, further skimming of the exposed gravel bar would compromise the channel's width-to-depth proportions setting the stage for significant changes in river morphology that could lead in turn to further impacts to sensitive habitat areas in and along the river, and to adjacent farmlands.

Given the current lack of material build-up on the exposed bar and following the Commission's denial in 2002 of a proposal for extract gravel from within a diverted reach of the main channel as being inconsistent with restrictions within the Coastal Act prohibiting mineral extraction from within environmentally sensitive habitat areas, the applicants have looked at other ways to undertake commercial gravel extraction that would concurrently incorporate habitat restoration and the improvement of fish and wildlife habitat as principal objectives. As a consequence, although the project is predicated upon a major portion of the sand and gravel materials extracted being made available for commercial sale as aggregate products, the development is also being proposed in the interest of restoring and improving fish and wildlife habitat.

Staff recommends that the Commission find that the proposed project is inconsistent with the Coastal Act and deny the proposed application for the following reasons:

- As the proposal to re-create the historic deep-water pool habitat and fill-in the breach within Woodruff Bar is dependent upon to the applicants being allowed to commercially sell 75 to 88 percent of the gravel materials extracted from the pool excavation that would not be utilized in filling the bar cross-channel, the proposed development does not constitute development where the primary function is the improvement of fish and wildlife habitat. Therefore, the development is inconsistent with Section 30236 as the development is not for one of the purposes for which Section 30236 allows substantial alteration of rivers and streams. No further analysis of the proposed project is required to find the development inconsistent with the policies and standards of the Coastal Act and support denial of the project. However, the Commission notes that even if the proposed uses of the site were consistent with the purposes for which Section 30236 allows the substantial alteration of rivers set out above, which it is not, the project is also inconsistent with other sections of the Coastal Act, as discussed below;

- Though proposed to restore habitat for migrating salmonid fish species, the in-stream excavations, diversion structure fill and channelization and other substantial alterations to excavate the proposed pool in the river would not likely result in meaningful restoration of salmon cold refugia habitat and would not, therefore, constitute "restoration purposes" as required by Section 30233(a)(7); and

- The development would interfere with the public's right of access to the sea and water-oriented recreational activities.

Staff believes the Commission cannot make the required findings under Sections 30236, 30233, and the public access policies of the Coastal Act. Therefore, staff recommends DENIAL of the application.

Commission staff continue to believe that the applicants could feasibly modify the proposed project to make it consistent with all applicable policies of the Coastal Act. For example, to demonstrate that the proposed trench excavation was sincerely being pursued foremost for purposes of restoring deep-water pool habitat rather than for other commercial ends, further consideration might have been given to self-scouring trench design features, such as digger logs or boulder wing-deflectors, that would help pool depth persist. An undertaking to both re-establish <u>and</u> sustain the historic cold-water refuge habitat along Woodruff Bar would more clearly be viewed as an earnest contribution to long-range recovery efforts for endangered and threatened fish species rather than to justify further excavation of sand and gravel materials for commercial sale and/or to create a sediment trap feature for capturing seasonal floodwater-transported sediment materials for extraction in future years. Such features would boost the

restoration's cost-benefit ration by reducing the frequency of the need to re-enter the main channel to conduct periodic dredging to maintain pool depth. In addition, by integrating such established in-stream habitat within the project design, the likelihood of the project's success would be heightened.

Additionally, had the habitat improvement and streambed stabilization measures been structured as part of a series of coordinated actions developed by a constituency of governmental, academic, industry, and interested party stakeholders for regionally improving and restoring habitat for salmonids throughout the entire Smith River hydrologic unit, not just a independent proposal focused solely on the project reach, then the primary purpose of the project would more reasonably concluded to be for the improvement of fish and wildlife habitat, as required by Section 30236, rather than principally a means to generate commercial income. As an element in a cooperative effort to provide region-wide benefits, the exclusive economic benefits derived from the sale of the surplus extracted materials would appear to be more of a secondary motivation and not the principal impetus for the project.

The applicants would also need to demonstrate that there is no feasible less environmentally damaging alternative to physically dredging-out the pool and would need to provide mitigation for any other significant adverse impacts of the project on riverine habitat as required under Section 30233(a). To produce an approvable project, the applicant would also need to further demonstrate that the project design would assure structural stability of the river channel morphology to enable the Commission to find consistency with Section 30253. In addition, the applicants would need to use a railroad flatcar or other free-spanning viaduct for vehicular access across the diversion channel and onto Woodruff Bar instead of a culverted crossing to ensure that public recreational boating access is protected and not interfered with as required by Sections 30210, 30211, and 30212.

The motion to adopt the Staff Recommendation for Denial is found on page 6.

STAFF NOTES

1. Jurisdiction and Standard of Review

The site of the proposed surface mining project is on the Woodruff Bar and within the perennial low-flow channel of the Smith River, 1.5 miles downstream of the State Highway 101 bridge. The project is located within the Coastal Commission's area of original or retained jurisdiction (see Exhibit No. 3). The standard of review is the applicable Chapter 3 policies of the Coastal Act.

2. Commission Action Necessary

The Commission must act on the application at the May 13, 2004 meeting to meet the requirements of the Permit Streamlining Act.

I. MOTION, STAFF RECOMMENDATION, AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

MOTION:

I move that the Commission approve Coastal Development Permit No. 1-03-039 pursuant to the staff recommendation.

STAFF RECOMMENDATION OF DENIAL

Staff recommends a **NO** vote. Failure of this motion will result in denial of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of the majority of the Commissioners present.

RESOLUTION TO APPROVE PERMIT:

The Commission hereby **denies** a coastal development permit for the proposed development on the ground that the development will not conform to the policies of Chapter 3 of the Coastal Act. Approval of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

II. FINDINGS AND DECLARATIONS.

A. Site Description and Project History.

The project site comprises an approximately ¼-mile reach of the perennial low-flow channel of the lower Smith River together with the upstream portion of the Woodruff Gravel Bar, located about 1½ miles downstream and west of the Dr. Fine Memorial Bridge crossing of Highway 101 in Del Norte County (see Exhibit Nos. 1 and 2). The Woodruff Bar is one of five gravel bars that are located within the coastal zone along the lower reaches of the Smith River. The Smith River enters the Pacific Ocean about 3.5 miles south of the Oregon border. The river has the greatest annual discharge per square mile of any major California basin. The run-off is estimated at 2.9 million acre-feet annually. The river has no exports of surface water, and therefore it has come to be

known as one of the cleanest and most pristine rivers in California, especially on its upper reaches. The lower Smith River flows in a roughly south-southeast to north-northwest direction through the Smith River Plain, a large uplifted marine terrace consisting of the Tertiary- to Quaternary-aged Battery and St. George Formations. This broad alluvial floodplain is extensively used for agriculture.

The project site is within the Commission's retained permit jurisdiction and is not governed by the certified LCP. Lands adjacent to the project site have land use plan designations of Prime Agriculture and Resource Conservation Area (AE, RCA), implemented through a Designated Resource Conservation Area – Estuary, Riparian Vegetation, (RCA-2 (e)(r)) zoning district.

In its present configuration, the perennial main channel of the Smith River runs along the southwestern side of the Woodruff Bar with a seasonal high-flow channel flanking its northeastern side. From bank to bank, the river is about 600-700 feet wide in the area of Woodruff Bar. However, during the summer and early fall months when low flow conditions prevail, the river is confined to a main channel of approximately 100 to 200 feet in width. The seasonal high-flow channel is dry during the summer and early fall gravel extraction season. Two secondary low-flow channels that are shallowly wetted during the dry season flow across the bar roughly dividing the stream feature laterally into thirds. As the river rises, the direction of flows changes from being routed tangentially around the bar through the main channel in a north-northwesterly direction to diagonally east-southeast to west-northwest across the bar through the secondary channels.

Access to the gravel bar is currently via an unimproved gravel road that crosses the seasonal channel and ascends the riverbank to a levee road leading to Fred Haight Drive. An approximately 4-acre (300-ft.·600-ft.) cleared and graded stockpiling area lies off of the access road approximately 250 feet from the riverbanks (see Exhibit Nos. 2 and 3).

The banks of the river are 20-30 high and are covered with well-established riparian vegetation dominated by a Sitka willow (Salix sitchensis) and red alder (Alnus rubra) plant community. These dominants are interspersed with tan oak (Lithocarpus densiflora) and firs (Abies sp.), with an understory composed primarily of Himalaya blackberry (Rubus discolor), California blackberry (Rubus ursinus), French broom (Genista monspessulana), coyote brush (Baccharis pilularis), and various forbs, ferns and upland grasses.

The riparian vegetation found on the gravel bar consists of two plant associations, a permanent palustrine scrub-shrub complex encompassing three contiguous acres along the northeastern side of bar. In addition, six acres of non-persistent palustrine scrub-shrub complex occur in four discrete areas on the northwest, east, and southeast sides of the bar. These areas range in size from approximately ½-acre to 2½ acres in size and

contain riparian vegetation, chiefly small Sitka willows (Salix sitchensis), with ½-inch to one-inch stem diameters-at-breast-height (see Exhibit No. 3).

The proposed project area was the subject of a wetlands investigation conducted in July, 1995, by Karen Theiss and Associates, Biological and Environmental Consultants. An updated vegetation assessment for the project site was prepared by Natural Resources Management Corporation (NRMC) in April, 2000 and January, 2001, and field-checked by the applicants' biological consultant in May, 2001. Among other observations, these investigations note that the bar is subject to hydrologic scouring during high flow periods over the winter and early spring seasons during normal rainfall years. This regime causes vegetative cover on the site to be limited to low-water vegetation characterized mostly by herbaceous and scattered young willows. All portions of the proposed extraction and fill sites are located a minimum of 100 feet from any of the riparian vegetation environmentally sensitive areas on the site.

The applicants have mined the upper portion of Woodruff Bar only sporadically in recent years, with approximately 40,000 cubic yards extracted during the 2000 season, within the 60,000 cubic yards/year limit imposed by Coastal Development Permit 1-00-005 and other permitting agencies, and approximately 15,000 cubic yards removed during the 2001 season. Past volumetric assessments (Larue, 1997, 1998, 1999) indicate that in previous years, in excess of 60,000 cubic yards of material was available within the proposed extraction area. However, due to low rainfall during the winter months over the last four years and a corresponding drop in river flows, little replenishment of the Woodruff Bar has occurred since the 2000 mining season. For the 2002 mining season, the applicants proposed to extract upwards of 28,400 cubic yards of aggregate materials from the gravel bar margin and adjacent low-flow channel. The Commission denied a permit for this development finding that the proposed commercial mining would have entailed mineral extraction within an environmentally sensitive habitat area, contrary to the standards of Section 30233(a)(6) the Coastal Act. Furthermore, based upon the information submitted, the Commission concluded that the application had not adequately demonstrated that the project was a legitimate restoration project and that potential geologic instability impacts would be avoided or mitigated to less than significant levels.

B. Project Description.

Because of the low rainfall over the last four years and the lack of large precipitation events that result in flood-stage sediment-mobilizing flows, very little replenishment of sand and gravel materials has occurred along the lower Smith River gravel bars, including the subject Woodruff Bar site. As a result of this lack of replenishment, further skimming of the exposed gravel bar would compromise the channel's width-to-depth proportions setting the stage for significant changes in river morphology that could lead in turn to further impacts to sensitive habitat areas in and along the river, and to adjacent farmlands.

Given the current lack of material build-up on the exposed bar and following the Commission's denial in 2002 of a proposal for extract gravel from within a diverted reach of the main channel as being inconsistent with restrictions within the Coastal Act prohibiting mineral extraction from within environmentally sensitive habitat areas, the applicants have looked at other ways to undertake commercial gravel extraction that would concurrently incorporate habitat restoration and the improvement of fish and wildlife habitat as principal objectives. As a consequence, although the project is predicated upon a major portion of the sand and gravel materials extracted being made available for commercial sale as aggregate products, the development is also being proposed in the interest of restoring and improving fish and wildlife habitat.

The applicants propose to recreate a roughly 10- to 20-foot-deep, 50-to 175-foot-wide pool flanking the southwestern side of Woodruff Bar in the location of a previous "hole" that existed in this location prior to being filled-in with material deposited from sediment-laden flood waters during the 1964 flood. The applicants contend that the recreated pool would provide deepwater habitat for rare and endangered salmonid fish species as they migrate through this reach of the river. In addition, the applicants propose to place a portion of the materials excavated from the pool onto the mid-section of Woodruff Bar within a diagonal cross-bar channel that formed in recent years as the result of the improper diversion of river flows during the removal of temporary channel crossings installed for gravel truck access during past-bar-skimming operations at the site. If this breach in the bar is not repaired, the channel may eventually expand to capture the river's main channel and re-direct the main erosive flows of the river towards the flood-control levee along the southwestern bank, possibly leading to its eventual failure. In addition to causing the inundation of significant areas of agricultural lands, such a failure could significantly alter the river channel downstream, further eroding the banks and adversely affecting the riparian habitat of the river.

To accomplish these objectives, the applicants request authorization to remove up to 40,000 cubic yards[1] of river-run sand and gravel aggregates during the 2004 mining season from a teardrop-shaped 800-foot-long excavation area to be located within the year-round main channel of the Smith River. As proposed, the excavation would comprise a 300-foot-long · 50-foot-wide · 10-foot-deep upstream section, a 200-foot-long · 100-foot-wide · 15-foot deep middle section, and a 300-foot-long · 175-foot-wide · 20-foot-deep downstream section, with 20- to 30-degree side slopes and a 1:10 head slope.

The applicants state that the proposed wet-trenching technique was suggested by and designed in consultation with the National Marine Fisheries Service (NOAA Fisheries)

[1] Assuming idealized prismatic cross-sections, and depending upon the actual side slope contours utilized, the described trench area would yield a total of approximately 32,900 to 39,460 cubic yards of aggregate materials if fully excavated to the dimension ranges stated in the permit application.

and the California Department of Fish and Game (CDFG). A further discussion of gravel extraction methods follows in Findings Section II.C, below.

The roughly ¼-mile-long diversion/extraction area would first be separated from the live waters of the river by placement of approximately 20 10-foot-lengths of concrete "k-rails" across the main channel at the upstream end of the diverted reach at two constrictions in the river near the head of Woodruff Bar (see Exhibit No. 4). The "k-rail" barriers would divert water towards the secondary high-flow channel that separates the bar from the northwestern bank of the river. The barriers would be placed in such a fashion to allow an unquantified volume of river water to trickle into and through the diverted reach to prevent interstitial habitat for aquatic organisms within the riverbed gravels from becoming desiccated.

A temporary crossing would need to be constructed so that excavation equipment and personnel could gain access to the bar without having to pass through the redirected river flows. The applicants propose to install a culverted crossing over the diversion channel consisting of an approximately four to five-foot-high bermed-up abutment approaches, formed from gravel materials taken from the exposed portions of the bar, graded up to and over a 48-inch-diameter corrugated metal pipe set at-grade within the secondary diversion channel (see Exhibit No. 4). Consequently, recreational boating passage through the project site would entail either a lengthy portage around the margins of an active mining operation, or, for those kayakers and other boaters wishing to remain in their craft, making a potentially hazardous run beneath the access route through the culvert in the diversion channel conveying the concentrated river flows. The applicants opine that disruption of recreational boating access will be less than significant because very few boaters utilize the lower reaches of the river during the time of year when mining activities would be conducted.

Once the river waters have been diverted into the secondary channel alongside the northeast side of the gravel bar, excavation of the deep-water pool would then be accomplished by mechanized equipment, such as excavators, bulldozers or front-end loaders stationed along the southern side of the exposed bar. Approximately 5,000 to 10,000 cubic yards of the excavated material would be replaced onto the upper Woodruff Bar to fill in the diagonal cross-bar channel that is beginning to bisect the bar. The remaining 30,000 to 35,000 cubic yards of sand and gravel excavated from the trench would be loaded onto dump trucks and transported to the stockpile area in the upland areas along the northern riverbank for further processing (i.e., screening, crushing, washing). The processing operations would be performed in Del Norte County's coastal development permit jurisdiction pursuant to County Conditional Use Permit No. UP-8949C. Upon completion of the mining, the diversion barriers would be removed to allow river waters to return to the deepened main channel. Once the river flows have been returned to the main channel, the temporary crossing berms and culverts would similarly be removed from the bar.

No further information was provided as to what reclamation and winterization work would be conducted upon the completion of the restoration and gravel extraction phases. Generally, following the end of the extraction season by early- to mid-October, the mining operator would be required by the permitting agencies to remove all equipment from the extraction site and smooth out any temporary stockpiles, pits or mounds formed on the bar during mining activities. This action is required under both the Corps' LOP procedure and the CDFG Streambed Alteration Agreement to avoid potential water quality impacts, instigation of erosion of the bar or channel relocation during winter-spring higher flows, and to prevent the stranding of fish when the river level recedes in late spring.

C. Smith River Resource Issues and Regulatory Background.

Resource Utilization

The Smith River has 11 gravel bars that have been mined on a regular or periodic basis since 1914. Five of these bars are located on the lower Smith River within the coastal zone (i.e., downstream of the Highway 101 / Dr. Fine Bridge). The gravel bars on the Smith River contain a renewable resource of cobbles, gravel, sand, and other rock-derived products. There has been an on-going demand for gravel and aggregate products within Del Norte County because of the construction of a variety of private developments and public facility improvements.

The Smith River and its tributaries are ranked among the most significant anadromous fisheries in Northern California. Chinook salmon (Oncorhynchus tshawyscha), coho salmon (Oncorhynchus kisutch), Klamath Mountain Province steelhead (Oncorhynchus mykiss irideus), and coastal cutthroat trout (Oncorhynchus clarki clarki) are among the most important species with regard to commercial and sports fisheries. The project area and the lower Smith River are mainly utilized by anadromous fish as a migration route to and from upstream spawning grounds. Most spawning areas along the lower Smith River have previously been lost due to sedimentation of this river system, although some main stem spawning use does occur by Chinook salmon.

In addition to the fish and wildlife habitat the river affords, the Smith River is also recognized for its significant recreational and aesthetic values. In 1972, the Smith River was included in the original listing of waterways under the California Wild and Scenic Act (PRC §5093.50 *et seq.*). The reach of river passing through the project site is classified as "recreational." PRC Section 5093.53 defines recreational rivers or river segments as: "...those rivers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past." Restrictions on land uses along recreational rivers are not as stringent as those on their "wild" or "scenic" counterparts, and are primarily limited to prohibiting the construction of dams or other permanent diversion structures. The protection and enhancement of recreational uses are stressed

with particular emphasis placed on ensuring that river front development does not block or impede recreational access within navigable waters.

The Smith River also provides domestic water supply to many residents of northern Del Norte County, including the City of Crescent City, the unincorporated town of Smith River, and Pelican Bay State Prison. Water is drafted from the river's aquifer through subsurface "Ranney Well" pumps operated by the City of Crescent City and several other community services districts. The service areas' current (1997) combined water consumption rate is approximately 62 million gallons per month.

Gravel Extraction Methodologies

Gravel bar extraction operations are seasonal activities. The gravel extraction season usually runs from June 1st to October 15th of each year. This period of time coincides with low water conditions on the river when substantial portions of the gravel bars are exposed and are above the live waters of the river.

Because of the dynamic nature of sediment transport within river systems, an adaptive management approach has been used in determining both the most appropriate locations for mining to occur and the least environmentally damaging extraction method to be used. In the past, the applicants have taken gravel from the Woodruff Gravel Bar using skimming operations, trenching operations, or a combination of both methods. Over the last decade, due to regulatory concerns about past trenching operations, the bar-skimming method has become the primary method of taking gravel from river bars.

Gravel removal by skimming occurs outside of the low-flow channel of the river. In skimming operations at the site, the operator skims gravel from the top of the bar in a manner that creates a shallow-sloped plain rising gently back from the river to the landward edge of the bar. Gravel removal equipment includes front-end loaders, scrapers, pushcats, excavators, or equivalent equipment. Gravel is transported from the extraction site by dump trucks or off-road trucks and stockpiled on the upland portion of the subject property. After completion of gravel extraction operations, the applicants return the gravel bar to a smoothly graded condition, sloping toward the main channel at no less than a two-percent grade, and without any pits, potholes, trenches, mounds, or stockpiles to prevent the creation of fish traps.

However, bar-skimming should not necessarily be viewed as an environmentally-superior mining technique compared to other forms of extraction. To the contrary, in situations where adequate replenishment has not occurred and the gravel bar profile has been lowered to within one to two feet of the water's surface, continued skimming on the bar could compromise the channel confining properties that the bar affords. If unabated, the loss of vertical diversity within the stream cross section may instigate major alterations in water flow and bedload depositional patterns, resulting in the formation of a shallow, multi-channeled riverbed configuration, or causing other changes in stream morphology

with associated impacts to fish and wildlife habitat and water quality. Accordingly, bar-skimming should only be used when site conditions support its application.

By contrast, trenching involves the excavation-at-depth of aggregate materials. Removal equipment is usually limited to back-hoes and excavators stationed along the side of the area to be trenched. Materials are generally removed off of the bar by lifting materials with the equipment bucket and placing them directly into a nearby dump truck for transport from the mining site. Trenching can take several forms: (1) "dry-trenching," in which a pit is dug wholly within the bounds of the exposed gravel bar; (2) "wet-trenching," where an area within the wetted channel of the river is de-watered by diversion of the river waters around the site and aggregate materials are removed directly from the riverbed; and (3) "alcove trenching," wherein an off-channel backwater area is excavated at the downstream end of the point bar to create a deep cold-water pocket in which fish may hold during migration periods. In addition, a "modified dry-trenching" technique has also been authorized in the past, where gravel materials are removed from the areas along the margins of the bar that have been separated from the river's waters by coffer damming, water-filled barriers, sheetpile bulkhead, or other types of impoundments.

The applicants propose to perform wet-trenching within a low-flow channel on the seasonally exposed portions of the bar during the 2004 extraction season. Trenching operations have been proposed in the past to: (1) encourage future gravel recruitment; (2) increase the hydraulic capacity of the low-flow channel; (3) create deep-water habitat for aquatic species; and (4) maintain the geomorphology of the river's bar and riffle, bank, and channel configuration. Trenching has been undertaken at various sites along the Smith River as recently as 2001.

Regulatory Chronology

Beginning in 1975 with the adoption of the Surface Mining and Reclamation Act or "SMARA" (PRC §2710 *et seq.*), the regulation of gravel mining has been a steadily evolving process. Reauthorization and amendments to the Federal Clean Water Act (CWA) in the early 1990's saw the U.S. Army Corps of Engineers (USACOE) becoming more actively involved in regulating many in-stream gravel operations under the auspices of the CWA Section 404 permit program. The extent of the Corps' CWA Section 404 authority with respect to in-stream gravel mining has subsequently been addressed and modified through several judicial rulings known as the "Tulloch Ruling Decisions."

Until the 1990's, there had been little coordinated review of the combined effects of the various gravel mining operations. An in-stream gravel mining operation can require the approval of a number of different agencies. Permits granted prior to the 1990s by the various approving agencies were site-specific and granted with little acknowledgement of the cumulative effects of gravel mining.

California Department of Fish and Game Lake or Streambed Alteration Agreements

The California Department of Fish and Game (CDFG) is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the State Legislature in the 1960's enacted Sections 1600 through 1607 of the California Fish and Game Code. These statutes requires that any person, business, state or local government agency, or public utility who proposes an activity that may impact a river, stream, or lake to notify the CDFG prior to commencing the activity. Notification to CDFG is required for activities that will: (a) divert, obstruct, or change the natural flow or the bed, channel or bank of any river stream or lake; (b) use material from a streambed; or (c) result in the disposal or deposition of debris, waste, or other material where it can pass into any river, stream, or lake.

If CDFG determines that the project may adversely affect existing fish or wildlife resources, a Lake or Streambed Alteration Agreement is required. An agreement is first drafted by the Department containing a list of measures needed to be taken to ensure that fish and wildlife resources are protected. Department staff will then generally work with project proponent to find a mutually acceptable solution, offering suggested ways to modify the project so that harmful impacts to fish and wildlife resources would be eliminated or reduced.

Once the Lake or Streambed Alteration Agreement has been executed between the Department and the project proponent, and all other legal requirements have been satisfied (i.e., the securement of other related permits and authorizations), the proposed activity may be undertaken.

Following the order issued by the County of Mendocino Superior Court on February 3, 1999, in Mendocino Environmental Center, EPIC, *et al.* v. California Department of Fish and Game, CDFG initiated changes in its Section 1603 Streambed Alteration Agreement process. The Department now conducts a tiered environmental review of such projects pursuant to the California Environmental Quality Act (CEQA).

County of Del Norte Surface Mining and Reclamation Program

The County of Del Norte regulates surface mining and quarries as a conditional use pursuant to Title 7, Chapter 7.36 of the Del Norte County, adopted as Ordinance No. 77-16 on April 15, 1977. The ordinance contains operational standards and limitations for mining and reclamation activities for the purpose of "keeping with the protection of the public health, safety, convenience, and general welfare." Conditional use permits for gravel mining may be issued for terms up to five years, subject to an annual review of the mining operation's compliance with permit conditions.

In 1999, the County of Del Norte began updating its environmental documentation for the 11 Smith River gravel operations. A programmatic Mitigated Negative Declaration was adopted July 7, 2000. This document updates the previous project analyses conducted

during the late 1980's and early 1990's, and incorporates mitigation and monitoring provisions in response to changes in regulatory programs, environmental review requirements, and federal and state threatened and endangered species listings (i.e., coho salmon, steelhead) which have occurred since their preparation. Under the current mitigation and monitoring programs, assessments of river and habitat conditions are conducted annually by the County's hydrologist in consultation with other resource agencies to determine appropriate quantities and areas for extraction for the upcoming season.

U.S. Army Corps of Engineers Letter of Permission Procedure and Section 7 Consultation with NOAA Fisheries and USFWS

In the fall of 1993, due to an amendment to the Army Corps of Engineers Clean Water Act Regulatory Program, the Army Corps of Engineers (Corps) became more involved in regulating gravel extraction operations. Whereas previously, the Corp's regulatory review of many in-stream gravel extraction operations focused mainly on the installation of channel crossings and stockpiling of material on the river bar, in 1993, the Corps began actively regulating incidental fill related to gravel mining activities themselves. In an effort to streamline the processing of Corps permits for numerous in-stream gravel operations within Del Norte County, the Corps adopted a Letter of Permission (LOP) procedure for authorizing such projects. On March 28, 1997, the USACOE issued a Letter of Permission No. 96-2 for the Del Norte County in-stream gravel mining operations which established a programmatic framework of extraction performance standards alleviating the need for individual Section 404 permits. The original LOP ran for a five-year period and was due to expire on March 22, 2002. As discussed below, the LOP was subsequently extended and renewed. The original LOP was adopted after a series of interagency and public meetings. Under the procedure, an applicant for a project covered by the LOP must submit yearly gravel plans and monitoring information to the Corps for approval. The Corps LOP procedure incorporates the County's review process outlined above.

As with all "federal actions" that might adversely impact rare, threatened, and endangered fish and wildlife, the LOP process is also subject to consultations with applicable natural resource trustee agencies as required under Section 7 of the Federal Endangered Species Act (FESA). FESA Section 7 directs all Federal agencies to use their existing authorities to conserve threatened and endangered species, and, in consultation with other federal agencies possessing ecological expertise regarding ecology and habitat requirements for these plants and animals, ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of Federal lands as well as other Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal permits, licenses, or other actions such as the proposed LOP gravel mining authorization procedure.

The consultation process primarily consists of the agency undertaking the action compiling biological assessment data detailing the current status of the fish and wildlife species within the area subject to the federal agency action and a preliminary assessment of the likely effects of the action on those species. This information is then submitted to the particular resource agencies assigned the responsibility for ensuring protection to the various FESA-listed species.

The National Marine Fisheries Service (NOAA Fisheries) issues a Biological Opinion regarding impacts of gravel extraction as proposed to be authorized by the LOP to listed salmonid species. Mitigation measures identified within the biological opinion are incorporated into extraction requirements of the LOP. As more information is gathered or conditions change with respect to the affected listed species, NOAA Fisheries may initiate consultation wherein a revised interim Biological Opinion is issued, revising operational standards and limitations as may be required to ensure protection of the listed species.

The National Marine Fisheries Service originally issued a Biological Opinion (Opinion) for the Letter of Permission Procedure for Gravel Mining and Excavation Activities within Del Norte County, California (LOP 96-2) in July, 1997. By the late 1990's the listing and candidacy of several anadromous salmonid fish species by the National Marine Fisheries Service (NOAA Fisheries) resulted in habitat and incidental take consultation requirements under the Federal Endangered Species Act (FESA) to be applied to riverine activities such as gravel mining. These actions included the May 1997 listing of the SONCC coho salmon as a threatened species. On September 12, 1997, NOAA Fisheries issued a new Biological Opinion regarding the USACE's LOP, finding that the implementation of the Corps' gravel mining letter of permission was not likely to jeopardize the continued existence of threatened SONCC coho salmon during the authorized period of mining.

Several other Endangered Species Act listing actions occurred subsequent to the issuance of NOAA Fisheries' 1997 Opinion. In March 1998, the Klamath Mountain Province steelhead trout became a candidate for FESA listing. NOAA Fisheries subsequently determined that listing of the species was not warranted. In response to the designation of critical habitat areas for the SONCC coho salmon, on September 23, 1999, the USACOE requested NOAA Fisheries to re-initiate consultation again on the Corps' Letter of Permission. NOAA Fisheries contracted a study to review the efficacy of regulatory efforts to protect listed fish species to date. On September 5, 2000, NOAA Fisheries issued a third Biological Opinion covering the 2000 and 2001 extraction seasons. The study concluded that the Corps' gravel mining regulatory program was not likely to jeopardize the continued existence of threatened SONCC coho salmon during the authorized period of mining. In June, 2001, the Corps extended the expiration date of LOP 96-2 to cover the entire 2001 mining season and requested that NOAA Fisheries amend the Biological Opinion to analyze the effects of the proposed extension of the LOP. The revised Biological Opinion was issued late in 2001.

NOAA Fisheries began working with the Corps, other agencies, and Del Norte County gravel operators and their consultants during the winter of 2001-2002 on a replacement LOP procedure originally anticipated to be in place for the 2002-2007 extraction seasons (LOP 2002-2). A draft LOP 2002-2 was circulated for public comment in May, 2002 at which time it became apparent to involved agencies that several issues could not be resolved prior to the 2002 mining season. As a result, to enable gravel extraction to be authorized for the 2002 gravel mining season, the Corps decided to further extend LOP 96-2 (re-enumerated as "LOP 96-2a") through December 31, 2002 to cover the 2002 mining season. The Corps requested that NOAA Fisheries again amend the 2000 Biological Opinion to analyze the extended duration of LOP 96-2a. The requested amended opinion was issued on August 16, 2002 with a conclusion that extending the LOP 96-2 procedures for gravel mining operations during 2002 "is not likely to jeopardize the continued existence of SONCC coho salmon or destroy or adversely modify its designated critical habitat."

In response to a consultation request from the Corps of Engineers circulated in late 2002, in September 2003, NOAA Fisheries issued a Biological Opinion addressing the effects that riverine mining activities in Del Norte County for the period of 2003 through 2007 under renewed LOP-2002-3 (now re-enumerated as LOP 2003-2) would have on listed fish species and essential fish habitat (see Exhibit No. 6). Under the preceding LOP 97-2, extraction for gravel mining purposes was restricted to skimming of exposed point bars and the areas "adjacent to the active channel of the Smith River, but remain outside of the wetted channel for all other waters." LOP 97-2 also provided for berms to be established to separate the extraction area from the active portion of the river. This latter extraction method has come to be referred to as "modified dry trenching" in past Commission permitting actions.

By contrast, LOP 2003-2 allows mining within a wider variety of settings, including within wetted low-flow channels, insofar as such projects are located "where geomorphic processes would normally result in pool formation and maintenance, as determined by a qualified hydrologist or geomorphologist." This program change ostensibly allows for trenching beyond the bar margins within the live water low-flow channel subject to prescribed performance standards recommended within NOAA Fisheries' Biological Opinion. These performance standards were incorporated as conditions within the Corps' final LOP document, issued March 26, 2004 (see Exhibit No. 5). These performance standards include:

- Locating the trenches a sufficient distance from riffles to protect the landforms from head-cutting that could adversely affect their elevation and stability;

- Limiting trench excavation to the period of July 15 to August 30 to minimize and buffer against impacts to migrating or rearing adult and juvenile salmonids;

- Placing large woody debris or boulders placed within the trenches following completion of excavation to provide habitat for holding or rearing adult and juvenile salmonids;

- Completely and entirely removing the berm or other containment and/or diversion structures from the channel once in-stream gravel extraction has been completed and suspended sediment has been allowed to fully settle;

- Leaving a layer of gravel on the bottom of the excavated trench; and

- Making the approval of any trenching proposals contingent upon a NOAA Fisheries-approved fish relocation plan.

Listing of Coho Salmon Under the California Endangered Species Act

On July 28, 2000, the California Fish and Game Commission (CFGC) received a petition from the Salmon and Steelhead Recovery Coalition requesting that the coho salmon north of San Francisco (i.e., Southern Oregon / Northern California Coast Environmentally Significant Unit or "SONCC Coho ESU") be listed as an endangered species under the California Endangered Species Act (CESA). The petition described runs of coho as having declined 90 percent in the past 30 years, to stand at 1 percent of the historic levels. CFGC subsequently forwarded the petition to the California Department of Fish and Game (CDFG) to review the petition and determine whether acceptance of the petition would be appropriate. On April 5, 2001, the CFGC accepted the petition for listing, initiating a 12- to 14-month review period by CDFG in which appropriate recommendations on the requested listing were to be developed. During that period, the protection granted to listed species under the CESA was extended to candidate species, specifically prohibiting taking of the species without the express consent of CDFG.

On April 27, 2001, the CFGC published a notice of findings declaring the coho a candidate species. Pursuant to Section 2084 of the Fish and Game Code, CDFG also adopted a Statement of Proposed Emergency Regulatory Action for the species' candidacy period. The so-called "2084 rules" establish a variety of performance standards for various types of in-stream activities, including gravel mining, that are to be required as part of any Streambed Alteration Agreements issued by CDFG. The standards are intended to minimize potential impacts to the coho during its listing candidacy.

In April 2002, the CDFG released Candidate Status Review Report 2002-3, "Status Review of California Coho Salmon North of San Francisco." The report concluded that CDFG had found that while a CESA "endangered" listing was not warranted at this time, the SONCC Coho ESU was in serious danger of becoming extinct throughout all or a significant portion of its range. Accordingly, CDFG recommended that the CFGC list the SONCC Coho ESU as "threatened." The CFGC subsequently took action at the August 30th meeting, listing the coho as an endangered species in the area between San Francisco

Bay and Punta Gorda and threatened between Punta Gorda and the California-Oregon border. To allow time for preparation of a recovery plan on how best to protect the coho, the CFGC placed a suspension on the listing to allow additional time for preparation of the recovery plan.

Subsequently, the CDFG Director initiated a multi-stakeholder statewide Coho Recovery Team (CRT) to make recommendations for a recovery plan. On August 28, 2003, The Department presented the *Recovery Strategy for California Coho Salmon* to the Fish and Game Commission, a document compiling the findings and recommendations developed by the CRT (see Exhibit No. 7). After receiving the Department's report and considering and responding to public comments and public testimony on the Recovery Strategy document, at its regular meeting of February 4, 2004, the Fish and Game Commission approved the recovery strategy and authorized its staff to publish notice of the Commission's intent to amend Title 14, Section 670.5 of the California Code of Regulations to formally list the SONCC ESA coho as a threatened species and hold requisite hearings on the listing (see Exhibit No.8). As of the date of the writing of this report, a final listing of the SONCC ESA coho remains pending.

Coastal Development Permit Authorization

The proposed project requires a coastal development permit from the Commission because the proposed mining and extraction activities are specifically enumerated in the Coastal Act definition of development that requires a coastal development permit pursuant to Sections 30106 and 30600 of the Coastal Act and because the gravel bar is located within the Commission's area of original or retained permit jurisdiction (see Exhibit No. 3). As described in detail above, the project before the Commission calls for: (1) diverting an approximately 1,270-foot-long area of the main channel of the lower Smith River with a series of concrete traffic control "k-rail" barriers; (2) extracting approximately 40,000 cubic yards of sand and gravel for by wet-trenching from an 800-ft.-long teardrop-shaped excavation area within the de-watered main river channel; (3) placing approximately 5,000 to 10,000 cubic yards of the materials to be extracted from the river channel onto the middle portion of upper Woodruff Bar to repair a diagonal cross-bar channel that has formed due to past mining activities and is destabilizing the channel-confining form and function of the landform; and (4) transporting the net 30,000 to 35,000 cubic yards of materials extracted from the main channel for processing and commercial sale as aggregate products.

All processing and stockpiling of the excavated materials would be performed away from the gravel bar and outside of the Coastal Commission's permit jurisdiction. The project requires a separate coastal development permit from Del Norte County for temporarily stockpiling and processing the materials at an upland portion of the applicants' property. The local coastal development use permit for processing and stockpiling of materials at an upland location was approved by the County in June 2, 1999 for a term of seven mining seasons, expiring on February 1, 2006. This local approval was not appealed to the Commission. The applicants are in the process of obtaining an annual review by the

County of their proposed extraction activities for the 2002 season (i.e., extraction stockpiling, and aggregate materials processing) pursuant to the requirements of the use permit.

Inter-agency Coordination

The regulatory developments described above underscore how close multi-agency review coordination and a comprehensive approach to river management of in-stream surface mining projects may be the only way in which permitted operations will be sustainable in the future. To this end, beginning in the Spring of 2001, meetings between the various regulatory agencies involved in Smith River mining were initiated. The purpose of these workshops was to foster a greater understanding of the roles and concerns of each agency and to promote greater efficiency in the review and permitting of gravel mining proposals. Among others, participants included staff from the USACOE, CDFG, NOAA Fisheries, U.S. Fish and Wildlife Service, California Department of Conservation – Office of Mine Reclamation, County of Del Norte, City of Crescent City, the University of California – Sea Grant Program, and the Coastal Commission.

D. Development within Coastal Rivers and Streams.

Section 30236 of the Coastal Act. Section 30236 provides that:

> *Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (l) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat*. [emphases added]

Section 30236 sets forth a number of different limitations on what projects may be allowed that cause substantial alteration of rivers and streams. For analysis purposes, a particular development proposal must be shown to be: (1) for a necessary water supply project; (2) for certain specified flood control projects; or (3) primarily for fish and wildlife habitat improvement. In addition, the development must incorporate the best mitigation measures feasible.

The proposed project is not proposed as a water supply project and would have no effect on water supplies. In addition, although preventing future damage to a flood control levee is cited as a rationale for filling-in the cross-channel forming on Woodruff Bar, the proposed development is not proposed as a flood control project and has not been shown to have any positive effect on actual flooding. Although the application portrays the channelizations as being for improvement of fish and wildlife habitat, the primacy of such improvement among the project objectives has not been established. The project proposes that 75 to 88% of the total 40,000 cubic yards of gravel to be excavated be

utilized for commercial sale. Furthermore, the applicants have indicated that the proposed restoration work would not be undertaken unless allowances for selling the surplus extracted materials not utilized on the Woodruff Bar are included in the Commission's action on the permit. As the vast majority of the gravel to be excavated would be utilized for commercial purposes and the applicants indicate the project would not be undertaken unless allowances are made for commercial sale of the gravel, the Commission finds that the primary purpose of the project is commercial gravel extraction rather than the improvement of fish and wildlife habitat. The Commission further finds that as the primary purpose of the stream channel development is not the improvement of fish and wildlife habitat, and the development is not a flood control project or a necessary water supply project, the streambed development proposed is inconsistent with Section 30236 of the Coastal Act.

The Commission notes that while the proposed project is not consistent with the provisions of Section 30236, other development proposals that might include gravel extraction for the improvement of fish and wildlife habitat may very well be found to be consistent with Section 30236 provided that "primary function" of the project work is found to be for "the improvement of fish and wildlife habitat."

No further analysis of the proposed project is required to find the development inconsistent with the policies and standards of the Coastal Act and support denial of the project. However, the Commission notes that even if the proposed uses of the site were consistent with the purposes for which Section 30236 allows the substantial alteration of rivers set out above, which it is not, the project is also inconsistent with other sections of the Coastal Act, as discussed below.

E. Dredging, Diking, and Filling in Wetlands and the Protection of Riverine Environment.

As presented in the application, the proposed project involves surface mining extraction of sand and gravel within the Smith River streambed using heavy mechanized equipment for grading and dredging operations. The operation is portrayed as having restoration benefits as the extraction would result in the creation of cold deep-water holding habitat for salmonids. Several Coastal Act policies address protection of the portion of the river environment below the ordinary high water mark from the impacts of development such as gravel mining. These policies include Sections 30231 and 30233. Section 30231 applies generally to any development in riverine environments and other kinds of water bodies in the coastal zone. Section 30233 applies to any diking, filling, or dredging project in a river and other coastal waters. Gravel extraction within a riverbed is a form of dredging within coastal waters and wetlands. Depending upon the nature of the proposed work, restoration activities within a streambed are similarly a recognized form of permissible dredging, diking, and/or filling within coastal waters and wetlands.

Section 30231 of the Coastal Act states, in applicable part:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes... shall be maintained and, where feasible restored...*

Section 30233 of the Coastal Act states, in applicable part:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> ...
>
> *(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.*
>
> *(7) Restoration purposes...*
>
> ...
>
> *(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary...* [emphases added]

The above policies set forth a number of different limitations on what fill, dredging, channelization, damming, and watercourse alteration projects may be allowed in coastal waters. For analysis purposes, the limitations can be grouped into four general categories or tests. These tests are:

1. That the purpose of the fill and dredging is for one of the eight use categories enumerated under Section 30233(a);

2. That feasible mitigation measures have been provided to minimize the adverse environmental effects;

3. That the project has no feasible less environmentally damaging alternative;

4. That the biological productivity and functional capacity of the habitat shall be maintained and enhanced where feasible; and

As discussed below, the Commission finds that the proposed development is inconsistent with test 1, in that the purpose of the fill and dredging project is not for one of the eight use categories enumerated under Section 30233(a).

1. Permissible Use for Dredging of Open Coastal Waters and Wetlands

The first test set forth above is that any proposed fill, diking or dredging must be for an allowable purpose as enumerated under Section 30233 of the Coastal Act. The proposed project involves dredging, diking, and filling of wetlands for mineral extraction and restoration purposes. Surface mining of gravel aggregate materials is specifically enumerated as a permissible use in the above-cited policy, if the activity is not undertaken in environmentally sensitive areas; Section 30233(a)(6) allows dredging for mineral extraction, provided the activity is not undertaken in environmentally sensitive areas. Therefore, to the extent that the proposed gravel extraction would avoid environmentally sensitive areas, the proposed project would be consistent with the use limitations of Section 30233(a)(6).

Section 30107.5 of the Coastal Act defines "environmentally sensitive area" as:

> *Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in the ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Under this definition, any area supporting a plant, animal, or habitat is environmentally sensitive if the area meets two main criteria: (1) the plant, animal, or habitat is either rare or of special value because of their unique nature or role in the ecosystem, and (2) the area could be easily disturbed or degraded by human activities and developments.

The perennially-inundated areas within the river meet the first criterion of the definition of environmentally sensitive area during the time that the proposed mining would be conducted as the reach may contain rare or endangered species, namely federal- and state-listed salmonids using this reach as a transit corridor between areas of holding habitat prior to the onset of upstream migration.

The perennially-inundated areas within the river clearly meet the second criterion in that diversion, dewatering, fill, and dredging activities for gravel extraction in the river, such as proposed by the applicant, can quickly disturb and degrade the habitat areas the mining activities come in contact with, at least during the mining activities. In addition, on a more permanent basis long after the initial excavation work is completed, trenching can also destabilize the river channel and easily cause erosional impacts that can degrade the perennially inundated areas within the river. Furthermore, the portions of the riverbed that remain wetted also qualify as environmentally sensitive areas because of their special role as a holding area and transit corridor for migrating threatened salmonids.

The Commission has previously determined in numerous permit actions that riverine perennial channels are environmentally sensitive areas. The Commission has

consistently conditioned permits for development in and near such channels and along riparian woodlands within streams and rivers to avoid disturbances of aquatic resources.

In the most comprehensive sense, the entire area between the banks of the river could be considered an environmentally sensitive area, at least during portions of the year when covered by higher flows. However, during the summer dry season when river waters are confined to the definable low-flow channels, the dry exposed areas within the stream banks become inaccessible to fish and other aquatic life forms. In recognition of this situation and the resource-dependent nature of sand and gravel mining, for purposes of considering the proposed gravel mining development's consistency with Section 30233(a)(6), when mining would occur during the summer-early fall dry season, the Commission has generally applied the environmentally sensitive area designation only to the portions of the river containing stream flow.

The proposed project would intrude into environmentally sensitive riverine perennial channels in several significant ways: First, approximately 1,356 cubic yards of concrete traffic control barrier materials would be placed across the main channel to form a diversion around the perimeter of the proposed roughly ¼ mile-long extraction work area. Secondly, up to 40,000 cubic yards of gravel are proposed to be removed from the riverine perennial channel. The proposed extraction would involve removing sand and gravel to a depth of 25 feet from within a teardrop-shaped trench within the perennial main channel. The proposed extraction would involve removing sand and gravel to depths of 10 to 20 feet from one continuous 800-ft.-long trench with widths ranging from 50 feet to 175 feet. This differs from previously permitted trenching operations, where the excavation has been performed on the dry exposed gravel bar, such as the series of four 200-ft.-long, 20-ft-wide, 15-ft.-deep dry trenching compartments authorized in 2001 (see CDP No. 1-01-027).

The applicants' agent reiterates his argument posited in past development applications that the Commission should not consider the proposed mining area as an environmentally sensitive area because the trenching will be dewatered first and therefore the diverted area wouldn't be functioning as a river when the actual trenching is performed. However, the water diversion elements of the project themselves are an integral part of the mineral extraction operation. Moreover, placing the diversion structures across the river constitutes a form of filling of coastal waters. Consequently, even if the trenching was to be viewed as occurring in an area that would not be considered an environmentally sensitive area in its de-watered state, the diversion activity itself is not consistent with Section 30233(a)(6).

Therefore, the Commission concludes that because the proposed sand and gravel mining operation would consist of de-watering and extraction activities within the riverine perennial channel, and the riverine perennial channel is an environmentally sensitive area, the proposed filling and dredging does not qualify as an approvable use for

dredging, diking, or filling in coastal waters and wetlands pursuant to Section 30233(a)(6) of the Coastal Act.

The applicants have also indicated that the gravel extraction project is primarily proposed to restore fish habitat by creating cold deep-water habitat within the aggraded segments of the lower Smith River. Section 30233(a)(7) allows dredging for "restoration purposes." As discussed in detail above, the proposed project requires dredging of riverine wetlands to re-create a deep-water pool, placement of fill for diversion control structures, access routes across the diversion channel, and the placement of fill to repair a breach on Woodruff Bar that is threatening to bisect the landform and adversely affect its channel-confining properties. The project is designed to increase the diversity of habitat types within the lower Smith River and enhance habitat values for anadromous fish species. Repairing the cleft in the Woodruff Bar would bolster the channel confinement the bar provides such that potential capture of the river's main channel that could re-direct the main erosive flow of the river on the flood control levee along the southwest bank could be pre-empted.

In past permit actions, the Commission has found wetland enhancement projects where the sole purpose of the project is to improve wetland habitat values to constitute "restoration purposes" pursuant to Section 30233(a)(7). For example, the Commission concurred with a consistency determination for a wetland enhancement project proposed by the U.S. Fish and Wildlife Service at the Humboldt Bay National Wildlife Refuge (CD-33-92). This project involved dredging, diking, and filling of wetlands to create and enlarge shallow ponds and sloughs and replace water control structures and was approved as a "restoration purpose" under Section 30233(a)(7). Similarly in 2000 and 2001, the Commission approved permits for the California Department of Fish and Game authorizing the excavation of shallow ponds within the Department's Mad River Slough (1-99-063) and Fay Slough (CDP No. 1-00-025) Wildlife Areas for the exclusive purpose of restoration. The Commission approved a permit amendment (CDP No. 1-00-025-A1) in March 2004 for additional restoration work at the Fay Slough Wildlife Area.

Neither the Coastal Act nor the Commission's administrative regulations contain a precise definition of "restoration." The dictionary defines "restoration" in terms of actions that result in returning an article "back to a former position or condition," especially to "an unimpaired or improved condition."[2] The particular restorative methods and outcomes varying depending upon the subject being restored. For example, the Society for Ecological Restoration defines "ecological restoration" as "the process of intentionally altering a site to establish a defined indigenous, historical eco-system. The goal of the process is to emulate the structure function, diversity, and dynamics of the specified ecosystem."[3] However, within the field of "wetland restoration," the term also

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[2] Merriam-Webster's Collegiate Dictionary, Tenth Edition

[3] "Definitions," *Society of Ecological Restoration News*, Society for Ecological Restoration; Fall, 1994

applies to actions taken "in a converted or degraded natural wetland that result in the reestablishment of ecological processes, functions, and biotic/abiotic linkages and lead to a persistent, resilient system integrated within its landscape,"[4] that may not necessary result in a return to historic locations or conditions within the subject wetland area. Similarly, "stream restoration" has been defined to be "re-creating spawning and rearing habitats; removing barriers to migration,; and restoring shelter, favorable temperatures, and water quality for the species that evolved in those conditions and therefore will survive in them on their own."[5] "River restoration," by contrast, typically include "the re-creation of meander bends on straightened channels, modification of channel geometry to create habitat for fish, planting banks with riparian vegetation, stabilizing eroding embankments, and creating open channels from streams formerly encased in underground culverts."[6]

Implicit in all of these varying definitions and distinctions is the understanding that the restoration entails returning something to a prior state. Rivers are dynamic systems in which specific attributes, such as the point bars, pools, and riffles are continually created, altered, and destroyed. Consequently "restoration," as contrasted with "rehabilitation," encompasses not only reestablishing certain prior conditions but also reestablishing the processes that create those conditions. In addition, most of the varying definitions of restoration imply that the reestablished conditions will persist to some degree, reflecting the homeostatic natural forces that formed and sustained the original conditions before being artificially altered or degraded, and not promptly return to the pre-restored state.

Moreover, finding that proposed diking, filling, and dredging constitutes "restoration purposes" is based, in part, on the assumption that the proposed project will be successful in improving habitat values. Should the project be unsuccessful at increasing and/or enhancing habitat values, or worse, if the proposed diking, filling, and dredging impacts of the project actually result in long term degradation of the habitat, the proposed diking, filling, and dredging would not actually be for "restoration purposes." These two characteristics are particularly noteworthy to restoration grant program administrators in reviewing funding requests to ensure that the return on the funding investment is maximized and liabilities associated with unwanted side-effects of the project are minimized.

Thus, to ensure that the project achieves its stated habitat enhancement objectives, and therefore be recognized as being for "restoration purposes," the project must demonstrate that: (1) it entails a return to or re-establishment of former habitat conditions for

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[4] *Position Paper on the Definition of Wetland Restoration*, Society of Wetland Scientists, August 6, 2000

[5] *Restoring Steams in Cities – A Guide for Planners, Policymakers, and Citizens*, Ann L. Riley, Island Press, 1998.

[6] *Geomorphology in River Restoration*, Environmental Management, 19:1-15, Matt Kondolf, PhD, 1995

salmonids, the presence of landscape-integrated ecological processes, and/or abiotic/biotic linkages associated with these fish species; (2) there is a reasonable likelihood that the identified improvements in habitat value and diversity will result; and (3) once re-established, it has been designed to provide the desired habitat characteristics in a self-sustaining, persistent fashion independent of the need for repeated maintenance or manipulation to uphold the habitat function.

For the reasons discussed below, the Commission finds that the proposed filling and dredging activities do not qualify under Section 30233(a)(7) as an allowable use for filling and dredging of coastal waters and wetlands.

Proposed Restorative Actions

The applicants state that the application currently before the Commission to restore the historic deep-water pool habitat alongside Woodruff Bar and patch the cross-bar breach was developed in response to suggestions from NOAA Fisheries staff as an example of how commercial gravel extraction could be undertaken on Upper Woodruff Bar and not further degrade the habitat and channel dynamics in this portion of the river or frustrate the recovery efforts for the various state and federal-listed threatened and endangered salmonids that inhabit the Smith River.

In a hydro-geomorphic analysis prepared by Ralph Christensen, a California registered geologist retained by the applicants, the purported benefits to fish habitat the proposed project would provide were presented (see Exhibit No. 9). Among the habitat improvements to the lower Smith River the project would provide are:

- Creating a relatively deep-water area in which cool, subsurface "hyporheic" groundwater passing through the adjoining floodplain strata would flow into the excavated pool and thermally-stratify (sink to the bottom) to provide a cold-water refuge for migrating salmonid fish species.

- Filling a cross-channel that has formed in the Woodruff Bar due to poor drainage design associated with past mining activities that unless promptly filled could expand to bisect the bar, potentially resulting in main channel capture that could re-direct the brunt of the river's erosive hydraulic forces onto the flood control levee along the southwest side of the river. In addition, by repairing the breach that is destabilizing the bar, the subsurface hyporheic river water will continue to flow through the bar, and cool and feed the fish on the downstream side of the bar.

The project is designed to increase the diversity of aquatic habitat types within the lower Smith River and enhance habitat values for water associated fish and wildlife. Excavating the pool along the bar would create would create a deep-water area where up-river migrating adult fish and sea-bound juveniles could safely hold and rest beyond the

reach of avian and mammalian predators between sprints to the spawning areas further upstream or to the ocean, respectively. Repairing the cleft within Woodruff Bar would help preserve the channel-confining properties of the bar and possibly prevent further destabilization that could lead to significant adverse geomorphic changes, such as formation of a shallow, multi-channeled braided river configuration, or sediment impacts to the river associated with failure of the flood control diking along the southwestern bank.

As proposed, the project includes development that is intended by the applicants to bring about a return to or re-establishment of former habitat conditions for salmonids, the presence of landscape-integrated ecological processes, and/or abiotic/biotic linkages associated with these fish species. However, for several reasons, the applicants have not demonstrated that the alleged benefits of the pool restoration work would actually occur.

First, the timeliness of undertaking the proposed restoration has not been established. No regional assessment has been provided documenting a compelling need for re-creating the historic deep-water pool habitat that apparently existed alongside the Woodruff Bar. Such an appraisal is particularly relevant as there is an on-going debate between interested parties as to whether or not the lower river is "sediment-choked." Some parties contend that due to the deposition of massive amounts of materials associated with poor timber harvesting practices in the upper watershed by past floods, the bed elevation of the lower river has been adversely elevated and is causing a variety of physical and biological environmental problems that can be improved only by dredging substantial quantities of sediment out of the lower reaches. Others counter that while the mass of gravel in the lower river is considerable, especially when compared with the amounts observed in past decades, these quantities are not out of scale with the magnitude of material that is episodically transported down the river over a geological timescale. Under this view, the current riverbed conditions are best considered as being a temporary anomaly that will be eventually flushed through the system, and there is no need for human intervention.

Second, the severity of need for reestablishing deep-water habitat on the lower Smith River has not been presented. Though it is widely recognized that an alternating riffle/pool configuration is preferable to a continuously shallow or multi-strand braided channel for providing habitat for salmonids, no information has been included with the application to substantiate that migrating fish are undergoing undue stress associated with high temperatures or exposure to predators due to a lack of deep, cold water refugia on the lower Smith River.

Third, no rationale has been provided for excavating a <u>second</u> trench along this segment of the lower Smith River. Although cited as an example of why head-cutting would not likely result from the project, a trench formed in the late 1980s by mining in the main channel alongside the portion of the lower portion of the Woodruff Bar (or "Crockett Bar") on the adjoining property directly down stream of the project site remains in place.

This feature was not considered as a factor in the justification presented by the applicants for restoring the historic pool on their property.

Therefore, the Commission finds that the alleged benefits that would be derived from the proposed pool restoration work have not been adequately established; thus, the applicants have not demonstrated that the purpose of the proposed gravel extraction qualifies as restoration purposes under Section 30233(a)(7).

Likelihood That Successful Restoration Would Result from the Proposed Development

A second factor that is considered in determining whether a proposed project whether a proposed restoration project has been designed and sited such that there is a reasonably likelihood that the habitat improvement objectives will actually be achieved.

Stream restoration projects, although intended to re-establish or improve habitat conditions for fish or aquatic species, have on occasion led to disastrous results due to poor planning or execution. Like gravel mining and other in-water development, restoration activities involving pit-mining or trenching within active river channels may result in incision upstream of the mine (by nick-point migration) and downstream (by sediment starvation). Incision may cause undermining of structures, lowering of alluvial water tables, channel destabilization and widening, and scouring on adjoining riverbanks, ironically leading to a loss of aquatic and riparian habitat if not properly undertaken.

Numerous examples on North Coast rivers and streams, especially on the Russian River in Mendocino County, Dry Creek in Sonoma County, and Redwood Creek and the lower Eel / Van Duzen River system in Humboldt County can be cited where channel modifications such as trenching in particular has led to lateral avulsion, channel capture, head-cutting, incision, nick-point migration, increases in the rate of meander straightening, decreases in channel sinuosity, lateral erosion of adjacent river banks and point bars, and other profound stream morphologic changes either upstream, downstream or within the excavated reach.[7] These changes can dramatically impact key salmonid habitat attributes by creating discontinuous areas within the floodplain where migrating fish would become stranded during low-flows, cause increases in water temperature due to loss of riparian vegetation, cause elevated sediment levels within the water column, form blockages at tributary confluences, simplify aquatic bed habitat through the removal of large woody vegetation, and other impacts to holding, rearing, and spawning habitat for migratory fish.[8]

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[7] *Impact Assessment of Instream Management Practices on Channel Morphology*, Aquafor Beech, Limited. & Step by Step, September, 1999

[8] *Management of Course Sediment on Regulated Rivers*, Report No. 80, California Water Resources Center, University of California, Davis, October 1993

A major factor in restoration success is knowing when not to act. Nature is resilient and often adjusts to changes in the watershed. A critical part of a restorationist's role is to know when to let such natural processes to make adjustments on its own. This point is emphasized in the draft NOAA Fisheries gravel extraction guidelines currently being circulated for comments:

> NOAA Fisheries recommends that gravel extraction projects proposed as stream restoration projects be regarded with caution. Resource management agencies acknowledge that, under the right circumstances, some gravel extraction projects, whether commercial or performed by the agencies themselves, may offer important opportunities for anadromous fish habitat enhancement. That is, gravel removal itself can be used beneficially as a tool for habitat creation, restoration, or rehabilitation (OWRRI, 1995). While it is tempting to promote gravel extraction as a means to enhance or restore stream habitat, the underlying objective of this Guidance document is to prevent adverse impacts caused by gravel extraction operations. Therefore, it is recommended that gravel extraction for habitat enhancement purposes done in conjunction with commercial gravel operations not take precedence, and not be a substitute for, habitat protection.[9]

Being a hydro-geomorphic rather than a biological analysis, the Christensen report submitted by the applicants primarily addresses the geologic history of the site, provides design standards and calculations for the estimated volumes of extracted and graded material needed to re-create the historic pool and repair the cross-bar breach, rationale for the particular designs proposed, and an analysis for potential fluvial destabilization and other impacts that may result from excavating the pool or filling in the cross-channel. The report does discuss the importance of deep, hyporheic-fed pool habitat to anadromous fish and the importance of protecting the channel confinement afforded by the Woodruff Bar, dismissing off-hand the potential for significant river destabilization resulting from the project. The report does not provide a quantitative probabilistic assessment of the feasibility of achieving the proposed habitat improvements. Although anecdotal observations of past usage are compiled in the permit application by the applicants' agent, no factual information is provided as to the likelihood that migrating salmonids will utilize the re-established pool.

The Commission concedes that such analysis can be difficult to develop. Given the inherent complexity of river processes, channel form, and aquatic and riparian ecology, it is simply not possible at our present level of knowledge to predict with certainty the behavior of a river channel in response to specific alterations. Moreover, while certain physical responses to channel alterations (i.e., instigation of head- and down-cutting,

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[9] Comment Draft, *National Gravel Extraction Guidance*, National Marine Fisheries Service, March 18, 2004.

channel capture, etc.) may be generally anticipated based upon past documented observations, or projected from fluvial hydraulic models, the biological responses to changes within a stream are much more elusive. Numerous examples are chronicled within fisheries biology literature where, despite adequate funding, the use of state-of-the-art enhancement measures, and design and implementation by experienced restoration professionals, the enhancement efforts have failed to result in appreciable utilization of the improved habitat.

However, while an error-free quantitative risk assessment may not be possible, a qualitative critique of the project attributes could provide some indication of the likelihood of success of the project to increase and improve habitat conditions. NOAA Fisheries generally considers five factors as being key to the success of restoration projects[10]:

1. Planning – including the establishment of goals, objectives, and performance criteria, taking into consideration time and spatial scales, structural conditions, functional conditions, self-maintenance, and the potential resilience of the system to disturbance in selecting the type of system to be restored and the site selected. Site selection should also examine historical or pre-disturbed conditions, the degree of present alteration, present ecological conditions, and other factors. Determining the level of physical effort, producing engineering designs, costing, scheduling, and producing contingency plans are all part of project planning. Stakeholders and the interested public should be identified and included in project planning.

2. Implementation – the degree by which the planned restoration efforts are carried out, utilizing materials and techniques that have been developed, field-tested, and determined appropriate for restoration projects based upon a record of success. To avoid commonplace mistakes during construction, the operation must be monitored by someone who is aware of the project goals. As partners in the success of the project, engineers and contractors play a key role in ensuring that decisions during construction result in improvement of the river system toward the stated goals. Also critical is the communication of those engineering aspects of the program that might necessitate a revision of goals or performance criteria.

3. Performance Assessment – chiefly entailing development of the monitoring program. The program needs to provide direct feedback on the development of the restored system with respect to performance criteria, using measurements of monitoring parameters. Field-sampling methods are selected for each parameter. The selection of appropriate reference or control sites in the vicinity of the restoration project is critical to analysis of monitoring data in order to identify trends that are not project-related.

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[10] *Systematic Approach to Coastal Ecosystem Restoration*, Prepared for the National Oceanic and Atmospheric Administration by Battelle Memorial Institute, September 2003.

4. Adaptive Management – the degree to which flexibility to respond to identified contingencies are built into the program. The monitoring program is used as a tool to assess project success and identify any problems that might affect progression toward the project goals. Broadly speaking, the options available to the manager are no action, maintenance of the system, and modification of the project goals. If the monitoring program identifies deviation from the predicted path of ecosystem development, adjustments can and should be made.

5. Dissemination of Results – documenting project progress and outcomes so that they may be shared with others and to contribute the evolution of the science. It is important for complete information about the project to be disseminated as widely as possible. All aspects of the project should be documented, to show the effect of decisions, and advancement toward goals. Planning for future projects requires such information to help minimize costs and maximize the probability of success.

Other than repeatedly stating that the National Marine Fisheries Service (NOAA Fisheries) and the California Department of Fish and Game field agent for Del Norte County consulted on the proposed trenching and providing other conclusory statements regarding the purported benefits of creating the deepened channel, the permit application does not contain any specific information or employ a systematic planning process in its development so as to give reasonable assurance that the restoration would be successful, either in the immediate project vicinity or incrementally from a watershed-wide perspective.

In addition, the description of the restoration work within the application implies that project has been designed in close coordination with NOAA Fisheries based on detailed site-specific studies, and that design input and tacit approval for the submitted design had been previously obtained from the agency (see Exhibit No. 4). To the contrary, both NOAA Fisheries and CDFG staff continue to express their concerns to Commission staff regarding the dubious habitat benefits the project would provide or the likelihood of success in bringing about significant and persistent restoration by reestablishing a pool within the main river channel given the overall degraded condition of the river at the site. NOAA Fisheries and CDFG staff have stated to Commission staff that while filling the breach forming in the Woodruff Bar, preferably with imported materials, may be a valid undertaking to prevent future destabilization of the point bar, further sand and gravel extraction at this time in the vicinity of Woodruff Bar would not be consistent with the environmental protections of the LOP that mining be conducted on a sustained yield basis, subject to demonstrated adequate annual replenishment.

Thus, the Commission finds that the alleged benefits that would be derived from the proposed restoration work have not been adequately assured, and therefore, the proposed gravel extraction does not constitute dredging of open coastal waters or wetlands for restoration purposes under Section 30233(a)(7).

Persistent or Self-sustaining Nature of the Resulting Restored Habitat

Finally, for the development to be recognized as being truly for "restoration purposes," the project should be designed to be reasonably cost-efficient with respect to its design life and maintenance requirements. The applicants readily concede that, like other past gravel mining excavations within the main channel, the excavated deep-water pool is likely to fill with sediment and lose in cold water refugia characteristics in a relatively short timeframe, possibly as few as one to two years upon the return of normal precipitation in the Smith River basin. No consideration was included in the design of the project to further prolong the presence of the deep-water habitat once it would be excavated. For example, the project proposal might have included digger logs, wing dams, or other in-stream restoration structures that could have facilitated self-scouring in the pool. Accordingly, the habitat benefits the restoration development would provide would be relatively short-term in the context of a long-range species recovery effort.

Therefore, for all the above reasons, the Commission concludes the proposed deepening of the main river channel to create cold-water pooling habitat has not been shown to be for "restoration purposes" and thus does not constitute an allowable use for filling and dredging of coastal waters under Section 30233(a)(7) of the Coastal Act.

2. Conclusion

The Commission finds that the proposed gravel extraction operation is not consistent with the requirements of Section 30233 of the Coastal Act, in that the proposed dredging diking and filling of wetlands is not for one of the allowable uses enumerated within subsections (1) through (8) of Section 30233(a). Therefore, the proposed project is inconsistent with the dredging, diking, and filling of coastal waters and wetlands provisions of Coastal Act Section 30233. No analysis of the consistency of the proposed development with the other three tests of Section 30233 is required to find that the development is inconsistent with Section 30233. The Commission notes that even if the proposed development was consistent with the other three tests of Section 30233, the proposed development would be inconsistent with Section 30233 as well as Section 30236 of the Coastal Act as previously described, and with the public access policies of the Coastal Act as discussed below, and must be denied.

F. Geologic Hazards and New Development.

The Coastal Act contains policies to assure that new development provides structural integrity, minimizes risks to life and property in areas of high flood hazard, and does not create or contribute to erosion. Section 30253 of the Coastal Act states in applicable part:

New development shall:

(1) *Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*

(2) *Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.* (emphasis added)

As discussed in Findings Section II.E above, trenching and gravel extraction projects can adversely affect the morphology of the river and create increased erosion and alteration of the riverbed and riverbanks. The applicants provide a fluvial geomorphologic analysis to evaluate the effects of the project on geologic stability of the river and whether the project would lead to erosion or destruction of the riverine environment inconsistent with Section 30253 (see Exhibit No. 9).

However, as discussed in detail in the review memorandum prepared by Mark Johnsson (see Exhibit No. 10), the Commission's staff geologist, in the absence of a basin-wide sediment budget with discrete calculation of the through-put of materials in the river reach on which the project would be conducted, the full effects of any streambed alteration project cannot be precisely predicted with exact detail given the complexities of river sediment transport. Thus, to the degree that information is available as to how the operation will likely affect the dynamics of river flow at low, normal, and flood flow, the overall movement of sediment within the river system, the stability of the river bank and other point and longitudinal bars, and the project's potential to cause increased bank erosion, instigate channel migration, "harden" the river bottom substrate making less desirable for fish habitat, or reduce the availability of sand-sized sediment to the littoral cell, the uncertainty can only be put into perspective, rather than resolved.

Dr. Johnsson notes that:

> The effects of the proposed project are potentially complicated and difficult to predict. Well-documented effects from similar excavation operations on rivers elsewhere in the State have resulted in destabilization of the channel, channel incision, and coarsening of the bed. The limited data available do not indicate that such problems have occurred on the Smith River as a result of past activities, but without such basic information as a complete sediment budget, potential impacts of the proposed project are difficult to judge.

Accordingly, regardless of the applicants' stated intent to correct disturbances caused by the accumulation of sediment within the lower river system that has resulted in adverse changes to the river's configuration, the analysis provided by the applicants does not factually substantiate that the project as designed assures stability and structural integrity

as required by Section 30253(2). Paradoxically, given the apparent past mining that has been conducted within the low-flow channel and the lack of clear evidence that adverse channel changes have resulted from past trenching, there is no clear evidence that the project would cause such geologic instability.

The Commission notes that even if the proposed development was consistent with the Section 30253, the proposed development would be inconsistent with Section 30233 as well as Section 30236 of the Coastal Act as previously described, and with the public access policies of the Coastal Act as discussed below, and must be denied.

G. Public Access.

Coastal Act Section 30210 requires in applicable part that maximum public access and recreational opportunities be provided when consistent with public safety, private property rights, and natural resource protection. Section 30211 requires in applicable part that development not interfere with the public's right of access to the sea where acquired through use (i.e., potential prescriptive rights or rights of implied dedication). Section 30212 requires in applicable part that public access from the nearest public roadway to the shoreline and along the coast be provided in new development projects, except in certain instances, such as when adequate access exists nearby or when the provision of public access would be inconsistent with public safety.

The project site is located between the first public road (Fred Haight Drive) and the sea (the Smith River is considered to be an arm of the sea in this area). Accordingly, a public access finding is required for the project.

In applying Sections 30210, 30211 and 30212, the Commission is limited by the need to show that any denial of a permit application based on these sections, or any decision to grant a permit subject to special conditions requiring public access, is necessary to avoid or offset a project's adverse impact on existing or potential public access.

Four shoreline access points presently exist within the coastal zone and the lower Smith River (i.e., downstream and west of the Dr. Fine or Highway 101 Bridge). From west to east, these access points are located at: (1) the southerly end of the mouth of the Smith River; (2) the Ship-a-Shore resort; (3) the southerly end of Sarina Road at the river's confluence with Rowdy Creek; and (4) the County-owned Smith River Fishing Access Point ¾ mile upstream of the project site near the Bailey Gravel Bar. There is no evidence of potential prescriptive rights within the project area.

Recreational use of the lower Smith River is extensive. The principal public access use of the project site that does occur is by fishermen who go out to the river channel for recreational fishing. Other public access and recreational uses of this stretch of the river include canoeing and kayaking. The prime fishing seasons occur during the wet months, when gravel extraction is not occurring. The peak canoeing and boating use takes places

during the spring before the gravel extraction season begins. Thus, the project will not affect the bulk of access use by fishermen, canoeists, or other recreational boaters. The project will also not create any new demands for fishing access or other public access use.

However, unlike operations on the Woodruff Bar in recent years that did not involve work in the main channel and provided a detour around the project site, the current proposal entails diversion and de-watering of the river's main thoroughfare. Although the amount of boating use may be reduced during the July 15 through August 30 when gravel mining is usually performed, any boaters who do choose to traverse the lower Smith River during this timeframe will be faced with having to undertake a lengthy portage around the trench and bar grading sites or attempting passage through the relatively small 48-inch-diameter culvert in the diversion channel.

Given the estimated 300-cubic-feet-per-second discharge rate for this portion of the river during the time of year restoration/mining would be performed, flow velocities of the diverted river water through the culvert cross-section would approximate 32- to 33-miles-per-hour. Navigating this relatively brisk water speed in a confined 48-inch-diameter space inside the culvert may be entirely within the capabilities of an experience kayaker or canoeist, but would be quite perilous for most amateur watercraft enthusiasts, resulting in possible injuries or even drownings.

Alleviating the hazards associated with the enclosed nature of the culvert could be achieved through use of a railroad flatcar crossing designed to provide adequate vertical freeboard (usually three-feet of clearance) instead of the culvert being proposed. However, the applicants have adamantly rejected the substitution of a flatcar for a culverted crossing of the diversion channel, reiterating their perspective that there is nominal use of the lower Smith River for recreational boating use during the gravel extraction season, referencing the presence of other nearby ingress/egress points upstream and downstream of the site, and citing the relative degree of environmental impact that would result from crossing the channel to construct the abutment on the bar from the railcar span.

Therefore, for the reasons discussed above, the proposed project would have significant adverse effects on public access. The Commission therefore finds that the project is inconsistent with the public access policies of the Coastal Act and must be denied.

H. <u>Alternatives</u>.

Denial of the proposed permit will not eliminate all economically beneficial or productive use of the applicants' property or unreasonably limit the owners' reasonable investment backed expectations of the subject property. Denial of this application to mine sand and gravel from within the year-round channel of the Smith River would still leave the

applicants available alternatives to use the property in a manner that would be consistent with the policies of the Coastal Act.

There are existing uses of the property that allow the applicants/owners to have economic uses of the property without performing the proposed gravel extraction operation. The project site consists of three parcels comprising a total of 300 acres. These lands are currently developed with several farm residences and are in active dairy and cattle ranching uses.

Moreover, there are alternatives to the project itself that could accomplish the two intended objectives of the project of: (a) restoring a portion of the river and its habitat, and (b) providing a certain amount of excavated gravel to process into commercially saleable sand gravel products. With respect to objective (a), it would be a feasible alternative to the project to conduct only the filling of the cross-bar channel portion of the proposed development. This later component of the project is widely acknowledged by the relevant natural resource trustee agencies as having recognizable benefits for restoring fish and wildlife habitat while avoiding the need for channelization or substantial alterations of the river. In addition, without the need to divert the river waters, no interference with public recreational boating access along this portion of the river would result. With respect to objective (b), the applicants could simply not undertake in-stream gravel mining until such time that the exposed gravel bar has been replenished to allow bar-skimming extraction to be possible without causing significant adverse impacts to river channel morphology. A deferred return to bar-skimming when favorable conditions were present at the site would also confine mineral extraction to areas outside of an ESHA, prevent the need for the substantial riverine alterations associated with wet-trenching, and avoid significantly interference with public access consistent with Coastal Act Sections 30233, 30236, and 30210-14, respectively. In addition, it might be possible for the applicants to either purchase in-fee or obtain leases for extracting sand and gravel on other in-stream mining sites.

Therefore, the Commission finds that feasible alternatives to the proposed project exist for the applicants to make economically beneficial or productive use of the property in a manner that would be consistent with the policies of the certified LCP.

I. <u>California Environmental Quality Act</u>.

Section 13906 of the California Code of Regulation requires Coastal Commission approval of a coastal development permit application to be supported by findings showing that the application, as modified by any conditions of approval, is consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Public Resources Code Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available, which would significantly lessen any significant effect that the activity may have on the environment.

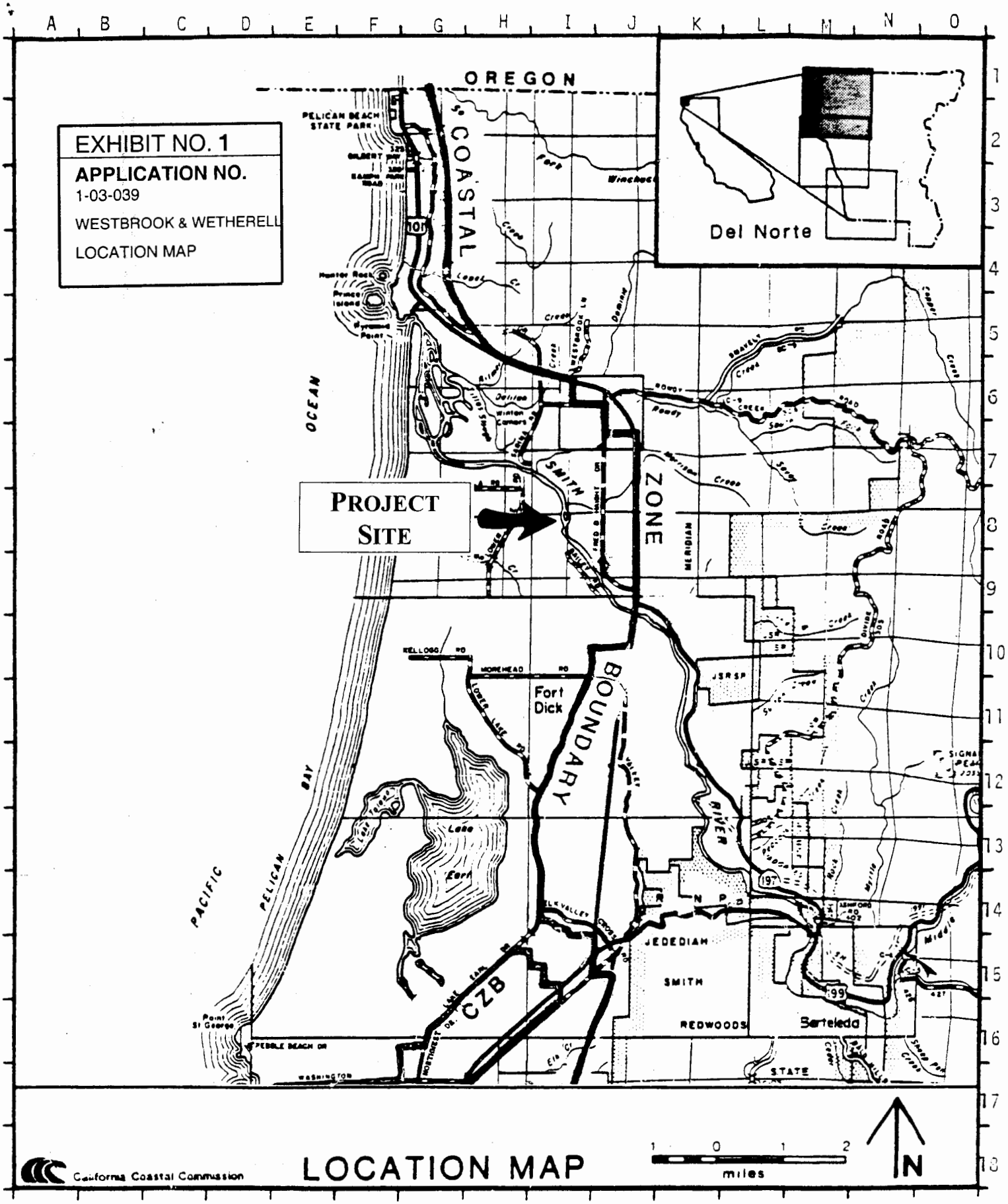
The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. These findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report.

As discussed herein, in the findings addressing the consistency of the proposed project with the Chapter 3 policies of the Coastal Act, the proposed project is not consistent with the policies of the Coastal Act that restrict the substantial alteration of rivers and streams, restrict the dredging and filling of coastal waters and wetlands, require that geologic stability and structural be assured, and require that development not adversely affect public access.

As also discussed above in the findings addressing project alternatives, there are feasible mitigation measures and feasible alternatives available which would substantially lessen any significant adverse impact that the activity may have on the environment. Therefore, the Commission finds that the proposed project cannot be found consistent with the requirements of the Coastal Act to conform to CEQA.

IV. EXHIBITS:

1. Location Map
2. Vicinity Map
3. DWR/CCC Aerial Photograph 212-11, 1:12,000, May, 30, 2001
4. Project Narrative and Mining Site Plan
5. *Public Notice - Letter of Permission Procedure No. LOP 2003-2*, U.S. Army Corps of Engineers, March 26, 2004
6. *Final Biological Opinion - Letter of Permission Procedure Gravel Mining and Extraction Activities within Del Norte County LOP 2003-2*, National Marine Fisheries Service, September, 2003
7. Excerpt, *Recovery Strategy for California Coho Salmon – Report to the California Fish and Game Commission*, California Department of Fish and Game, August, 2003
8. *Notice of Proposed Changes in Regulations*, California Fish and Game Commission, California Regulatory Notice Register 2004, Volume 11-Z, pp. 302-304
9. Excerpt, *Geomorphology and Hydrology Wetherell – Upper Woodruff Bar Salmon Habitat Restoration*, EGR & Associates, Inc., August 30, 2003
10. *Review Memorandum*, Mark Johnsson PhD, CEG, CHG, California Coastal Commission – Technical Services Unit, April 19, 2004



County of Del Norte

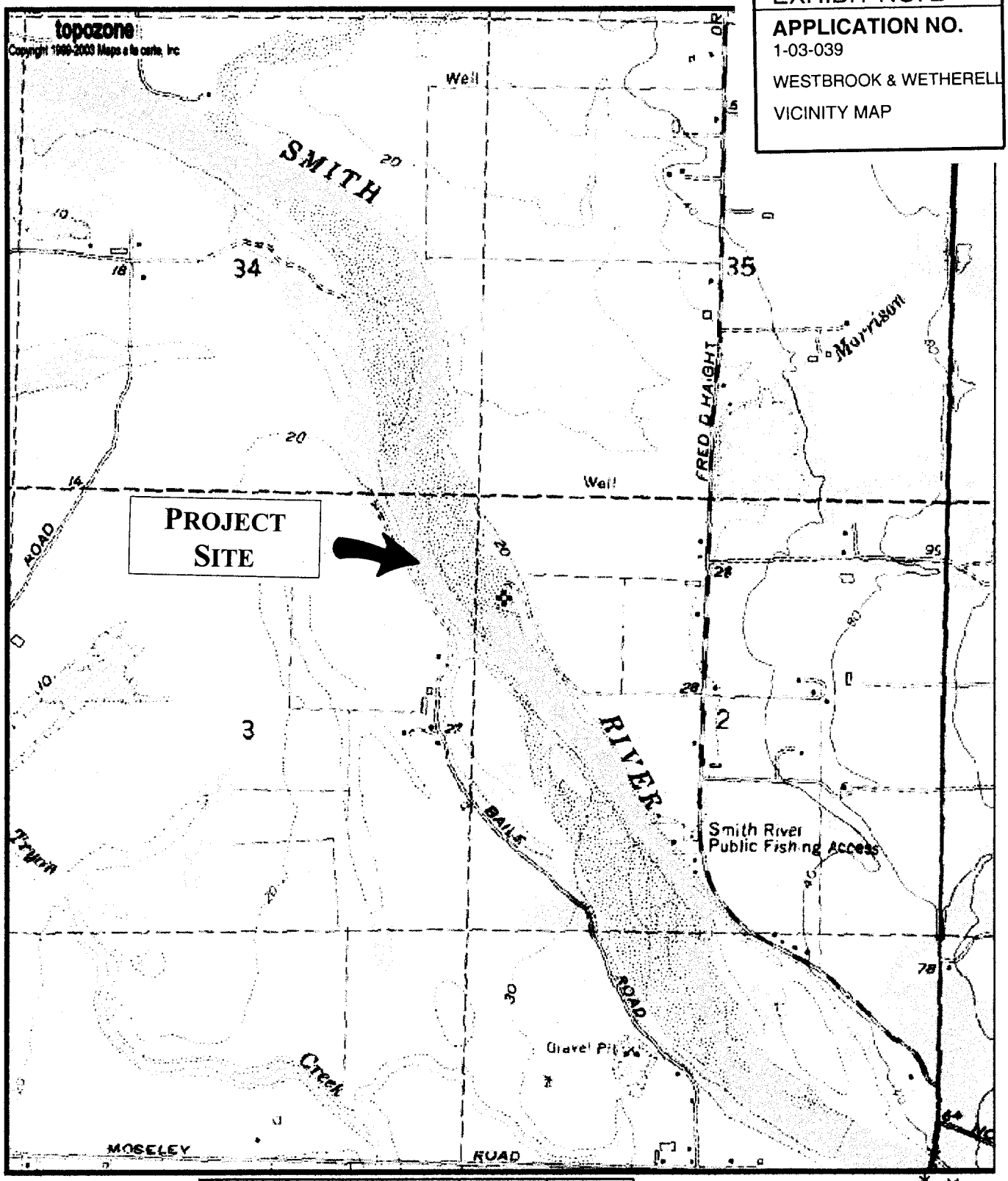
Sheet 1 of 3

EXHIBIT NO. 2

APPLICATION NO.
1-03-039

WESTBROOK & WETHERELL

VICINITY MAP



0 0.3 0.6 0.9 1.2 1.5 km

0 0.2 0.4 0.6 0.8 1 mi

Map center is UTM 10 404188E 4639079N (WGS84/NAD83)
SMITH RIVER quadrangle
Projection is UTM Zone 10 NAD83 Datum

M=16.63
G=-0.771

EXHIBIT NO. 3

APPLICATION NO.
1-03-039
WESTBROOK & WETHERELL

DWR/CCC AERIAL PHOTOGRAPH 212-11, 1:12,000, MAY 30, 2001

UPPER WOODRUFF BAR
(Mr. Harry Wetherell, Clarence T. Westbrook and Kathyryn, Trustee, Applicants)
Assessor's Parcel Numbers - 105-020-02, 105-020-03, & 105-020-21

SALMONID HABITAT RESTORATION AND BAR STABILIZATION PROJECT
PROJECT DESCRIPTION AND IMPACTS ANALYSIS

RECEIVED
JUN 0 6 2003
CALIFORNIA
COASTAL COMMISSION

Prepared for:
California Coastal Commission

By:

GALEA WILDLIFE CONSULTING
200 Raccoon Court
Crescent City, CA 95531

June 4, 2003

EXHIBIT NO. 4
APPLICATION NO.
1-03-039
WESTBROOK & WETHERELL
PROJECT NARRATIVE &
MINING SITE PLAN
(1 of 26)

PROPOSAL TO RESTORE THE WOODRUFF POOL VIA TRENCH EXCAVATION, UPPER WOODRUFF BAR, SMITH RIVER.

INTRODUCTION

The Smith River is the last major free flowing river in California that directly drains into the Pacific Ocean. Four principle species of anadromous fish are found in the system: fall-run chinook salmon, coho salmon, winter-run steelhead and coastal cutthroat trout. Compared to other north coast river systems, salmonid populations in the Smith River are considered to be good condition (Voight and Waldvogel, 2002).

Historically, the lower Smith River contained excellent migratory and rearing habitats for salmonids. However, major flood events in 1955 and 1964 caused alteration of the river channel, filling in of historic pools and other major changes to the lower system. Galea (1998a) noted a lack of deep water pools during salmonid surveys on the Smith River.

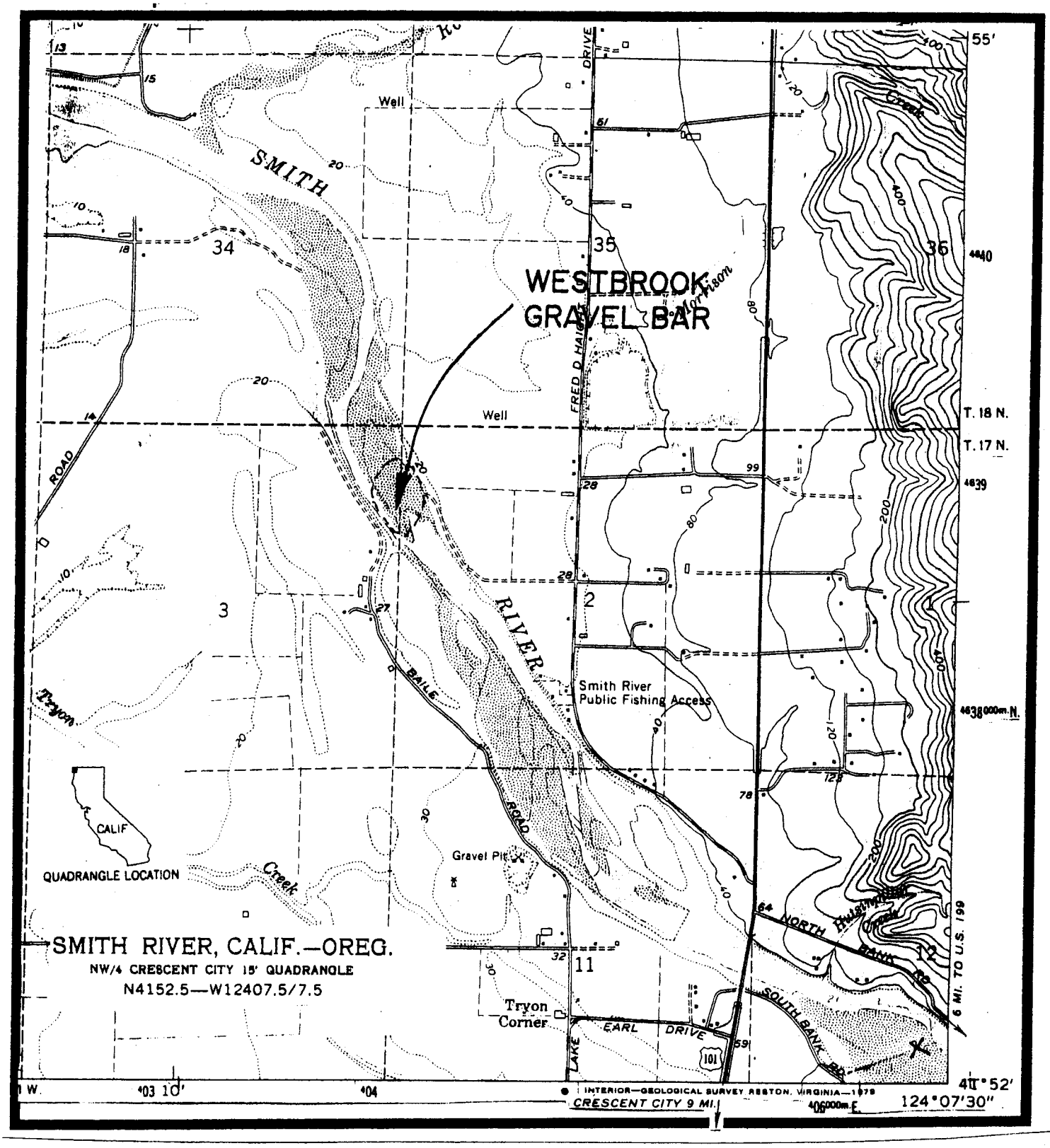
Pools are an essential habitat element for salmonids (Bjornn and Reiser 1991). Pools provide a complex of deep, low velocity areas, backwater eddies and submerged structural elements that provide cover, winter habitat, and flood refuge for fish (Brown and Moyle 1991). During their upstream migrations, adult salmonids typically move quickly through rapids and pause for varying duration in deep holding pools (Briggs 1953, Ellis 1962, Hinch *et al.* 1996, Hinch and Bratty 2000). Holding pools provide salmon with safe areas in which to rest when low-flows and /or fatigue inhibit their migration (Moreau and Moring 1993).

Pools are also the preferred habitat of juvenile coho salmon (Hartman 1965, Fausch 1986, McMahon 1983), and they are an important habitat feature for juvenile steelhead (Nielson *et al.* 1994). Pools with sufficient depth and size can also moderate elevated water temperatures stressful to salmonids (Matthews *et al.* 1994).

During early fall salmonid runs the Smith River is very shallow due to lack of rainfall over the summer and the lack of stored water from dams. Salmon runs typically begin before the onset of fall rains. Deep water pools provides slower water for resting between "runs" through shallow-water riffles. A complexity of pools versus runs is important in the system, therefore, to provide migratory habitat for upstream spawners.

The Woodruff bar is located in the lower Smith River, below the Highway 101 bridge and the mouth of Rowdy Creek (Figure 1). The Wetherell Ranch owns the upper half of the bar (Upper Woodruff), with the property line located approximately halfway down the bar. This location has been the source of gravel extraction for decades. Proper extraction techniques on the Wetherell Ranch have maintained the bar in approximately the same shape as it was historically, based upon early aerial photos.

Figure 1. Location of Proposed Pool Restoration Project, Upper Woodruff Bar, Smith River.



PURPOSE: Salmonid Habitat Restoration

Datum: msl

Applicants: Harry Wetherell and Clarence T. Westbrook & Kathyrn, Trustee

AT: Westbrook Bar, aka Upper Woodruff Bar

ON: Smith River, Del Norte County, CA
APN's: 105-020-02, 105-020-03, 105-020-21

3 of 26

The 1964 flood event caused severe damage to the Wetherell Ranch in the form of land erosion and loss (H. Wetherell, pers. comm.), consequently a dike was built on the south side of the river with the help of the U.S. Army Corp of Engineers to protect the ranch from further erosion. Another impact of the 1964 flood was the loss of a pool which had been located approximately ½ way down the bar on the south side of the river. The Wetherell family has described the historic pool as relatively deep, approximately 25 feet, and lengthy, covering an area large enough where trolling for salmon from a boat was often done.

Currently, no pool exists in relation to the Woodruff bar. The nearest pool to the bar is the Bailey "hole", which is a deep water pool located some distance upstream from the bar. Historically, the lower Woodruff hole was located some distance down-river, below the mouth of Morrison Creek, however it is probable that this hole is at least partially filled in as well.

As the historic Woodruff pool no longer exists, salmonids migrating upriver face a long "run" of relatively shallow habitat from well below the bar up to the Bailey hole, for a distance of almost one mile. By excavating and restoring a pool at the historic site, migrating salmonids would have a resting pool located at a strategic location on the river. Habitat diversity would be increased for the benefit of migrating adult salmonids and young coho salmon as well.

The Applicants for this project (Mr. Harry Wetherell, Clarence T. Westbrook and Kathyryn, Trustee) are proposing a rock and gravel extraction at the site of the historic upper Upper Woodruff pool for the 2003 season. This extraction would be accomplished by diverting the main flow of the Smith River into an overflow channel located at the northern edge of the bar along the north bank, then shaping the pool into the desired shape and depth via gravel extraction. A percentage of the rock and gravels removed from the river extraction would be used to restore a portion of the bar which has been incised by river flow, which could potentially lead to bar degradation.

Three alternatives are presented here, including a non-extraction alternative (Alternative 3). Both Alternatives 1 and 2 have been assessed for their potential impacts, both positive and negative, upon salmonids and their habitats, based upon the eight potential effects identified in the National Marine Fisheries Service's (NMFS) 1996 National Gravel Extraction Policy document.

Permits are required from Del Norte County, the California Coastal Commission and Department of Fish and Game and a letter to proceed must be obtained from the U.S. Army Corp of Engineers under LOP 2003-2 (currently not approved). The NMFS is critical to the review process as they make recommendations regarding protection of salmonids to the Corp.

BIOLOGICAL SETTING

Project Area Location

The project area is located on the main stem of the lower Smith River. The project lies approximately one mile upstream from the mouth of Rowdy Creek, in Township 17N, Range 1 West, in the extreme northeast portion of Section 3.

Physical Environment

The climate of northern California is characterized as Mediterranean, with cool, wet winters and warm, dry summers with frequent fog. Along the coastline, proximity to the Pacific Ocean produces high levels of humidity and results in abundant fog and fog drip precipitation. The maritime influence diminishes with distance from the coast, resulting in lesser amounts of fog, drier summer conditions and more variable temperatures. Annual precipitation in the project watershed ranges from 60 - 150 inches occurring primarily as rain during the winter months. Snowfall is sporadic at higher elevations. Air temperatures measured in Crescent City, immediately south of the Project Area vary from 41° F to 67° F annually. Temperatures are more extreme in the eastern portion of the Smith River basin.

Geology and Soils

Bedrock in the Project Area is predominately of the Broken Formation of the Franciscan Assemblage. The rocks of this formation are late Jurassic to early Cretaceous in age, and are composed of tectonically fragmented inter-bedded graywacke, shale and conglomerate (Alto and Harper 1982). Wide valley bottoms along the lower Smith River are filled with vegetated alluvial terrace deposits of fluvial origin dating from the Pleistocene and Holocene ages (Davenport 1984).

POTENTIAL ENVIRONMENTAL EFFECTS OF AGGREGATE GRAVEL EXTRACTION

The NMFS National Gravel Extraction Policy (1996) identifies eight potential effects from gravel extraction activities to stream morphology, riparian habitat and anadromous fish. They are:

1. Extraction of bed material in excess of natural replenishment by upstream transport causing bed degradation.
2. Gravel extraction increases suspended sediment, sediment transport, water turbidity and gravel siltation.
3. Bed degradation changes the morphology of the channel.
4. Gravel bar skimming significantly impacts aquatic habitat.
5. Operation of heavy equipment in the channel bed can directly destroy spawning habitat, and produce increased turbidity and suspended sediment downstream.

6. Stockpile and overburden left in the floodplain can alter channel hydraulics during high flows.
7. Removal or disturbance of instream roughness elements during gravel extraction activities negatively affects both quality and quantity of anadromous fish habitat.
8. Destruction of the riparian zone during gravel extraction operations can have multiple deleterious effect.

The Smith River Anadromous Fish Action Plan (Voight and Waldvogel, 2002) identifies another potential effect to anadromous fish by gravel extraction. It points out that fall-run Chinook salmon can utilize the larger substrate in the mainstem of the Smith River for spawning, and that redds have been documented in close proximity to some gravel extraction sites.

ALTERNATIVE 1 - PREFERRED ALTERNATIVE - POOL RESTORATION AND BAR STABILIZATION VIA DIVERSION OF RIVER FLOW

Project Description

Pool Restoration

In 2002 during consultation between the Applicant and the NMFS the idea for restoration of a historic pool surfaced during discussions of historic conditions. The NMFS geomorphologist and fisheries biologist present at the consultation both were supportive of a proposal to restore a historic deep water pool at the site.

The primary goal of Alternative 1 is the formation of a tear-shaped, deep-water pool at the site of the historic pool (Figure 2). A tear shape was chosen as this best fits the site and the primary function of the pool, which is fall-run salmonid resting habitat. The broader portion of the tear-shaped pool (approximately 175 feet wide by 300 feet long) would be located downstream, at the western end of the property. This wider portion of the pool would be deepest, at approximately 20 feet. Should bedrock be encountered before a depth of 20 feet the proposed project depth will be altered to approximately one foot above bedrock level. The southern edge of the pool would be a relatively straight line, as the excavation would be offset from the center of the thalweg by at least 30 feet. The primary reason for this is protection of the flood control levy on the south side of the channel.

As the pool progresses up river it would narrow (to approximately 100 foot wide for 200 feet) and also become shallower (15 feet). At the top (upstream), or narrowest portion of the design (approximately 300 feet long) , the top of the tear would be relatively narrow, only 50 feet wide, and also shallowest, at 10 feet. Thus, upstream migrant salmonids have a deep water rest at the deepest end of the pool, which is also widest and therefore disperses the flow over a greater area. As they move inland, they are "channeled" by the shape of the pool toward the upcoming riffle at the head of the bar (located 600 feet from the closest edge of excavation).

The amount of material removed from the river would be approximately 37-40 thousand cubic yards of aggregate. A portion of this, from 5 to 10 thousand cubic yards, depending upon need, would be used for stabilization of the bar (see Bar Stabilization section below).

At the onset of operations, the overflow channel would be temporarily diverted using a K-rail barrier in order for a temporary bridge/culvert to be installed from the north bank (Figure 2), across the overflow channel to the bar, for equipment access. The span would be approximately 50 feet. Once the temporary bridge was in place, the K-rails would be removed from blocking the overflow channel.

In order to operate and excavate in the location of the historic pool, Alternative 1 would entail the re-directing of the main channel flow from it's present course on the south side of the gravel bar. Diversion of the low flow channel reduces elevated turbidity levels by containing the active excavation area away from the flowing water. Diversion and extraction in the low flow channel requires the placement of diversion structures within the flowing stream to localize impacts to the immediate excavation site.

During late summer's low water flows a barrier (made up of concrete barriers, or K-rails) would divert the main flow to the north, into the already existing river overflow channel on the north side of the bar (Figure 2). A small amount of flow would be allowed to permeate through the barricade and into the main channel in order to prevent total dessication of invertebrates and plants in the channel proper. For gravel extraction operations such as pool restoration, utilization of stream diversions, excavation adjacent to the low flow channel and time period for settling of fine sediments prior to breaching reduce the occurrence and duration of elevated suspended sediments (NMFS BO, 2002).

The pool area would be excavated using an excavator, with the material loaded into dump trucks and immediately hauled off the bar over the temporary bridge. Storage and processing of the excavated material would occur off-site.

By operating in the diverted area the extraction will limit the release of suspended sediments into the channel during operations and block the passage of fish into the area of excavation during high tides (some minor influence of tides is detectable at this point of the river). The primary flow would be diverted into the overflow channel, and re-enter the main channel approximately at the mid-point (downstream) of the bar where the overflow channel currently ends, on the boundary of the Wetherell and Crockett properties. Once the river flow is diverted, pool restoration and shaping via gravel extraction would take place within the previously wetted channel, using an excavator. After excavation, increased suspended sediment within the area of excavation is allowed to settle prior to removal of the diversion structures.

Pool Maintenance and Monitoring

One of the goals of a habitat restoration project where a pool is restored is to use natural conditions, or create conditions, where the pool is self-maintaining. The historic pool at this site may have been self-sustaining due to the historic positioning of the bar. Prior to the 1955 flood, the Woodruff bar was two separate sections, each on opposite sides of the river. Moving past the upper portion of the Woodruff bar the main river flow was on the south side of the channel, then it ran into the lower, downstream portion of the bar, turned north and the main flow channeled to the north side (see Photo A). The historic pool was located where the river ran into the downstream portion of the bar.

The flood of 1964 changed the bar conditions in this section of the river, where now all of the bar is on the north side of the river and the primary channel remains on the south side. Therefore historic conditions which once kept the pool self-maintaining are no longer available.

Once the Woodruff pool is created, the restoration site will be monitored for several years to observe the dynamics of the site. It is currently unknown as to whether the pool will be self-maintaining, if it will fill in over time and how long it may take before the site no longer functions as a deep water pool for salmonids. A review of the restoration effort will take place in 2004, including consultation with NMFS and the California Department of Fish and Game, to determine if the restoration effort was effective, and if any additional restoration is necessary to enhance the site. The introduction of large rocks or woody debris may be necessary in future enhancements to self-perpetuate the pool.

The pool restoration effort would also be monitored for salmonid use. The restoration site would be surveyed by an experience fisheries biologist/technician before the onset of operations, to describe conditions in the restoration site and conduct a survey of the number and age class of all fish observed within the project area. Post-restoration, the new pool would be surveyed again to record the same data. The restored pool would be surveyed at least once a month in the fall of 2003 until fall/winter rains increase the river flow to dangerous levels for surveys. The goal of surveys would be to determine if there is an increase of fish densities for the project area, what age class are utilizing the restored pool, and if fall migrants utilize the restored pool as planned. A complete report of monitoring efforts and findings would be prepared by December 2003 and made available to all regulatory agencies.

Bar Stabilization

A secondary goal of this project is bar stabilization. The overflow channel at the north side of the bar has partially filled in over the past 5 years (as is evidenced by aerial photographs), narrowing the channel and decreasing it's depth. An artifact of this is that the main bar is currently being dissected by a new channel, flowing from the overflow channel, over the bar to the river. This dissection is causing erosion and bisection of the bar, threatening bar stability. It is also depriving the overflow channel of water flow, decreasing rearing habitat suitability for young salmonids.

The Applicants propose to take between 5 and 10 thousand cubic yards of the material extracted from the pool formation and deposit this material onto the bar. The material would be strategically placed to 1) block the new channel, thereby preventing further erosion of the bar and increasing the amount of flow to rearing habitat located in the overflow channel and 2) fill in those areas on the bar already incised by the bisecting channel. The newly-deposited material would be sloped to conform with natural conditions already existing on the bar.

Extraction would likely begin in late July or early August and encompass approximately five weeks to completion. All work in the river would end by October 15th, as stipulated in the LOP.

Potential Impacts to Resources

The NMFS National Gravel Extraction Policy (1996) identifies eight potential effects from gravel extraction activities to stream morphology, riparian habitat and anadromous fish. Analysis of each potential effect relative to this proposal is presented below.

1. Extraction of bed material in excess of natural replenishment by upstream transport causing bed degradation.

The actual amount of annual recruitment in the Smith River is currently unknown due to the lack of recent studies, however in 1983 the Department of Water Resources estimated average annual recruitment level of 330,000 cubic yards of substrate (Del Norte County 1983). Historic (pre-listing of the Coho salmon) annual extraction levels of 80,000 to 100,000 cubic yards (Del Norte County Planning Depart., pers. comm. 2001) have never reached this estimate of annual recruitment. The amount of aggregate removed from the Smith River has decreased substantially in the past 5 years due to1) reduced recruitment due to decreased transport of materials because of reduced rainfall, 2) the listing of the Coho salmon increased monitoring and limits of gravel operations for resource protection. For the past few years, the amount of aggregate removed from the Smith River has been greatly reduced. The number of gravel extraction operators and sites for extraction on the Smith River is also reduced (pers. observation).

Although not supported by survey data, there is a consensus among those who have observed the river post-1964 flooding that several historic fish pools below Dr. Fine bridge have filled in, and that aggregate levels in the lower Smith River are historically high and summer/fall water depths are greatly reduced (La Rue, 2002). At the project site, historical summer depths adjacent to the bar were around six feet, where now the main river channel depth during the extraction season rarely exceeds one foot (Wetherell, H., pers. comm.). Therefore, the lower portion of the river (below the Highway101 bridge) likely contains high levels of aggregate as a result of past floods.

The amount of material proposed for removal at the restoration site is approximately 40 thousand cubic yards. A portion of this material will be used for bar stabilization. The amount of material to be extracted is limited compared to past extraction levels. The amount of cumulative

extraction proposed for 2003 is unknown, but is likely to be far below the estimated annual recruitment level, based upon current applications to Del Norte County.

2. Gravel extraction increases suspended sediment, sediment transport, water turbidity and gravel siltation.

The purpose of diverting the river into the overflow channel is to de-water the extraction area and therefore prevent or decrease the amount of suspended sediment, sediment transport, water turbidity and gravel siltation. A minor amount of increased turbidity may result when the diversion is removed and water flows through the excavated area.

The primary concern of increased fines sediments is the potential impacts they may have to incubating fish eggs (NMFS 1996). Fortunately, anadromous fish eggs have hatched before the onset of the extraction season, and extraction is completed before the fall spawning run begins. Also, there are few records of salmon spawning this far downstream in the Smith River, and the few noted are considered abnormal incidents caused by years with late rains which would allow for normal migration upriver.

3. Bed degradation changes the morphology of the channel.

River morphology was greatly affected by the historic floods of 1955 and 1964. A levy was built on the south side of the river to prevent further land loss and erosion to the river. This project seeks to restore the morphology of the river to historic conditions by re-creating a historic pool.

The river bed will not be degraded by this project as the maximum depth of the project is 20 feet. Should bedrock be encountered before a depth of 20 feet the proposed project depth will be altered to approximately one foot above bedrock level. Overall, this project has little or no potential at bed degradation.

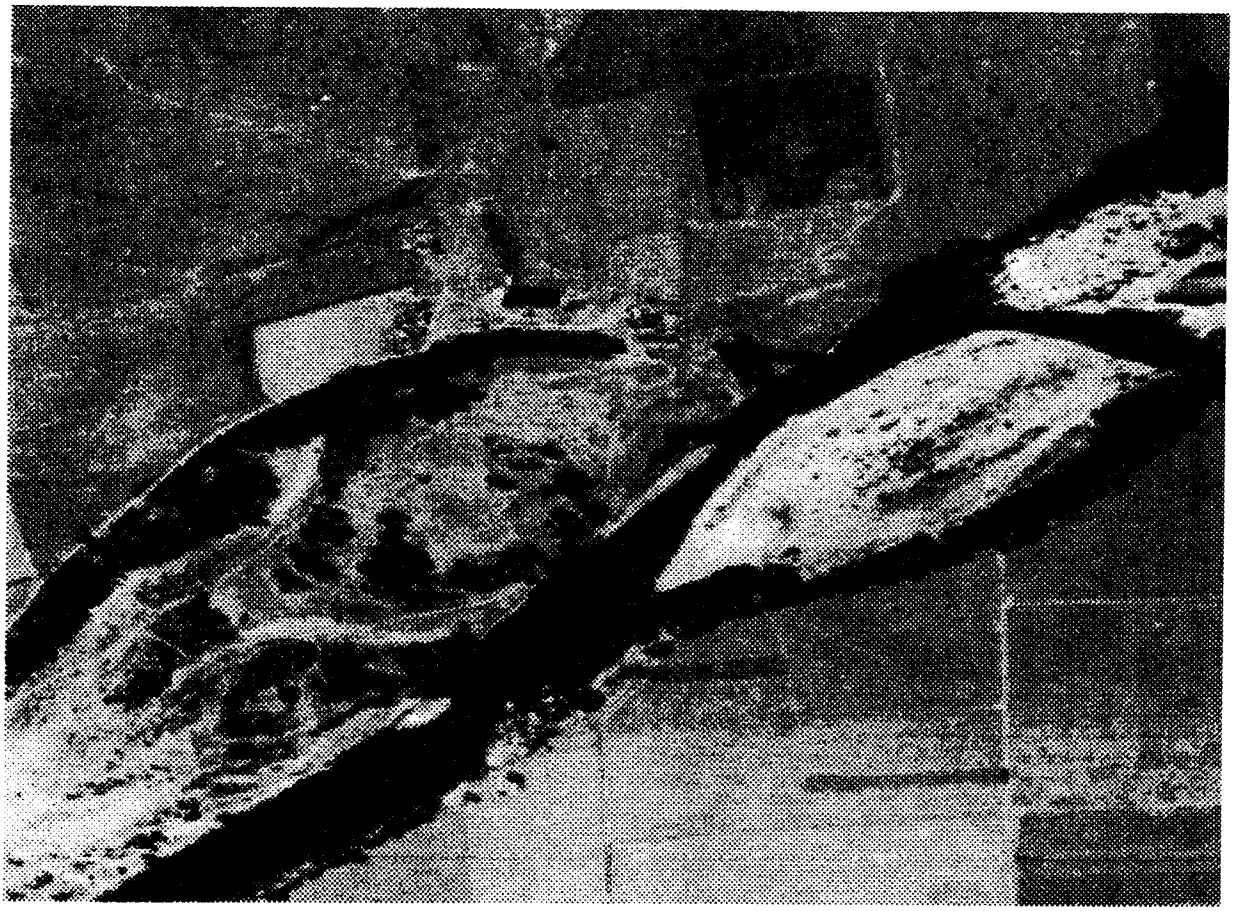
4. Gravel bar skimming significantly impacts aquatic habitat.

There will be no bar skimming in this project, therefore there will be no decrease in aquatic habitat. The bar stabilization portion of this project will actually accomplish the opposite of bar skimming in that the level of the bar will be increased.

5. Operation of heavy equipment in the channel bed can directly destroy spawning habitat, and produce increased turbidity and suspended sediment downstream.

The Woodruff bar location on the Smith River is located very close to the ocean relative to the balance of the river, and anadromous fish do not spawn in that portion of the river (except for the occasional abnormality by Chinook salmon). Coho salmon do not spawn in the main channel, preferring secondary tributaries off the main river. Therefore, activities on this bar would not impact spawning habitat.

Photo A. 1942 Aerial Photograph of the Woodruff Bar, taken on September 11, 1942. The Smith River flows downstream to the right. The location of the historic pool is located where the river takes a sudden right (north) turn when encountering the next bar.



For pool restoration the method used to extract materials while keeping sediment and turbidity to a minimum would be a river diversion. This way the pool area can be excavated in a "dry' condition, minimizing suspended sediment to the system.

When the river is diverted into the overflow channel there may be a slight increase in turbidity and introduced fine sediments, however this amount would be negligible.

6. Stockpile and overburden left in the floodplain can alter channel hydraulics during high flows.

There would be no stockpiling on the bar, and no remnant overburden would left on the bar, therefore channel hydraulics would not be affected. The purpose of the bar stabilization would be to restore aggregate to the bar in an effort to re-stabilize the bar and prevent further alteration of channel hydraulics.

7. Removal or disturbance of instream roughness elements during gravel extraction activities negatively affects both quality and quantity of anadromous fish habitat.

Instream roughness refers to structure, such as logs, woody debris or large rocks. The area proposed for the pool restoration site has none of these features. There is very little fish habitat here during summer and fall months, as the river becomes very shallow and fish are exposed. The restoration of a deep water pool would increase the diversity of habitat types for anadromous fish in this portion of the river, therefore quantity, and potentially quality, of habitat would be improved.

8. Destruction of the riparian zone during gravel extraction operations can have multiple deleterious effect.

There would be no impacts upon the riparian zone during operations, as the restoration would be located within the primary channel flow. This project will have no impact upon riparian habitats, as any extraction will take place far from established riparian vegetation.

A temporary crossing in the form of a culvert bridge will be built across the overflow channel. The site for the bridge crossing is open and clear of riparian vegetation, as the crossing has been in place for many years.

For bar stabilization, excavated material will not be placed on or near riparian vegetation. The portion of the bar to be stabilized is very open and free of riparian vegetation.

Benefits to Resources

Natural, deep water pools are lacking in the lower Smith River. Between Ruby Van Derventer Park and Rowdy Creek, there are only three naturally occurring deep pools (>15 feet); all bedrock formed lateral scour. In the lower portion of the Smith River there are few pools, and fall migrant salmonids must travel significant distances between pools.

As previously noted, deep water pools have high value as habitat for salmonids. In the fall, before rains appreciably increase water flows in the Smith River, deep water refugia are critical habitat for these large salmonids. Because pool habitat is limited within the lower Smith, low flow conditions in the fall have the tendency to limit the amount of available holding habitat for

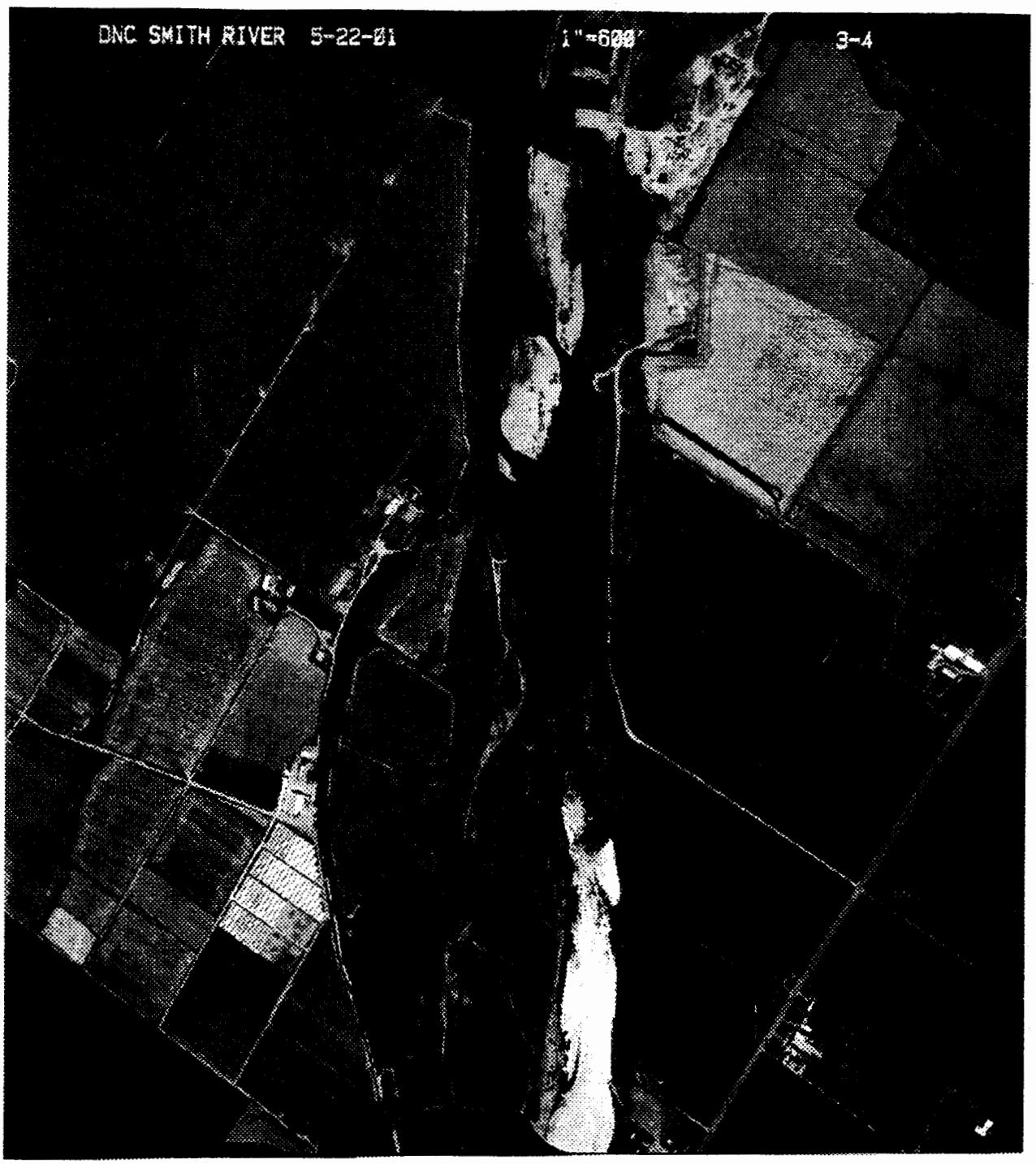


Photo B. 2001 Aerial Photograph of the Woodruff Bar, taken on May 22nd, 2001. The river flows to the top of the picture. All of the bar visible in the top of the photo is the Woodruff Bar. The two lower segments comprise the project area. Where these two large sections are bisected by river flow is the portion of the bar to be stabilized, directly across from the visible access road.

upstream migration. With the limited number of pools, large fish take advantage of depth within the channel or in areas of agitated water to seek cover from predators.

Stabilization of the bar is critical for maintaining the current hydraulics of the river. Currently, the bar is being bisected by a non-normal flow from the overflow channel, which is depriving the overflow channel of water. The overflow channel is therefore decreased in value as rearing habitat. Should the bar be allowed to further degrade, there could also be a loss of riffle habitat in the main channel.

ALTERNATIVE 2 - POOL RESTORATION ONLY

Project Description

For Alternative 2, the Project objectives would be the same for the restoration of the historic Woodruff pool, however there would be no attempt at stabilization of the bar itself. All material removed to create the pool would be removed off-site. The amount of material excavated may be less as there would be no material deposited onto the bar for stabilization.

Potential Impacts to Resources

For Alternative 2, creation of the pool would have the same potential impacts to resources as those outlined for Alternative 1. Greater impacts to resources may occur under Alternative 2, however, if the bar is not stabilized. Potential rearing habitat in the overflow channel would be lost, and potentially the riffle associated with the bar could be lost if the entire bar degrades. The main channel would be split into two or more secondary channels, which could negatively impact river hydrology. If the channel divides into two flows over the bar, the high-quality riffle currently at the head of the bar would be replaced by two smaller riffles, with less flow and depth, therefore the overall quality of the habitat in the area would be decreased.

Potential Benefits to Resources

For Alternative 2, creation of the pool would have the same benefits to resources as those outlined for Alternative 1. However, there would be no benefit in the form of bar stabilization.

ALTERNATIVE 3 - NO POOL RESTORATION, BAR STABILIZATION OR GRAVEL EXTRACTION

If this project is denied, there will be no attempt at pool restoration at this site. There will be no increase in the number and location of deep pool habitats within the vicinity of Woodruff Bar. The bar would continue to degrade and possibly collapse.

Potential Impacts to Resources

As there would be no pool restoration and aggregate extraction, there would be no potential negative impacts to resources such as minor increases in turbidity or sediments in the water column. However, there would also be no restoration of the historic pool.

There may be great impacts to resources if the bar is allowed to further degrade. There potentially could be the loss of salmonid rearing habitat from the loss of the overflow channel, and there may be the loss of the high-quality riffle currently in place at the head of the bar.

Potential Benefits to Resources

As there would be no increase in depth diversity on this section of the river, there would be no improvement of habitat conditions for salmonids. There would be no replacement of gravels onto the bar as proposed in Alternative 1.

Economic Impacts

Although this project is designed for salmonid habitat restoration, there are economic benefits to the project. In order to restore the historic deep water pool, approximately 40 cubic yards of aggregate from the Smith River would be removed. A portion of this amount would be used for bar stabilization, and the rest would be sold to an aggregate retailer. A portion of theses funds would be used to pay for the pool restoration and bar stabilization.

A relatively small amount of aggregate material would now be available for construction in Del Norte County. Although the amount is small, it is significant in an area which has recently observed a 100 percent increase in the cost of aggregates. Therefore, Alternative 3, the no-action alternative, would result in no positive impacts upon resources and negative impacts upon the community.

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CALIFORNIA
COASTAL COMMISSION

Mr. Robert Merrill
Coastal Manager, North Coast District Office
California Coastal Commission
710 E Street, Suite 200
Eureka, CA 95501

July 25, 2003

Re: Application for Salmonid Habitat Restoration and Bar Stabilization Project (Development), Upper Woodruff Bar, Smith River.

Dear Sir,

We are in receipt of your comments regarding a proposed Salmonid Habitat Restoration and Bar Stabilization Project on the Upper Woodruff Bar for 2003. I hope that this response will satisfy your needs to allow an application review to move forward. If you require additional information please feel free to contact me via email or at (707) 464-3777. We would appreciate this review moving forward in a timely manner.

We are requesting that this project be placed on the Coastal Commission agenda for September, as the hearing will take place in Eureka. Other locations in the state make attendance at the meeting cost-prohibitive for the Applicant.

I will respond to your comments as numbered in your July 3rd letter.

1. (a) You are correct in your assumption that additional "k-rails' may be necessary to block water from leaving the overflow channel and entering the incised channel. The amount of water flowing down the Smith River during late summer is very reduced, therefore one height of k-rail would be adequate to direct the flow down the overflow channel.

The amount of flow allowed to continue down the main channel after diversion would be the amount "escaping" between k-rails and on the edges of the diversion. The purpose to allowing minimal flow to occur is to prevent total dessication of the diversion area, thereby maintaining the invertebrate insect population, which anadromous smolts feed on.

The amount of flow allowed past the diversion would not be enough to transport any significant amount of sediment or cause siltation downstream of the extraction. Note that any disturbed sediment is already in the river and no sediments would be introduced into the system.. The water column at the point of disturbance would be so shallow that any disturbed sediment would have little or no potential to move downstream.. Also, extraction would take place from the

downstream end first, thereby allowing any sediments from upstream excavation to settle into the newly created depths at the downstream end.

(b) To reach the depths proposed for this pool, we require the use of an excavator and potentially also a backhoe. The excavator would be positioned as close to the distal side of the trench as needed to be able to reach down to the required depths. Exactly how the excavator would perform would depend upon the conditions found at the site (i.e. large versus small substrate), safety concerns, plus the logistics of being able to fill the trucks used to haul the material from the site. A backhoe may be needed to work in those areas where the greater weight of the excavator is not possible. When not in use, the equipment would be parked back from the water, far up onto the bar. Absorbent mats would be placed beneath the either machine in case of any hydraulic or engine fluid drips.

Excavation would begin from the downstream end of the proposed pool, and proceed upstream. In this way the greater depth would be extracted first, so any sediments moving downstream would be captured within the deeper portion of the excavation. The first loads of material removed would be placed onto the bar at strategic locations to block the incised channel and fill in where the incised channel has removed material. After the required amount for restoring the bar has been excavated, the remaining loads would be carried over the temporary bridge to an established processing site located on the north bank

(c) The temporary crossing to gain access to the bar is the same location and design as proposed and permitted by the Coastal Commission and the California Department of Fish and Game in the 2001 project application by the same Applicants, and is the same method of access which has been used for approximately 20 years. As the approach to the crossing is already in place on the north bank, including a dirt road to the water's edge, there would be no increase in geologic instability.

The amount of flow in the Smith River during the late summer / early fall is so reduced as to require only a relatively small culvert (4 foot). Placement of a culvert actually requires less site disturbance than the placing a bridge, as the bridge would require the building of foundation supports, which means that equipment would have to cross the overflow channel first in order to build the bridge supports. By using a culvert, we can build the crossing without getting equipment into the channel. The amount of material needed to build the crossing is minimal, as there is already some depth to the overflow channel, and after the placing of the culvert, only one to two feet of overfill is required. The overfill would be taken from overflow channel at the placement of the culvert and from gravels stored at the process site.

There is very little or no recreational boating of this portion of the Smith River during the late summer / early fall as flow is so reduced. Also, there are no public take-outs downriver of this project site. Just upriver from the project area there is a public boat launch on Fred Haight Drive, which the public uses to exit the river.

The river would be diverted into the overflow channel, which contains a large amount of riparian habitat (alder and willows), which would impair boaters from using the channel as well. Therefore, using a culvert rather than a bridge would have no impact upon recreational boating.

(d) I have included the additional maps and cross-sections as you requested.

4. We have applied for a permit from the U.S. Army Corp of Engineers. As you are no doubt aware, at this time the permit requirements for projects in the Smith River is complicated and expensive. You are requesting that I explain to the Coastal Commission how I plan to respond to a Federal Agencies permit requirements, though we do not know if they even have an issue with our application. Perhaps, since this is a habitat enhancement project, the Corp is more flexible in their requirements as they would like to see an improvement in salmonid habitat. I believe that this application process is complex and difficult enough without our exploring a whole new method of analysis, i.e. the Coastal Commission reviewing the Corps' permit procedure.

I have included a copy of Coastal Use permit No. 8969.

5. Coastal Access: This project is not located between the first public road and the sea (See Figure 1 of Application). West of the project area is Lower Lake Road, on the south side of the Smith River, which provides public access at Tolowa Dunes State Park. On the north side of the river, and west of the property, is Rowdy Creek, which flows from the Smith River northward and blocks access between the Project Area and the ocean, plus there are several roads between the Project Area and the ocean, including Sarina Road, Ship Ashore, and others.

Access to the river is limited in this area. The road going to the project area is private and gated. There is a public access to the river just south of the project area at a public boat launch site on Fred Haight Drive. This project, therefore, will not impede public access to the ocean or river.

7. Please note that the idea of restoring a historic pool at this location was first proposed to the Applicants by the National Marine Fisheries Service during consultation in 2002.

Note that we do not intend to narrow the low-flow channel as stated in your comments. We are not proposing to excavate alongside the levy, where the greatest water flow currently occurs, as we do not wish to cause any instability near the levee. Rather, our project is proposed mid-channel, and is designed to provide deep water habitat in an area where there is none. The channel will not be narrowed, rather the excavation with narrow at the upper end.

Cross-section are completed and included. The applicant also had the hydrologist show the depths of material in the channel this year compared to 1999. These cross-sections of the channel clearly show an increase in materials in the main channel since 1999, even though material was removed from the bar and the channel in 2001.

The cross-sections also demonstrates the lack of depth within the primary channel alongside the bar. The June profiles show a relatively flat bottom across the channel, from the bar to the levee on the opposite bank. Nowhere alongside the bar does the channel show a depth of more than three feet, demonstrating a relatively flat bottom with no defined, deep channel.

This demonstrates the need for improving salmonid migration habitat along the bar. Currently, when fall migrants come upriver they encounter a very shallow reach with no deep water refugia

and may be prevented from moving upriver due to shallow water. By providing deep water refugia and a deeper, defined 'run" along the bar, early fall migrants can take advantage of the improved habitat to move upriver earlier. By doing so they spend less time in the warmer estuary and can move upriver into cooler water near spawning habitats faster.

To further demonstrate the ability of this project to enhance salmonid habitat, I contacted Paul Albro, a fisheries technician who has worked on the Smith River for 16 years and is currently collecting fish data on Mill Creek in the recent State Parks acquisition. Paul noted the abundance of Chinook pre-smolts in the gravel excavations in the Smith River which resulted in artificial deep water habitats, and also noted their use by upstream migrants. I have attached a copy of his statement for your records.

Additional information demonstrating the benefits of "trench" excavation was not collected, as the excavators were told for years by the State of California that they were doing a great job, and no justification for their actions was previously required. Therefore, no studies or monitoring of gravel practices was initiated. The California Department of Fish and Game was the lead agency for gravel excavation, and they managed the methods and mitigations of gravel extraction on the river, but kept no records.

You also noted a concern with the excavation causing upstream incisions or head-cutting. Please note that our proposal is for an excavation approximately 800 feet long, ending 600 feet downstream from the head of the bar. Also note that in 1988, a 1,200 foot wet trench was placed in the same location, only 300 feet downstream from the riffle at the head of the bar. No "headcutting" of the bar occurred from the project in 1988, even though it was larger than what we are proposing in 2003, and it was located 300 feet closer to the riffle! This historic, large excavation filled in within three winter recruitment periods.

Please note the following: A wet trench was dug at Upper Sultan Bar and another dug upstream from Huffman bar in the early 1990's. At least two wet trenches were dug along Simpco Bar, and a long, wet trench was dug along the Westbrook-Wetherell and Crockett bars also in the early 1990's, and a wet trench has been dug at Tedsen bar. There have been no negative impacts on the river channel resulting from all of the above operations (G. LaRue, Hydrologist report, 2001). There is a great deal of evidence demonstrating that previous deep excavations, including those larger than what we are proposing, have worked within the Smith River.

As to a minor reduction in sediment transport downstream, this will undoubtably occur. However, the Smith River below the project area already contains high levels of aggregate, as documented by hydrologists in previous reports (see Larue report, 2001). Hydrologists have noted that in the 1960's and 1970's, boats were docked and people trolled for fish at the Ship Ashore Resort. This is not possible today due to the shallow depths.

Cattle used to swim at the "cattle crossing" on the lower river, where today they can wade in relatively shallow water. There is evidence that the decreased depth of the river near Ranch Bar, downstream of the project area, is causing bank erosion as the river channel is being forced against the left bank. A small failure in 1988 is now a massive failure several hundred feet long.

This evidence demonstrates that the loss of a minor amount of material moving downstream in this system is not going to cause channel degradation or destabilization, or the loss of riparian habitats.

Please note that this project does not propose to create a "floodplain gravel pit".

We understand your concern for excavation stability, however we feel that a stability analysis from a civil engineer is not warranted and is a very expensive proposal. As noted above, there is a history of projects similar to this one on the Smith River, with no negative impacts. This project is notably smaller than a historic, similar project in the exact same location, which caused no negative impacts.

8. I have contacted the State Lands Commission and sent them a Project Description. We are anticipating a revised letter from their office.

9. A cumulative analysis of our project's impacts upon threatened or endangered fish (only the coho salmon is a federally listed species, and the Smith River has never had a large coho run), or any anadromous fish species cannot realistically be done. We do know any potential negative impacts (minor changes in the river bottom contour, increased diversity, minor, temporary increases of sediment in the water column) are insignificant related to all other factors which impact anadromous fish in the system, such as upstream logging and road-building, ocean and river recreational fishing (though listed, coho are still hooked and released), yearly, natural fluctuations in the river system (the Smith River yearly moves millions of cubic yards of material). We also cannot measure impacts from other gravel extraction operations, as none have yet been permitted. We do know that only one other operation has submitted permit applications, compared to the normal five to six operators submitting permit applications per year. Therefore, the total amount of gravels proposed to be removed from the Smith River this year is greatly reduced from the norm.

We do know that anadromous fish populations in the Smith River are considered "healthy" compared to other systems. In the mid-1990's, the American Fisheries Association reported the steelhead population in the Smith River to be in good condition. The cutthroat trout population is considered the best in the State of California. Jim Waldvogel, fisheries biologist, reports that for the past three years he has had the best numbers of chinook salmon reproduction in the system since he began monitoring twenty years ago. When this information is considered relative to the fact that commercial gravel extraction has taken place in the Smith River since before 1960, it suggests that gravel extraction is having minimal, if any, impacts upon anadromous fish species.

Individually, this project should have no negative impacts and potentially should have positive impacts. Galea Wildlife Consulting has monitored gravel extraction at similar operations before, and noted no fish mortality and a minimal amount of sediment transport.

The Woodruff bar location on the Smith River is located very close to the ocean relative to the balance of the river, and anadromous fish do not spawn in this portion of the river. Coho salmon

do not spawn in the main channel, preferring secondary tributaries off the main river. Therefore, extraction activities at this site would not impact spawning habitat.

Currently, we do not have an alternative source of peer-reviewed evidence demonstrating individual and cumulative effects of gravel mining on the lower Smith River in lieu of NMFS documentation. Please note that this project was first proposed to the Applicant by NMFS as a salmonid habitat proposal, and this is the primary project function. We are working with NMFS and hope to have a letter of support from them for your files. In the interim, we request that this proposal go forward to the Coastal Commission members for their decision.

10. At issue here is whether this project is consistent with the Coastal Act regarding operations in environmentally sensitive areas (ESA).

Section 30107.5. of the State Coastal Act provides the following definition: "Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

We believe that it is unfortunate that the Commission has included all live waters of the Smith River as ESA habitat and that this warrants further review. This interpretation is very limiting and takes away the flexibility which is sometimes required to conduct habitat enhancement projects without extreme scrutiny and expense. We think it unwise to consider the entire live river system as ESA for a species, instead of focusing on specific habitats within the river as ESA, such as spawning habitat. It should be noted that salmonids do not spawn in this lower reach of the river.

Please note again that the idea of restoring a historic pool at this location was first proposed to the Applicants by the National Marine Fisheries Service during consultation in 2002. There has generally been a lack of agency support for deep-water excavation within the Smith River due to a lack of data which supports this practice as an enhancement of salmonid habitat. We have provided some initial testimony; however most of the information supporting deep water habitat for fish is anecdotal at this point. However, if projects such as this are not allowed, than no data can be collected to demonstrate, one way or another, the effectiveness and validity of such as project.

This project has been 1) initially proposed by the National Marine Fisheries Service 2) designed primarily with salmonid habitat improvement and 3) included into the design was the restoration of the gravel bar for stability.

We have previously documented the lack of diversity of salmonid habitat in the lower Smith River and the lack of deep water habitat for over a one mile length. We have also documented the use of such deep water pools by juvenile chinook salmon, and by migratory steelhead and chinook. The creation of a deep water pool cannot take place without the excavation of aggregate from the site. Introducing in-stream structure, such as trees or rocks, cannot be accomplished without first increasing depth as this introduces a boating hazard, and there is no information to insure that this alone will create a deep pool.

At this time, this project is not a part of a coordinated watershed level restoration effort that we know of. When first proposed to the Applicant by the National Marine Fisheries Service, we were not made aware that this was a requirement. When discussions regarding habitat restoration projects via gravel extraction were conducted in an inter-agency meeting including Coastal Commission staff, no mention of such a requirement was made or brought forward. This requirement is not noted in any past documents from the Coastal Commission. The Applicant is more than willing to be a part of salmonid habitat restoration efforts, however for the purpose of this project the timing does not allow for coordination at this late date.

We are in coordination with the National Marine Fisheries Service and the California Department of Fish and Game regarding this proposal, and have been assured that letters of support for this project are forthcoming from these agencies when all parties are in agreement regarding the project's scope and design. At this point we request that this project be permitted to the members of the Coastal Commission, whereby upon approval from other agencies the Coastal Commission will not be the impediment to what should be a good habitat improvement project.

Thank you for your time and consideration.

Sincerely,

Frank Galea
Certified Wildlife Biologist
Agent for Applicants

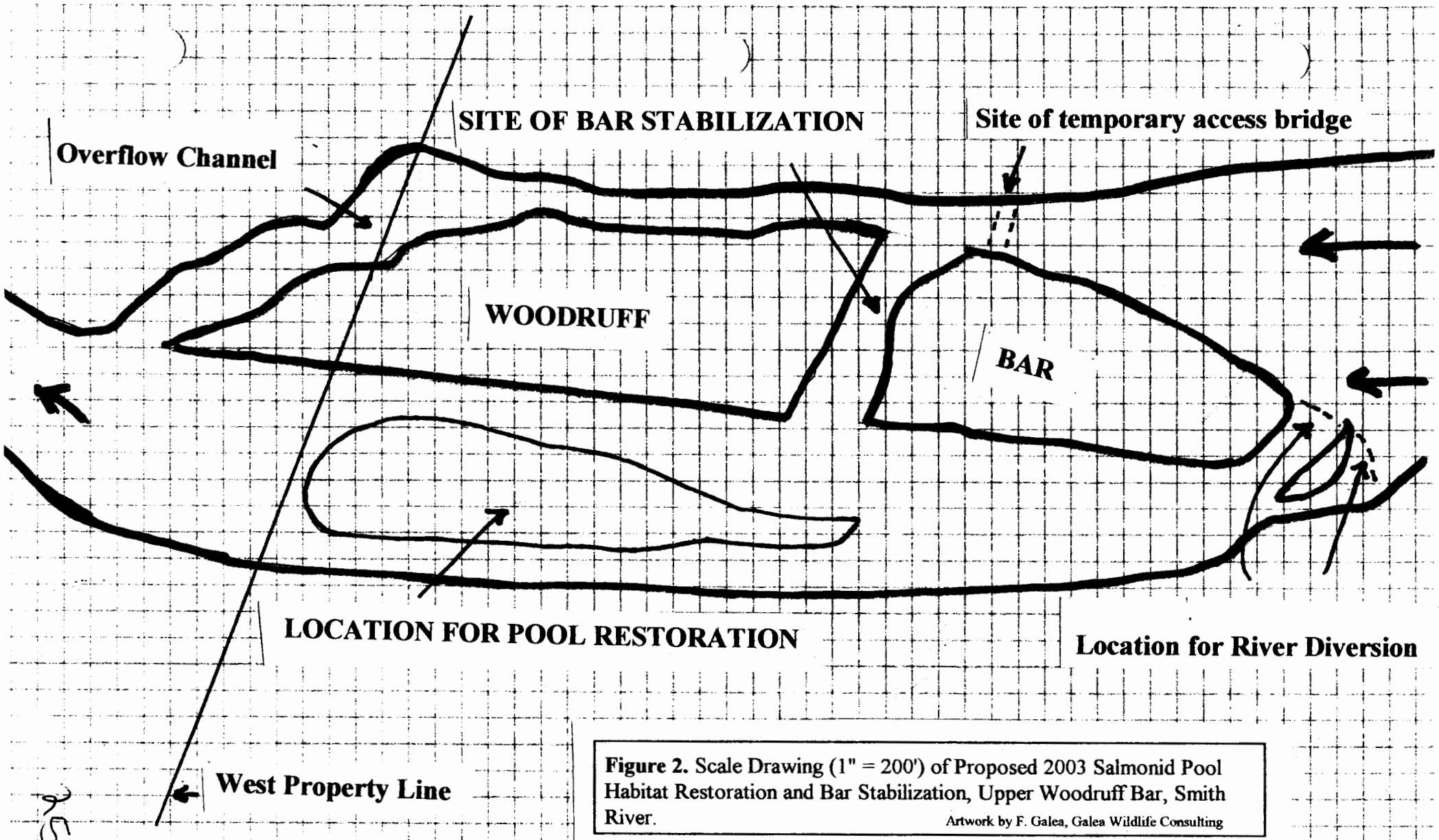

Figure 2. Scale Drawing (1" = 200') of Proposed 2003 Salmonid Pool Habitat Restoration and Bar Stabilization, Upper Woodruff Bar, Smith River.

Artwork by F. Galea, Galea Wildlife Consulting

I have conducted fish surveys on the Smith River for 16 years. In the summer of 2000 I conducted fish surveys which included surveying several deep water excavation sites before, during and after excavation. Included were the gravel excavations at Sultan Bar and Simpco Bar. For additional information regarding these surveys see Galea 2000.

In the fall of 2000 I observed adult chinook holding in these excavations during the fall upstream migration. The adults were using the excavations for holding / resting areas on upstream migrations.

In the early spring of 2001 these same excavations were being utilized by adult steelhead as holding / resting areas as well.

In May of 2001 I was surveying the lower river in search of coho smolt runs. During these surveys I dove into the trenches dug from the previous gravel extraction season to see if any fish were using the tenches. I noted that the highest concentrations of chinook pre-smolts in the river were located a foot from the bottom of these excavations. There was an extremely high density of pre-smolts in the bottom of these trenches, to the point that the numbers were uncountable. As these fish had not hatched in deep water, it was apparent that they had migrated to these artificial habitats in search of deep water refugia.

I have noted that the lower Smith River (Sultan Bar and below) is relatively lacking in salmonid habitat diversity. Deep water refugia is notably lacking from this part of the system. Although artificial, I believe that deep water excavations created by gravel extraction can mimic natural pools preferred by salmonids. I have observed that excavations done at the proper time of the year have minimal negative impacts.

Paul Albro, fisheries technician
P.O. Box 1011
Smith River, CA 95567

US Army Corps
of Engineers.

Regulatory Branch
333 Market Street
San Francisco, CA 94105-2197

SAN FRANCISCO DISTRICT

PUBLIC NOTICE

LETTER OF PERMISSION PROCEDURE FOR GRAVEL MINING AND EXCAVATION ACTIVITIES IN DEL NORTE COUNTY

GRAVEL LOP 2003 -2
FILE NUMBER 28222N
DATE: March 26, 2004

PERMIT MANAGER: Kelley Reid PHONE: 707-443-0855 e-mail: kelley.reid@spd02.usace.army.mil

INTRODUCTION: The U.S. Army Corp of Engineers, San Francisco District (Corps) is issuing a new Letter of Permission (LOP) procedure 2003-2 for the authorization of gravel mining activities in streams and rivers in Del Norte County, pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). The LOP procedure expires on December 31, 2007.

SUMMARY: The procedure applies to gravel extraction on the unvegetated gravel bars within the streams and rivers of Del Norte County. Activities that may be authorized by this procedure include but are not limited to temporary stockpiles of gravel, construction of temporary cofferdams and road crossings. Gravel may be obtained by excavation of "horseshoe pits," alcoves, trenches, skims, or "wetland pits."

BACKGROUND: LOP procedure 96-2 was authorized initially on March 28, 1997, expired on March 28, 2002, and was later extended from July 26, 2002 until December 31, 2002. The LOP procedure 2003-2 is valid until December 31, 2007. The LOP's issued to authorize the individual extraction proposals will continue to contain site-specific limitations intended to protect the environment and natural and cultural resources. If the District Engineer (DE) considers it necessary, proponents will be required to apply for an individual permit.

The enclosed "Letter of Permission Procedure, Gravel Mining and Excavation Activities within Del Norte County" details extraction season and the requirements for the extraction companies.

ENDANGERED SPECIES: The Corps has determined that authorization of the extraction proposals by this procedure will not affect threatened or endangered species listed by the U.S. Fish and Wildlife Service (Service). However, in the event that threatened or endangered species in the Service's jurisdiction may be found in proximity to the extraction sites, additional operating requirements are attached to the procedure as Appendix E. The Corps has also determined that authorization of the extraction proposals may affect the Federally threatened Southern Oregon/Northern California Coastal coho salmon. A biological opinion was received from the National Marine Fisheries Service and the incidental take statement has been attached to the enclosed LOP procedure as Appendix F.

FOR MORE INFORMATION: Additional details may be obtained by contacting Kelley Reid of our office at telephone 707-443-0855, writing to the Eureka Field Office or E-mail: Kelley.Reid@spd02.usace.army.mil.

EXHIBIT NO. 5
APPLICATION NO.
1-03-039
PUBLIC NOTICE – LETTER OF PERMISSION PROCEDURE NO. LOP 2003-2, U.S. ARMY CORPS OF ENGINEERS, MARCH 26, 2004 (1 of 28)

LETTER OF PERMISSION PROCEDURE

GRAVEL MINING AND EXCAVATION ACTIVITIES WITHIN

DEL NORTE COUNTY

Interested parties are hereby notified that, in accordance with Title 33 CFR 325.2(e) published in the Federal Register, November 13, 1986, The U. S. Army Corps of Engineers, San Francisco District (Corps) has adopted a Letter of Permission (LOP) procedure for the authorization of work described herein. The purpose of the LOP procedure is to expedite Section 404 of the Clean Water Act authorization for gravel mining and extraction activities in Del Norte County that do not pose significant adverse individual or cumulative impacts.

The LOP's to be issued under this procedure will contain limitations intended to protect the environment and natural and cultural resources. In cases where the District Engineer (DE) considers it necessary, applications will be required for individual permits.

In addition, the Corps regulates work in navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899. Activities authorized under this LOP procedure may also include Section 10 authorization.

SCOPE OF WORK:

Work authorized by LOP under this procedure is limited to discharges of dredged or fill material associated with excavation activities in waters of the United States, including navigable waters of the United States, within Del Norte County, California. Activities that may be authorized by LOP under this procedure include, but are not limited to, sand and gravel mining and work associated with these activities, such as temporary stock piling of gravel in the stream and construction of temporary coffer dams and road crossings. Impacts to waters of the United States, including wetlands, shall be avoided or minimized through the use of practicable alternatives. Reasonable compensation for unavoidable adverse impacts to waters of the United States will be required. Work that would have unmitigatable adverse impacts on the aquatic environment or cause a substantial reduction in the extent of waters of the United States will not be authorized by LOP. The activities authorized under this LOP procedure shall be part of a single and complete project.

EVALUATION PROCEDURES:

Applicants shall submit complete applications to the Corps for review prior to receiving Department of the Army authorization under the LOP procedure. Each application shall be reviewed to determine consistency with the LOP procedure, and reviewed under an abbreviated environmental assessment. Applications which pass these reviews will be permitted for three years. However, each permittee must also submit yearly monitoring data regarding extraction amounts, cross-sectional information, biological monitoring and aerial photos.

Each year, in March, the Corps will conduct a public interest evaluation and coordination meeting with the Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), California Coastal Commission (CCC), California Department of Fish and Game (CDFG),

Del Norte County's hydrologist, and the California Regional Water Quality Control Board (RWQCB) to review new applications and yearly compliance data of previously authorized activities. If a proposed (new) activity will meet the conditions of the LOP procedures, it will be authorized by LOP. If an authorized activity has met the conditions of the LOP, and there is assurance that its planned operation for the next season will meet the LOP conditions, based on the information submitted, it will be allowed to continue for the next season under the existing authorization, until the applicant's LOP expires.

Should an agency or member of the public object to continuing an activity under an existing authorization, based on evidence of non-compliance or evidence of more than minimal impacts, the Corps will suspend and revoke the existing authorization and require an individual permit unless the permittee can demonstrate compliance with the LOP, or reduce the future impacts of its operations to minimal impacts, and mitigate for past non-compliance.

The general time line for the LOP process is stated below. Biological monitoring dates are listed in Appendix D.

FEB 1	New Class A and all class B projects must submit notification to the Corps with environmental documentation that is submitted to the Lead Agency.
FEB 1	Annual report that evaluates the past extractions, provides recommendations on future extractions, lists the cumulative amount of impacted riparian vegetation from extraction activities, includes the biological monitoring, and the provides the status of mitigation areas due to Corps and the other regulatory agencies.
MAR	Gravel Week: Corps meets with other Regulatory Agencies to review permits.
LATE MAY	Aerial photos flown.
	Gravel extraction plans reviewed by County and Hydrologist must be submitted, with recommendations, to the Corps and NMFS, unless late seasonal rains prevent data gathering. Corps then will establish new deadline. Class B projects due to Corps by May 15.
OCT 1	Gravel stockpiled on non Wild and Scenic river bars must be removed by Oct 1.
OCT 15	Regrading must be complete for all gravel bars, even those receiving an extension. All gravel extraction ceases on river bars, unless an extension is given.
NOV 1 - FEB 28	Planting of mitigation areas.
NOV 1	Post cross-section data submitted to Corps and Hydrologist.
DEC 31	Mitigation monitoring reports due to Corps.
JAN 1	Biological monitoring data submitted to Corps.

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GRAVEL EXTRACTION RESTRICTIONS:

Projects authorized under the LOP procedure are subject to the following limitations. The Corps has the right to add or modify conditions as appropriate.

1. Excavation: Excavation shall be limited to less than the amount of annual replenishment. The Corps will consider extractions from storage and NMFS will review all extraction plans in excess of annual replenishment.

Proposed trenching areas should be located where geomorphic and riverine processes would normally result in pool formation and maintenance, as determined by a qualified hydrologist or geomorphologist. Similarly, as recommended by the hydrologist or geomorphologist, runs may be utilized if that type of habitat can be maintained and not altered to unnatural pool habitat. In all cases, trenches will not be located in riffles and shall be located a sufficient distance from riffles such that head cutting of the trench will not affect riffle elevation and stability. Trenching shall be limited to the period from July 15 through August 30 to minimize and buffer against impacts to migrating or rearing adult and juvenile salmonids. Following extraction, all trenches created in the low flow channel shall have large woody debris or boulders placed within to provide habitat for holding or rearing adult and juvenile salmonids. Once instream gravel extraction is completed, and suspended sediment allowed to settle completely, the berm must be completely and entirely removed from the channel. In-stream gravel operations must leave a layer of gravel on the bottom of the extraction area.

For sites above the active channel, excavation shall proceed by skimming except for projects where the stream or river becomes dry during the summer months where excavation may proceed either by skimming or trenching. Operations that must remain outside the active channel must be a minimum of 1 vertical foot above the water surface elevation and above the 35% exceedence flow. See NMFS' Hydrology Report for additional information about the 35% exceedence flow. To aid compliance with these setbacks the area of extraction shall be clearly flagged, painted, or staked. No extraction shall occur on the head of bar, which is defined as that portion of the bar from the widest point of the bar upstream, unless hydrologist/geomorphologist and NMFS personnel determine extraction on head of bar is appropriate. If the bar is irregularly shaped, the head of bar shall be the upstream 1/3 of the bar.

All equipment must remain out of standing and flowing water except for building temporary channel crossings; equipment, however, can reach into water to extract gravel.

All projects diverting stream flow to a side channel must notify the National Marine Fisheries Service, the California Department of Fish and Game, and the United States Fish and Wildlife Service prior to being approved by the Corps.

Temporary storage of excavated material may occur on the gravel bar, but must be removed by October 1. Temporary stockpiling of gravel on bars that are on rivers listed under the Wild and Scenic Rivers Act may occur during the active work week, Monday through Saturday, but must be removed on or before Saturday of each weekend. Work on gravel bars shall be limited to Monday through Saturday, 7:00 a.m. to 6:00 p.m. Modifications to excavation procedures may be made to increase fisheries and wildlife habitat with Corps approval. Haul roads shall follow the shortest route possible while avoiding sensitive areas such as riparian vegetation, and shall be scarified after extraction is complete to prevent compaction of the gravel bar.

All riparian woody vegetation and wetlands must be avoided to the maximum extent possible. Any riparian vegetation or wetland that is disturbed must be clearly identified by mapping. Woody vegetation that is part of a contiguous 1/8 acre complex, or is at least 2 inches diameter breast height (DBH) that is disturbed must be mitigated for adverse impacts. Impacts to other woody vegetation must be described and submitted to the Corps

and CDFG with gravel extraction plans. These impacts may require mitigation at the discretion of the Corps. Impacted areas, which must be mapped, consist of riparian vegetation, which have drip lines within 25 feet of excavation activities (excavation, stockpiling, parking, etc.) or wetlands that are filled, excavated or drained. Impacts to woody vegetation shall not include existing haul roads, stockpiles, etc. (See discussion under Required Mitigation).

Gravel removal must remain a minimum distance of 500 feet from any structure (i.e. bridge, water intake, dam, etc.) in the river. For bridges, the minimum setback distance is the length of the bridge or 500 feet, whichever is greater. Gravel removal may encroach within this setback with owner approval and approval by the Corps.

2. Regrading: The project area must be regraded before the water levels rise in the rainy season and must be completed by October 15. Regrading includes filling in depressions, grading the construction/excavation site according to prescribed grade (a minimum of 2%), sloping downward to the upper buffer's edge and/or downstream, and removing all temporary fills from the project area.

3. Timing: Unless the letter of permission is specifically modified, gravel extraction shall not commence until June 1, and shall cease by October 15 of each year. Regrading procedures shall be completed prior to October 15 of each year. Requests for extensions of these time periods will be reviewed on a case-by-case basis. The applicant, however, must have regraded the site before an extension can be authorized. Requests for extensions must include an approved CDFG Stream Alteration Agreement (SAA) extension or exemption.

4. Stream crossings for gravel mining purposes: The size and number of stream crossings must be kept to a minimum. All stream crossings in the main channel must be spanned to the maximum length possible using either a flatcar or bridge span, and must maintain a three-foot elevation above the water surface. Culverted crossings may be utilized in certain circumstances where the size and nature of the crossing dictates that culverts are more appropriate. Information describing the need for culverts must be submitted with culvert requests and shall be supplied to the hydrologist, CDFG, and the Corps. All crossings and associated fills must be identified as to the type (culvert vs. flatcar) and location in the submitted yearly information, and removed before October 15th of each year unless specifically modified in any extension authorized by the Corps.

5. Wild and Scenic Rivers: Sections of the Smith River and its tributaries and the Klamath River in Del Norte County are designated recreational, scenic and wild. No Department of the Army authorization shall be given for sections of rivers designated "wild" under the Wild and Scenic Rivers Act. For a list of these recreational and scenic river sections see Appendix B. For new projects in these river sections, the applicant must provide information demonstrating that the activity will not degrade the fisheries, historical, scenic and/or recreational values for which the river was included in the system. For example, new mining operations where new processing plants are constructed along portions of a scenic river would generally not be considered appropriate under this letter of permission.

6. Endangered Species: All new applicants shall submit, as part of the application, a written assessment by a qualified biologist describing the potential effects of the project on federally threatened, endangered, or proposed species under the Endangered Species Act. This assessment shall include, at a minimum, an account of habitat suitability for listed and proposed species within a 0.25 mile radius of the project site, information on any known bald eagle or American peregrine falcon nest sites within a 0.50 mile radius of the project site, and additional pertinent site information. All suitable marbled murrelet and northern spotted owl habitat within 0.25 miles of the project site shall be mapped. For projects that are closer than 0.25 miles (setback limit) from marbled murrelet and northern spotted owl nesting and roosting habitat or tidewater goby habitat, or closer than 0.50 mile (setback limit) of the bald eagle or American peregrine nest sites see Appendix E to plan projects which have no effect or to not likely to adversely affect listed or proposed species.

The streams and rivers of Del Norte, and especially the Smith River, are designated critical habitat for Southern Oregon/Northern California coho (SONCC) salmon (*Oncorhynchus kisutch*), a federally threatened species. To limit the adverse impacts to the habitat and the species, the permittee shall provide the Corps and NMFS a copy of the proposed extraction plan simultaneously. NMFS shall also review each extraction plan with special emphasis on the use of culverts, stream diversions, alternative extraction designs (including wetland pits, alcoves, etc.) and trenching in secondary channels (those channels that have annual river flow except during the extraction season). Temporary channel crossings may be placed after June 1 and must be removed before October 15 of each year. An extraction plan will not be approved to excavate gravel from the flowing river. All large woody debris found on the bar in the spring should be stockpiled during extraction and returned to the gravel bar following extraction. Trenching proposals will be contingent upon an NMFS-approved fish relocation plan.

7. New projects: Any project which has not been previously authorized under the County by vested rights, conditional use permit or exemption by written notice, as of April 1, 1996. New projects must submit a preliminary project description including excavation and processing locations on a USGS topo map, estimated quantity of material proposed to be excavated, and the Endangered Species assessment to the Corps by February 1 of the year in which gravel extraction is to occur. Projects removing 5000 cubic yards or more of material must also submit aerial photos.

8. Additional special conditions may be added to the LOP on a case by case basis to minimize adverse impacts.

LOCATION OF WORK:

An LOP issued under the provisions of this procedure shall apply to work in waters of the United States, including navigable waters of the United States, within Del Norte County, California and also any projects that straddle the county lines.

AUTHORIZATION FROM OTHER AGENCIES:

The permittee is responsible for obtaining any and all additional federal, state, tribal, or local permits that may be required, which include, but are not limited to:

1. STATE WATER QUALITY CERTIFICATION: California's Regional Water Quality Control Board's (RWQCB) certification is required for work within the state of California, except for work within the boundaries of a Federally recognized Indian Reservation (See #5 below). Applications for certification must be submitted to the Executive Director, California Regional Water Quality Control Board, North Coast Region, 5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403.

The state of California has adopted general National Pollution Discharge Elimination System (NPDES) permits to cover those mining activities which must obtain permits to discharge storm water associated with industrial activity - as defined in 40 CFR Section 122.26(b)(14). Applicants can contact the RWQCB, North Coast Region, for information about NPDES requirements.

2. When stream bed materials such as sand and gravel are to be disturbed or removed from waters in the state of California, the permittee must obtain a Stream Alteration Agreement from the CDFG, except when working within the boundaries of a Federally recognized Indian Reservation (See #5 below). The permittee can contact the CDFG at California Department of Fish and Game, Region 1, 601 Locust Street, Redding, California 96001.

3. All gravel and mining operations must either be permitted by or exempted by the California Department of Conservation Division of Mines and Geology's Lead Agency, except for work within the boundaries of a Federally recognized Indian Reservation (See #5 below). The Lead Agency for Del Norte County is: Del Norte County Community Development Department, 700 Fifth Street, Crescent City, California 95531. Failure to provide proof of a conditional use permit, vested rights or exemption letter will preclude use of the LOP procedure.

4. Sand and gravel extraction and other development activities located within or affecting the Coastal Zone may require a Coastal Development Permit and a Coastal Zone Management Act Consistency Concurrence from the California Coastal Commission located at 45 Fremont Street, Suite 2000, San Francisco, California 94105-2219.

5. Activities within the boundaries of a Federally recognized Indian Reservation need to obtain Water Quality Certification from the EPA, or from the Indian Reservation if it has been authorized by the EPA to grant water quality certification. In addition, there may be other permits required by the Indian Reservation that are not listed here. The applicant shall contact the appropriate Indian Reservation for more information.

6. Activities that occur below the ordinary high water mark on tidal waterways and below the ordinary high water mark on non-tidal waterways may have to obtain easements from, or pay fees to, the California State Lands Commission (SLC). The SLC can be contacted at 100 Howe Avenue, Suite 100 South, Sacramento, California 95825-8202, or reached at (916) 574-1800.

7. This LOP procedure has been authorized under the terms of consultation with NMFS. Each permittee shall comply with all the Reasonable and Prudent Measures (RPM) of the Incidental Take Statement (ITS), included in Appendix F. Each project shall also be reviewed by NMFS in order to assure the proposed extraction complies with the Biological Opinion.

CONDITIONS OF THE LETTER OF PERMISSION:

In addition to limitations discussed in the scope of work, projects authorized by LOP are subject to the general conditions contained in Appendix A, and the RPM of the ITS contained in Appendix F, and any special conditions added under authorization.

APPLICATION PROCEDURES:

Applications shall be classified as one of two different categories based on quantity of material removed from the river basins. The two categories are: Class A projects: Projects which remove 5,000 cubic yards of material per year or more; and Class B projects: Projects which remove less than 5,000 cubic yards per year of material. All new projects (See #7 under General Restrictions on Page 7) must submit a notice of intent to mine gravel to the Corps, Eureka Field Office, by February 1 of that year.

In all cases an application for authorization of work under this LOP procedure must include a complete written description of the project, proposed work schedule, the address and telephone number of a point of contact who can be reached during working hours, an 8.5 by 11 inch vicinity map, and an 8.5 by 11 inch site or location map showing all the boundaries of all work to be done (maps and figures can also be on 11 by 17 inch paper). The

information may be submitted on an Application for Department of the Army Permit form (ENG Form 4345) or in any other form which will clearly supply the information in a concise manner. In general, projects that remove more than 100,000 cubic yards per year will not be considered eligible for authorization under this permit.

- Class A Projects: Projects that remove 5,000 cubic yards or more per year of material from the river basin. Project submittal must include a description of the project and at least the following information, on a yearly basis:

I. A pre-extraction report shall be submitted to the Corps and NMFS after it is approved by the County and after review by the hydrologist selected by the gravel miners and approved by the County and the Corps of Engineers. The pre-extraction report shall be submitted a minimum of two weeks prior to excavation. Pre-extraction reports shall include:

A. Cross-section Surveys: Monitoring and Extraction cross-section surveys shall be done according to Appendix C (attached), unless modified by the Corps in review with the County hydrologist. Each year spring surveys shall be submitted by May 15 to the Corps, unless river levels and weather prevent data collection, at which point a deadline will be determined by the Corps. Applicants shall submit gravel extraction plans, approved by the county and the hydrologist, to the Corps for approval, prior to commencing gravel extraction operations;

B. A Stream Alteration Agreement (SAA) or any extension signed by the CDFG, or a Riparian Protection and Surface Mining Permit signed by a Federally recognized Indian Reservation. Permits may be obtained concurrently with the Corps permit;

C. A pre-extraction vertical aerial photo of the location, with a scale of 1 inch equals 1000 feet or better. Photos shall be taken in the late spring of each year and shall include the entire project reach (extraction zone plus immediate upstream and downstream reaches within one half length of the extraction zone reach, as measured along the thalweg (the bottom of the low-flow channel)). Photos shall only be taken after the river recedes and the water is clear enough to see the bottom;

D. A mitigation report containing the mapped areas that are impacted (riparian vegetation and wetlands) and the mitigation proposed to minimize these impacts;

E. For new projects, the applicant must submit to the Corps and the consulting regulatory agencies participating in the March Meetings, by February 1 of the initial gravel mining year, copies of the environmental documentation required by the Lead Agency when requesting a conditional use permit, vested right or exemption. The Corps may also require additional information.

II. A post-extraction report shall be submitted to the Corps, NMFS and the County Hydrologist by November 1 of each year. Post-extraction reports shall include:

A. A post-extraction survey, which shall be conducted following cessation of extraction and before alteration of the extraction area by flow following fall rains, preferably before October 15. Post-extraction reports shall include the amount and dimensions of material excavated from each area mined. See Appendix C for post-extraction requirements;

B. A longitudinal profile view of the thalweg for the active channel line along the project reach based on the monitoring cross-sections;

III. Biological monitoring report as described in Appendix D due January 1.

IV. Final Report from the hydrologist due February 1. The hydrologist shall submit to the Corps the evaluation of the extraction sites, monitoring cross-sections, impacts associated from previous extraction operations and any definable changes in the river morphology that may alter extraction prescriptions.

- Class B Projects: Projects that remove less than 5,000 cubic yards per year of material from the river basin. Class B projects must be physically separated from other gravel operations to be considered separate projects. Projects cannot be located on the same gravel bar, or on the same parcel number as other projects, and be considered as separate projects. The Corps reserves the right to elevate a Class B project to Class A status.

Project submittal must also include a description of the project and at least the following information, on a yearly basis:

I. A pre-extraction report, approved by the County appointed hydrologist, and submitted by May 15 of the gravel year, unless high flows prevent data gathering, that includes:

A. Plan and cross-section view drawings of the project site on 8.5 by 11 inch or 11 by 17 inch paper. Drawings shall be labeled with dimensions, and quantities of material removed from each site. Plan views must map any salmonid spawning sites.

B. A minimum of one monitoring cross-section and five extraction cross-sections per extraction site (See Appendix C for cross-section details).

C. A copy of the SAA signed by the CDFG, or a Riparian Protection and Surface Mining Permit signed by the Federally recognized Indian Reservation. Permits may be obtained concurrently with the Corps permit.

D. Photos of the mining area before excavation. Photo location shall be mapped (location and direction) to maintain consistency with post-extraction report photos.

E. Mapping and description, including size, species and number, of any riparian vegetation that will be removed, cut, or within 25 feet of excavation, stockpiling or trafficking of gravel and any wetland that will be impacted. Also included in submittal shall be a mitigation plan to minimize any unavoidable impacts.

II. A post project report, due by November 1 of extraction year, which shall include:

A. Post-extraction data for extraction and monitoring cross-sections according to Appendix C.

B. Photos of the mining area after excavation. Photos shall be taken from the same location as pre-project photos.

REQUIRED MITIGATION:

Each permittee shall mitigate impacts to wetlands and riparian zones in the following manner: avoidance of the impact; minimization of the impact, rectifying the impact, reducing or eliminating the impact over time, and

finally compensating for impacts. For all unavoidable impacts a mitigation plan shall be submitted with applications for all projects that will adversely affect wetlands and riparian vegetation. Mitigation must consider the size and age of the vegetation removed or adversely impacted. All vegetative mitigation must be planted between November 1 and February 28 following excavation and must have an approved survival rate over three growing seasons. Failure to obtain a three year survival rate shall require replanting. Annual reports depicting the survival of vegetation shall be due by December 31 each year for three growing seasons after planting year.

SITE VISITS:

Each year project owners must also inform the Corps upon completion of gravel removal so that a site visit can be planned before the rainy season commences. Notification, by phone or fax, shall occur within two days of project completion.

APPLICATION SUBMITTAL:

Applications should be mailed to:

U.S. Army Corps of Engineers, Regulatory Branch, Eureka Field Office, Attention: Mr. Kelley Reid, P.O. Box 4863, Eureka, California 95502. If you have questions you can phone the Eureka Office at (707) 443-0855 or fax (707) 443-7728. Our e-mail address is kreid@spd02.usace.army.mil.

Work may not proceed prior to written notification that the District Engineer has issued an LOP. For projects which have obtained the LOP, the activity may not begin each year until a confirmation letter has been issued by the Corps. It is the applicant's responsibility to insure that the authorized project meets the terms and conditions set forth herein; failure to abide by them will constitute a violation of the Clean Water Act and/or the Rivers and Harbors Act of 1899.

The Corps is responsible for determining compliance with this LOP. The Corps may take actions to rectify projects which are not in compliance. These actions may include, but are not limited to, the following:

A. Permit revocation.

B. Permit suspension.

C. Project and habitat site restoration orders.

D. Reduction of authorized gravel extraction amounts per year.

E. Modification of extraction plan.

No authorization will be granted under an LOP for any excavation or grading that is for the primary purpose of river engineering, channel or river capture, channel realignment or for a project that is likely to result in the above, unless explicitly stated in the submittal and unless approved by the Corps. Projects outside the scope of this LOP may be considered for authorization by individual permit.

This procedure shall become effective on the date of the signature of the District Engineer, or his authorized representative, and will automatically expire five years from that date unless the permit is modified, revoked, or

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extended before that date. Activities authorized under this permit that have commenced (i.e. are under operation), or are under contract to commence in reliance on this permit, will remain authorized provided the activity is completed within twelve months of the expiration, modification, or revocation of the permit, unless discretionary authority has been exercised by the Corps on a case-by-case basis to modify, suspend, or revoke the authorization. Prior to expiration, a public notice seeking public comment will be reissued within five years from the date of signature of this LOP procedure. The public notice will supply a summary of past actions and may also seek reauthorization of this LOP procedure.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:
FOR THE DISTRICT ENGINEER:

Michael McCormick
Lieutenant Colonel, Corps of Engineers
District Engineer
San Francisco District

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APPENDIX A

CONDITIONS OF LETTERS OF PERMISSION ISSUED UNDER "Gravel Mining and Excavation Activities in Del Norte County"

GENERAL CONDITIONS:

1. The Department of the Army has relied in part on the information provided by the permittee. If, subsequent to issuing this permit, such information proves to be false, incomplete, or inaccurate, this permit may be modified, suspended, or revoked, in whole or in part.

2. Permittees whose projects are authorized by this LOP shall comply with all terms and conditions herein and the RPM identified in the ITS, Appendix F. Failure to abide by such conditions invalidates the authorization and may result in a violation of the law, requiring restoration of the site, remedial action, or legal action.

3. An LOP should not be considered as an approval of the design features of any authorized project or an implication that such is considered adequate for the purpose intended; a Department of the Army permit merely expresses the consent of the Federal Government to the proposed work insofar as public rights are concerned. This permit does not authorize any damage to private property, invasion of private rights, or any infringement of federal, state or local laws or regulations. Nor does it relieve the permittee from the requirement to obtain a local permit from the jurisdiction within which the project is located and to address all non-encroachment restrictions within a regulatory floodway of such local jurisdiction as identified by the Federal Emergency Management Agency.

4. This LOP procedure may be modified or suspended in whole or in part if it is determined that the individual or cumulative impacts of work that would be authorized using this procedure are contrary to the public interest. The authorization for individual projects may also be summarily modified, suspended, or revoked, in whole or in part, upon a finding by the District Engineer that immediate suspension of the project would be in the public interest.

5. Any modification, suspension or revocation of the District Engineer's authorization shall not be the basis for any claim for damages against the United States.

6. This permit does not authorize the interference with any existing or proposed Federal project, and the permittee shall not be entitled to compensation for damage or injury to the structures or activities authorized herein which may result from existing or future operations undertaken by the United States in the public interest.

7. No attempt shall be made by the permittee to prevent the full and free public use of all navigable waters of the United States, at or adjacent to the project authorized herein.

8. There shall be no unreasonable interference with navigation by the existence or use of the permanent and temporary structures authorized herein.

9. The permittee shall make every reasonable effort to conduct the activities authorized herein in a manner that will minimize any adverse impact of the work on water quality, fish and wildlife, and the natural

environment, including adverse impacts to migratory waterfowl breeding areas, spawning areas, and riparian areas.

10. The permittee shall allow the District Engineer and his authorized representative(s) to make periodic inspections at any time deemed necessary to assure that the activity being performed under this authorization is in accordance with the terms and conditions prescribed herein.

11. The impact of activities authorized by LOP using this procedure on cultural resources listed, or eligible for listing, in the National Register of Historic Places (NRHP), shall be taken into account by the U.S. Army Corps of Engineers (Corps) prior to the initiation of work. If previously unknown cultural resources are encountered during work authorized by this permit, the San Francisco District shall be notified and the sites avoided until the Corps can assess their eligibility for listing in the NRHP. Sites determined to be eligible for listing in the NRHP shall require consultation between the Corps and the State Historic Preservation Office and/or the Advisory Council on Historic Places. Cultural resources include prehistoric and historic archeological sites, and areas or structures of cultural interest which occur in the permit area.

12. All temporary fills shall be removed in their entirety.

13. All extraction activities in the vicinity of federal projects shall be coordinated for required setback distances with the Corps office prior to application for a permit.

14. Heavy equipment working in wetlands shall be placed on mats, or other measures shall be taken to minimize disturbances to soil.

15. No authorization will be granted under this LOP for an activity that is likely to adversely affect or cause unauthorized take of a threatened or endangered species or jeopardize the continued existence of a species proposed for such designation, as identified under the Endangered Species Act, or for an activity that is likely to destroy or adversely modify the critical habitat of such species. See Appendix E for "not likely to adversely affect" determinations.

16. The project shall not significantly disrupt the movement of those species of aquatic life indigenous to the water body or those species that normally migrate through the project area.

APPENDIX B

WILD AND SCENIC RIVER SECTIONS IN DEL NORTE COUNTY, CA

Waterway: section		Outstandingly Remarkable Value	River Value
Smith River: at Main Stem:	Confluence of Middle and South Forks to the mouth the Pacific Ocean	Anadromous fish	Recreational
Rowdy Creek: River	California/Oregon border to confluence with Smith	To be provided by the National Park Service.	Recreational
Mill Creek:	Junction of East Fork and West Branch to confluence with Smith River	Same as above	Recreational
Mill Creek: West Branch:	Tributary confluence in northern portion of S17 T15N R1E to junction with East Fork Mill Creek	same as above	Recreational
Mill Creek: West East Fork:	From source in S36 T16N R1E to confluence with Branch Mill Creek	Same as above	Recreational
Bummer Lake: East Creek:	From source in S36 T16N R1E to confluence with Fork Mill Creek	Same as above	Recreational
Dominie Creek: Rowdy	From source in S7 T18N R1E to confluence with Creek.	Same as above	Recreational
Savoy Creek:	From source in S5 T17N R1E to confluence with Rowdy Creek	Same as above	Recreational
Little Mill Creek: Smith	From source in S9 T17N R1E to confluence with River	Same as above	Recreational
Rock Creek: Smith	From source in S36 T15N R1E to confluence with River	Same as above	Recreational
Remaining Creeks and Rivers on the Smith River within the Six Rivers National Forest are Wild, Scenic or Recreational. Please consult with the Six Rivers National Forest for information regarding sites within National Forestland for status and permits they may require.		Same as above	
Klamath River:	From Del Norte County line to Pacific Ocean	Anadromous Fish	Recreational/

APPENDIX C

CROSS SECTION GUIDELINES FOR GRAVEL EXTRACTION IN DEL NORTE COUNTY

Cross-sections, maps, and associated calculations such as extraction volumes, must be prepared under the direction of a State of California Licensed Land Surveyor or a legally authorized Professional Engineer and certified as to content and accuracy.

Monitoring cross-sections are permanent, monumented cross sections whose purpose is to document yearly and long-term changes in river channel elevation and morphology at extraction sites. They also aid in extraction planning and in estimation of volumes extracted.

Extraction zone cross-sections are temporary, seasonal cross-sections used for the planning an extraction, for estimation of the actual volume extracted, and for evaluating compliance with Corps approved gravel plans. The extraction zone is the total area that will be extracted and/or graded as a result of gravel extraction activities.

I. Standards for Monitoring Cross-Sections:

A. Number and layout of required cross sections for an extraction project to follow the guidelines below:

1. A hypothetical centerline for the river channel, measured equidistant from both banks and delineating the actively scoured channel (bank full width) must first be established to determine the length of the project line.

2. If the radius of curvature is less than ten times larger than the average actively scoured channel width of the project reach, the reach is considered a bend. If the radius of curvature is more than ten times larger than the average actively scoured channel width of the project reach, the reach is considered straight.

3. Cross-sections shall be oriented perpendicular to the center line.

4. Cross-sections shall be no more than 400 feet apart on bends and 500 feet apart in straight reaches. If the length of the project reach is not evenly divisible by 400 or 500 feet, the number of cross-sections should be rounded to the next larger number.

5. The first cross-section should extend across the channel at the upstream limit of the project reach (entire project site); the last cross-section should extend across the channel at the downstream limit of the project reach.

B. Cross-sections to extend completely across the river channel (so as to include all actively scoured channel width) and to terminate either on banks in mature riparian vegetation (clearly older than 10 yr; DBH >4 in.), or on the 10-year flood terrace.

C. At least one bench mark (permanent monuments) to be established for each bar above the watercourse's active banks and in positions such that they will not be eroded away by relatively frequent (<10 yr flow) events. Bench marks to be tied to a common vertical and horizontal control datum, the 1988 North American Vertical Datum (NGVD) and to the 1983 North American Datum, among all extraction sites.

D. Cross-section endpoints and tie points to be clearly monumented and labeled in the field and accurately located on current air photos and maps. A common color of flagging, or environmentally benign painting to be used to mark cross-sections at all sites.

E. Cross-section endpoints to be placed far enough away from eroding banks that they will not be removed by relatively frequent flows (e.g., by floods smaller than the 10-year event).

F. Cross-sections to be resurveyed from the same endpoints each year New cross-sections to be added as necessary as the river's course shifts, and to be oriented approximately normal to the channel center line.

G. Pre-extraction cross-section surveys need only include those portions of each cross-section inundated by the previous winter's highest flow. If the highest flow of the season occurs after the cross-section survey is completed, the cross-section must be resurveyed. All monitoring cross-sections should be surveyed each spring, regardless of whether extraction took place in them in the previous year.

H. Post-extraction cross-sections need only be resurveyed through those portions of the cross-section altered by extraction, temporary stockpiles, road construction, and equipment storage areas.

I. Stake or spray paint the following points on the ground in each cross-section at time of survey (to facilitate the County, CDFG or the Corps in relating the cross-section at time of survey to the ground during field review):

1. Water's edge on both sides of river; or if this is not practicable, stake at 10 ft offset (measured along ground surface) from water's edge. Position of stake to be included in survey.

2. On both sides of river, one hub (2 inch by 2 inch wooden stake), painted brightly and labeled, shall be driven in nearly flush with the ground at the survey point closest to midway between water's edge and cross-section endpoint. Exception: this is not required if it would put the stake in a steep eroding bank.

3. Stakes should be labeled with cross-section and station number (horizontal distance from left end point).

II. Standards for Extraction Zone Cross-Sections

A. Number and layout of extraction cross sections for an extraction project to follow the guidelines below:

1. A hypothetical center line for the proposed extraction, located equidistant from both edges of the extraction zone and extending down its long axis must be established.

2. A minimum of 5 equally-spaced extraction cross-sections to be surveyed in each extraction zone or area.

3. Cross-sections shall be oriented perpendicular to the extraction center line.

B. Extraction cross-sections to be surveyed in prior to extraction, and used to design extraction and to estimate extraction volume.

C. Extraction cross-sections to be resurveyed after extraction is complete. Extraction cross-sections need not be resurveyed in subsequent years.

D. Extraction cross-sections require temporary (seasonal) monuments at each end if possible, and at least at one end, using items such as stakes or rebar which can be relocated after extraction is complete.

E. Extraction cross-sections should be clearly staked and marked on the ground so that the County, CDFG or the Corps can readily locate them in the field.

III. Preparation of Cross-Sections.

A. All Cross-Sections shall be prepared according to the following criteria:

1. Surveyed cross-sections shall be noted to the nearest 0.1 ft and should include:

a. end points and ground surface elevation at end points

b. all obvious breaks in slope

2. Cross-sections to be tied to a common vertical and horizontal control datum among all extraction sites. This is specified as the 1988 North American Vertical Datum (NAVD) and 1983 North American Datum (NAD) elevation for sea level.

3. Cross-sections at all sites to be plotted at the same simple, usable vertical and horizontal scales. All cross-sections must have a vertical exaggeration of 10. Recommended scales to use for cross-sections are as follows:

Cross-Section Width	Paper Size	Horizontal Scale
≤ 100 ft.	8 ½" x 11"	1 in. = 10 ft.
100 ft. - 500 ft.	8 ½" x 11"	1 in. = 100 ft.
500 ft. - 1200 ft.	8 ½" x 14"	1 in. = 100 ft.
≥ 1200 ft.	8 ½" x 14" or 11" x 17"	1 in. = 100 ft.

Cross-sections can be cut and stacked so that whole cross-sections can be placed on one page. Cross-sections that are cut and stacked must be consistently presented each year.

4. Cross-sections to be surveyed and drafted consistently so that the right bank (RB) of the river as you face downstream is at the right side of the drafted cross-section.

5. Zero (0) distance in cross-sections to be at the left (LB) endpoint as you face downstream.

6. Cross sections to be plotted on gridded paper, where the grid logically corresponds to the scale at which the cross-section is plotted. We suggest a grid of 10 squares to the inch. Grid to be visible in the reproduced paper copies provided to the Corps and the hydrologist.

7. Cross sections to have clearly labeled vertical and horizontal axes. Each cross section should have its

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own horizontal axis to facilitate measurement of distances (rather than a single set of axis labels at bottom of page). Each cross-section should have its origin on a heavy grid line.

8. Any vertical or horizontal datum or endpoint changes should be clearly noted along with the length and direction of change(s) on the cross section plots.

9. Maximum distance between any two elevational points along a cross-section shall be 50 feet, including wetted portion. Exception: if ground outside wetted channel is essentially level for a distance of 500 feet, distance between points can be increased to 100 feet. All obvious breaks in slope must still be included.

10. Elevations, notations, etc. on the cross-sections should be clearly legible, not an overlapping, unreadable mess.

11. Net cross-sectional area change pre-extraction to post-extraction, or post-extraction to next year's pre-extraction, as appropriate, should be calculated for each cross-section. Measurements and calculations should be included

12. The survey data for each cross section should be provided to the Corps and the hydrologist on a 3.5" diskette as a digital file in ASCII text format (alphanumeric, tab-delimited). The data should be grouped by cross-section and organized from L bank to R bank, using the format below: An example is shown.

XS 20+78

Point No.	Horizontal Offset	elevation	description
45	50	57.94	LB rebar
46	...	...	...

A paper printout of the data should also be supplied.

13. Cross-sections for planning extractions should be surveyed in late May of the year in which extraction is proposed. Cross-sections following mining to be surveyed as soon as practicable after mining ends, and definitely before winter high flows occur.

B. **All monitoring cross sections shall also include**:

1. Where discernible, elevation and position of high-water marks for previous winter's flow (flood marks); these should be consistently determined among cross-sections;

2. Water-surface elevation and location (both banks) at time of survey;

3. Cross-sections must include the river bottom (especially location of the thalweg) as well as the water surface. Water surface elevation alone is insufficient; the bed must be included;

4. Elevation and location of top of silt band ("bathtub ring") if visible at time of survey;
5. Location of major vegetation breaks, e.g., edge of willows or riparian forest;

6. Water discharge at time of survey (from nearest USGS gage) to be shown in cross-section legend;

7. Flood marks, silt line, water's edge, monuments, and reference stakes should all be clearly labeled in the cross-section and their elevations indicated;

8. For spring cross-section data all monitoring cross-sections shall include the current year's spring cross-section overlain on the previous year's spring and fall (if any) cross-sections. The area of actual extraction should be lightly shaded or hatched. Water-surface should be shown with a dotted line, and its date clearly indicated;

9. For pre-extraction survey, total volume change since the previous year's post-extraction survey should be
calculated using double end-area or computer generated digital terrain models. All measurements and calculations should be included and verified by a California Licensed Land Surveyor or appropriately authorized engineer; and

10. For post extraction cross-section data, all monitoring cross-sections which overlap the extraction area shall include the current year's post extraction data overlain on the current year's pre-extraction cross section data and the previous year's post extraction cross-section data and the original prescription recommended by the hydrologist. The post-extraction cross-section should be shown with a solid line, the pre-extraction by a dashed line. The actual area of extraction should be lightly shaded or hatched.

C. **All Extraction Cross-Sections shall also include**:

1. Spring extraction cross-sections shall include the spring cross-section data overlain on the Corps approved prescription cross-section. The proposed area of extraction should be lightly shaded or hatched;

2. Post extraction cross-sections shall include the fall cross-section data overlain on the previous year's post extraction (if any) and the current year's pre extraction cross-section data and the Corps authorized prescription cross-section. The actual area of extraction should be lightly shaded or hatched; and

3. The net cross-sectional area change pre-extraction to post-extraction should be calculated for each cross-section. Total volume extracted should be computed, using double end area or computer generated digital terrain models. All measurements and calculations should be included and verified by a California Licensed Land Surveyor or appropriately authorized engineer.

IV. Preparation of Maps:

A. All site maps to be prepared on an aerial photo from current year. Photos can be oblique for spring surveys. Site maps should show the river and the proposed extraction area. Site maps should have a scale of approximately 1:12000 (1 in = 1000 ft).

B. All monitoring cross-sections should be accurately located and labeled on the site map. In particular, the end points of each cross-section must be located in their true positions, not just guessed at or estimated.

C. Pre-extraction photos should be taken when the river is low enough to see the channel. Earlier photos may be used for preliminary planning, but a current final set is required and should be used for the site map.

APPENDIX D

BIOLOGICAL MONITORING REQUIREMENTS FOR GRAVEL EXTRACTION IN DEL NORTE COUNTY, CA

As stated on page 1, only activities that do not pose significant adverse individual or cumulative impacts would be eligible for authorization by this procedure. The purpose of the biological monitoring is to verify the specific extraction proposal meets those criteria by mapping important resources such as fish habitat and riparian vegetation. This monitoring plan is not a river management plan but part of the Corps regulatory requirements to ensure protection of the aquatic ecosystem.

Each permittee shall study their project reach(es), which shall include the 1.5-meander lengths upstream and downstream from the extracted gravel bar. Modifications to the project reach may be made by the Corps for projects in close proximity to other gravel operators, and for projects that span large distances with relatively small excavations. Each Class A applicant shall submit the following biological monitoring data to be obtained by a qualified biologist. Each applicant is responsible for ensuring that all data submitted is accurate and obtained by qualified individuals. Failure to employ qualified individuals may require resurveying, and or suspension of the permit.

A. Anadromous Fish:

1. An annual adult summer steelhead snorkeling survey shall be conducted once each year for three years. The annual survey shall be taken within the month of July and shall survey all pools within the project reach. Pools where fish are present shall be mapped.

NMFS is requiring the following monitoring.

2. Applicants shall perform habitat mapping as described here. NMFS will consider changes to this protocol based on individual river characteristics on a site-specific basis.

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. NMFS' personnel will link habitat parameters shall be linked to pre- and post- season cross-sections of extraction sites. NMFS shall be provided copies of both the pre-and post-season cross-sections, and aerial photographs.

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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 NMFS personnel. Field data for each polygon shall be entered into a spreadsheet of an appropriate database (NMFS shall provide concurrence on the choice of database). 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 NMFS 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.

3. 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 depths, shall be measured within the gravel extraction reach (or zone), and distances upstream and downstream of 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 NMFS, at the address below.

4. 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.

5. A monitoring plan that assesses salmonid stranding, which includes a fish rescue plan, if needed, shall be submitted as part of any mining plan that proposes trenching as an extraction methodology.

6. NMFS shall be provided color copies of all air photos, and all electronic copies of cross-sections submitted under the entire implementation of LOP 2003-2. Although NMFS has sporadically received copies of air photos, they do not have a complete data set.

7. When completed all monitoring reports are to be provided to

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

C. Birds:

Gravel operations that begin in the spring (March, April or May) may adversely affect nesting and brooding activities of avian species. Monitoring of avian species to determine use of riparian areas and gravel bars according to sex, age, and breeding status may be required of any operation that commences gravel extraction before June 1. Any monitoring plan shall be approved by CDFG and USFWS personnel in writing.

APPENDIX E

OPERATING REQUIREMENTS FOR PROJECTS LOCATED WITHIN AND AROUND SETBACK ZONES OF ENDANGERED SPECIES NEEDED FOR A "NO EFFECT" "NOT LIKELY TO ADVERSELY EFFECT" DETERMINATION

Projects located within and around setback zones of the bald eagle, American peregrine falcon, marbled murrelet, tidewater goby and or the northern spotted owl, are not likely to adversely affect these species if:

1. Gravel extraction operations that are closer than 0.50 miles (setback zone) of any known bald eagle or American peregrine falcon nest sites shall not operate from January 1 to July 31;

2. Gravel extraction operations closer than 0.25 miles (setback zone) from suitable northern spotted owl habitat shall not operate from February 1 to July 31 unless surveys performed according to the "Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls" dated 7 March 1991 indicate that there are no detection of this species in the area. USFWS must approve report.

3. Gravel extraction operations closer than 0.25 miles (setback zone) from suitable marbled murrelet habitat shall not operate from April 1 to September 15 or until surveys performed according to "Methods for Surveying for Marbled Murrelets in Forests: A Protocol for Land Management and Research" dated March 1994 and amended 8 March 1995, indicate that there are no detections of this species in the area. USFWS must approve report.

4. Gravel extraction operations shall be at least 0.25 miles (setback zone) from known occurrences of tidewater gobies.

APPENDIX F

NOAA Fisheries' INCIDENTAL TAKE STATEMENT FOR THE LOP 2003-2 PROCEDURE

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. NOAA Fisheries further defines "harm" as an act that 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 defined as take that is incidental to, but is not the purpose of, the 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

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 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 the LOP 2003-2 procedure for the five year duration of the procedure will result in take of juvenile SONCC coho salmon. This incidental take 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. The effects to habitat from implementation of LOP 2003-2 are expected to last longer than the five-year period because the habitat will remain altered for some time once the activity ceases. NOAA Fisheries anticipates that the number of individuals harmed will be low. NOAA Fisheries anticipates that a small number of juvenile coho salmon may be killed, injured, or harassed during wet trenching activities from turbidity, direct contact with equipment, and stranding or displacement during dewatering. Due to the low number of juvenile coho salmon observed in the project area, NOAA Fisheries expects that no greater than five juvenile coho salmon would be killed, injured or harassed during wet trenching activities in any single mining season.

NOAA Fisheries does not anticipate the incidental take of any adult coho salmon due to implementation of the proposed LOP 2003-2; therefore, incidental take of adult coho salmon is not exempted by this ITS.

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 the LOP 2003-2 procedure 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. NOAA Fisheries expects that physical habitat impacts will be confined to habitat associated with the sites described in Table 1 (below).

Table 1. Gravel bar sites are listed from the most upstream site to the most downstream site, and are not necessarily contiguous.

Stream	Gravel Bar Site Name
Smith River	Lower Sultan Bar
	Simpco Bar
	Saxton Bar
	Woodruff Bar
	Crockett Bar
	Tedsen Bar
	Reservation Ranch Bar
Rowdy Creek	Maris Pit
	Lower Rowdy Creek
Klamath River	Blake's Bar

Anticipated incidental take will be exceeded if gravel mining operations extend beyond the areas described in the action area, are not in compliance with the applicable project design features of LOP 2003-2, 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 Opinion.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to SONCC coho salmon.

C. Reasonable and Prudent Measures

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon.

The Corps shall:

1. Ensure that the pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.
2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 2003-2 procedure.

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3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps, and its permittees, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting requirements. These terms and conditions are non-discretionary.

RPM 1. Ensure that the annual pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.

a. All projects authorized under LOP 2003-2 must undergo annual hydrologic and geomorphic review, with associated recommendations, provided by CDFG, NOAA Fisheries, and either the Del Norte County hydrologist or a hydrologist hired by the applicant(s) and approved by Del Norte County and NOAA Fisheries. Copies of all pre- and post-extraction information, including cross sections, vertical aerial photos, and other information shall be provided to NOAA Fisheries. In addition, mutually agreeable dates shall be scheduled between the Corps and NOAA Fisheries for site reviews.

RPM 2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 2003-2 procedure.

a. In order to protect against potential channel and habitat degradation, the amount of annual replenishment on each bar shall be calculated by cross-section analysis.

b. For "skim type" gravel extraction activities outside the active channel, the Corps proposed a minimum skim floor elevation that corresponds to the 35% exceedence flow for each site, and a minimum of one vertical foot elevation above the low flow water surface. The primary objective of setting a minimum skim floor elevation on the rivers of Del Norte County is to protect the low flow channel. The flow that is exceeded 35% of the time in the daily average flow record represents a water surface elevation that confines the low flows, since 35% of the time the flow is higher than this. On average this elevation may be exceeded by storm flows roughly, from late December until the end of April (approximately 35% of each year), though in reality there are storm flows outside this period that exceeds the 35% exceedence flow.

   Data was compared at five separate gages in the Humboldt County rivers to determine when the 35% exceedence flow occurred relative to the other rivers. It was noted that for the period of record of daily average streamflow, the 35% exceedence flow occurred within one or two days of each other during the spring receding flows. For the purpose of setting the minimum skim floor elevation, NOAA Fisheries assumes that the 35% exceedence flow occurs on the same day throughout the extraction reaches of each watershed. The water surface of the 35% exceedence flow at each site is assumed to occur when the flow at the nearest stream flow gage reaches the 35% exceedence flow. For example, the 35%

exceedence flow at the extraction areas on Rowdy Creek, a tributary to the Smith River, is assumed to occur at the same time that the 35% flow occurs at the Smith River gage near Crescent City. The flows in Table 2 should be used to set the minimum skim floor elevation. The 35% exceedence flow elevation for each extraction site should be measured utilizing methods provided by NOAA Fisheries in the draft implementation guide for setting the elevation of the 35% exceedence flow in Humboldt County.

Table 2 Exceedence values to use to set minimum skim floor elevations

RIVER	USGS GAGE TO USE TO MARK WATER SURFACE ELEV.	35% EXCEEDENCE FLOW
Smith River	Smith River near Crescent City	2,900 cfs
Rowdy Creek	Smith River near Crescent City	2,900 cfs
Klamath	Klamath River near Klamath	16,900 cfs

The 35% exceedence requirement may be phased-in during 2003, the first year of implementation. In 2003, the top of the silt band, where available, may be used to set the minimum skim floor elevation as a surrogate for the elevation of the upper limit of the low flow channel. Furthermore, at all sites that the top of the silt band is available, the elevation of the top of the silt band shall be recorded as part of the monitoring and extraction cross-sections in order to assess its applicability. When possible, the date of the formation of the top of the silt band on the bar should be noted. This will assist NOAA Fisheries in its assessment of using the top of the silt band as a surrogate for the water surface elevation that corresponds to the 35% exceedence flow. Where the top of the silt band is unavailable and the water surface elevation at the 35% exceedence flow is unknown, a two-foot vertical offset from the summer low flow may be used to set the minimum skim floor elevation. As the river stage rises, the date that the river stage reaches the two-foot above summer low flow elevation should be noted. This will assist NOAA Fisheries in the assessment of using a two-foot vertical offset as a surrogate for the 35% exceedence flow.

NOAA Fisheries is committed to working with the operators in 2003 and 2004 to assist in implementation of the 35% exceedence requirement. This could include NOAA Fisheries on-the-ground assistance in marking flow levels, identifying silt bands, modeling, and other assistance with measuring and evaluating hydrologic data.

c. In order to minimize the impacts to juvenile salmonids from wetland pits, cover must be provided at the edges of the wetland pit by vegetation, and by placing woody debris within the pit. The vegetative cover at the edges of the wetland pit may be natural and/or planted. The pre-extraction mining plan shall describe the cover that is, or will be, associated with the excavated wetland pit. In addition, the calculated flow inundation frequency of the surface that the wetland pit is located on shall be provided as part of the pre-extraction mining plan.

d. In order to minimize the impacts to salmonids from trenches, vegetative cover must be provided within the trench in the form of placing woody debris within the excavated trench.

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The pre-extraction mining plan shall describe the cover that will be associated with the trench.

e. Minimize the amount of time heavy equipment is in the wetted low-flow channel by limiting the number of heavy equipment crossings per each temporary channel crossing installation and removal. A maximum of two crossings per installation or removal shall be allowed, although one crossing where possible is preferred.

f. In order to minimize the turbidity associated with temporary channel crossing use, all wet excavated sediment must be stockpiled on the gravel bar away from the low flow channel and allowed to drain prior to hauling across the temporary channel crossing. Alternatively, wet excavated sediment may be loaded into a truck and allowed to drain away from the low flow channel prior to hauling across the temporary channel crossing.

g. The ITS shall be attached to all Letters of Modification issued under LOP 2003-2 procedure to aid in compliance with terms and conditions by the applicants.

h. Prior approval must be granted by NOAA Fisheries for extensions to the June 1-October 15 season for gravel extraction operations.

i. Culvert requests and information describing the need for culverts must be provided to NOAA Fisheries for review and approval of salmonid impact minimization measures, and that culverts allow upstream and downstream fish passage for all life history stages.

j. NOAA Fisheries shall review and approve requests for potential fisheries enhancement projects before being authorized by the Corps.

k. In order to protect LWD deposited on mined gravel bars, "No Wood Removal" signs, shall be posted at all access roads owned, controlled or utilized by the gravel operators. The signs shall also include information regarding the importance of LWD to salmonids.

RPM 3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

a. The Corps, the applicants, and NOAA Fisheries will develop a monitoring plan to monitor for trends in stream bed aggradation or degradation, changes in longitudinal and cross sectional topographic channel variability and complexity, and utilization of habitat by various life stages of listed anadromous fish in the extraction reach. This comprehensive monitoring plan will be developed before June 1, 2004. Monitoring in 2003 will include monitoring cross sections and riffle crest elevations at the thalweg, within the extraction area plus the upstream and downstream riffle from each extraction area. The riffle crest elevations shall be recorded relative to the survey datum used for cross-sectional surveys. Points of measurement of riffle crest elevations should be noted on the aerial photos used for the monitoring cross sections. The future, comprehensive monitoring plan will replace the anadromous fish monitoring requirements proposed by the LOP. In addition, the Corps, the applicants, and NOAA Fisheries will develop a data form for to consistently report cross-

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151422SWR02AR8387: DF

Mr. Calvin Fong
Chief, Regulatory Branch
Department of the Army, Corps of Engineers
333 Market Street
San Francisco, California 94105-2197

Dear Mr. Fong:

This letter transmits the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) based on our review of the Letter of Permission Procedure for Gravel Mining and Excavation Activities in Del Norte County (LOP 2003-2) and Granite Construction's proposed gravel extraction operations (hereafter referred to as Projects), and its effects on Southern Oregon/Northern California Coast (SONCC) coho salmon *(Oncorhynchus kisutch)* pursuant to section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This Opinion (Enclosure 1) is based on the best available information provided to NOAA Fisheries from the U.S. Department of the Army, Corps of Engineers (file numbers 26016N, 27248N, and 27249N), and other relevant published studies and unpublished information.

After reviewing the best available scientific and commercial information, the current status of SONCC coho salmon, the environmental baseline for the action area, the anticipated effects of the Projects, and the cumulative effects, it is NOAA Fisheries' biological opinion that the Projects, as proposed, are not likely to jeopardize the continued existence of SONCC coho salmon.

Essential Fish Habitat Consultation

In addition, recent amendments to the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) require Federal agencies to consult with NOAA Fisheries regarding any action or proposed action that may adversely affect essential fish habitat (EFH) for Federally managed fish species. NOAA Fisheries evaluated the Project for potential adverse effects to EFH pursuant to section 305(b)(2) of the MSA.

The action area of the Project includes areas identified as EFH for various life stages of Chinook salmon and coho salmon, Federally managed under the Pacific Coast Salmon Fishery Management Plan. Based on the best available information, NOAA Fisheries has determined that the proposed action may adversely affect EFH. EFH Conservation Recommendations are provided in Enclosure 2. For more information on EFH, see our website at http://swr.nmfs.noaa.gov.

If you have any questions regarding these consultations, please contact Mr. Dan Free at (707) 825-5164.

Sincerely,

Rodney R. McInnis
Acting Regional Administrator

Enclosures

Enclosure 1

Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION

ACTION AGENCY: U. S. Army Corps of Engineers

ACTIVITY: Del Norte County Gravel Extraction - LOP 2003-2 and Granite Construction

CONSULTATION CONDUCTED BY: Southwest Region, National Marine Fisheries Service

DATE ISSUED:

I. BACKGROUND AND CONSULTATION HISTORY

On December 13, 2002, the National Marine Fisheries Service (NOAA Fisheries) received a request for Endangered Species Act (ESA) section 7 consultation from the United States Army Corps of Engineers (Corps) on the proposed Letter of Permission procedure for gravel mining (LOP 2003-2) in the streams and rivers of Del Norte County, California (December 4, 2002, letter from C. Fong, Corps, to R. McInnis, NOAA Fisheries). NOAA Fisheries notified the Corps in a letter dated January 3, 2003, that the consultation initiation package was incomplete and, therefore, formal consultation would not begin until a complete package was received. On February 12, 2003, NOAA Fisheries received a response from the Corps to this request for additional information with a letter dated February 4, 2003. Despite the fact that the Corps' initial December 4, 2002, request letter stated that a biological assessment and other information would be forthcoming in thirty days, NOAA Fisheries did not receive adequate information (e.g., no biological assessment was provided) in the Corps' February 4, 2003, response. Despite the lack of information, NOAA Fisheries began the formal consultation process on February 12, 2003, in order to complete the consultation so that implementation of the proposed action would proceed in a timely manner. The request for consultation concerns the effects of the proposed LOP 2003-2 on threatened Southern Oregon/Northern California Coast (SONCC) coho salmon *(Oncorhynchus kisutch)* and its designated critical habitat.

On March 17, 2003, NOAA Fisheries received a request for ESA section 7 consultation from the Corps on Granite Construction=s application for a Department of the Army section 404 of the Clean Water Act authorization for gravel extraction and related activities in the Smith River, Del Norte County, California (March 13, 2003, letter and referenced information packet, from C. Fong, Corps, to R. McInnis, NOAA Fisheries) on the effects of the proposed individual permit on SONCC coho salmon and its designated critical habitat. The Corps also requested consultation on Essential Fish Habitat (EFH) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act for both the proposed LOP 2003-2 and Granite Construction=s individual permit application.

This biological opinion (Opinion) considers the two proposed actions referenced above in one document. The proposed LOP 2003-2 and Granite Construction=s individual permit application

share the same *Status of the Species* and *Environmental Baseline* sections, and the *Effects* section analyzes the effects of both proposed actions. The description of the proposed actions, the conclusions, and the incidental take statements are separate sections for each proposed action. Project batching is an established technique that has been effectively used to streamline section 7 consultations for many years. Batching addresses projects whose effects are predictably similar and whose applicable mitigation and minimization measures are also similar. By considering the effects of two or more similar consultations that are within the same action area, NOAA Fisheries is able to analyze the cumulative impacts of similar proposed projects within the same action area, at one time.

The following is a chronological description of the consultation history for the effects of gravel mining and associated activities on SONCC coho salmon and their designated critical habitat in Del Norte County from 1997 to 2003.

NOAA Fisheries originally issued a September 12, 1997, Biological Opinion (1997 Opinion) on the LOP 96-2 procedure. The 1997 Opinion determined that implementation of the LOP 96-2 was not likely to jeopardize the continued existence of threatened SONCC coho salmon Evolutionarily Significant Unit[1] (ESU).

Subsequent to issuance of the 1997 Opinion, critical habitat was designated for SONCC coho salmon (May 5, 1999, 64FR 24049). Reinitiation of consultation is required if a new species is listed or critical habitat is designated that may be affected by the identified action [50 CFR 402.16(d)]. On September 23, 1999, the Corps requested reinitiation of consultation on LOP 96-2 for impacts related to SONCC coho salmon designated critical habitat (letter from C. Fong, Corps, to R. McInnis, NMFS dated September 23, 1999). On September 5, 2000, an opinion that included the effects to SONCC coho salmon critical habitat was issued (2000 Opinion).

The Corps then requested (letter from C. Fong, Corps, to R. Lent, NMFS, dated June 25, 2001) that the 2000 Opinion be amended to add an additional mining site on the Klamath River. NOAA Fisheries amended the 2000 Opinion on September 19, 2001.

On December 20, 2001, the Corps and NOAA Fisheries met to discuss the timeline for development of a new LOP procedure for Del Norte County. During this meeting the Corps and NOAA Fisheries agreed that LOP 96-2 could be extended for one year to allow more time for development of a new LOP procedure. Despite this agreement, the Corps issued a draft Public Notice for LOP 2002-2 on May 1, 2002 which was intended to supercede LOP 96-2. The public comment period for the draft LOP 2002-2 closed June 1, 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 Del Norte County gravel operators and NOAA Fisheries, the Corps decided to further extend LOP 96-2 (now 96-2a; Public Notice File Number 26813N, July 22, 2002) to December 31, 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 2002-2. NOAA Fisheries responded to the first extension of LOP 96-2 with our second

[1]For the purposes of conservation under the Endangered Species Act, an Evolutionarily Significant Unit (ESU) is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples 1991).

amendment (dated August 16, 2002) to the 2000 Opinion. Our second amendment analyzed the extended duration of the proposed action for an additional mining season and the addition of special conditions for conducting instream trenching.

On November 29, 2002, the Corps issued the Public Notice for the proposed LOP 2003-2. The Corps worked informally with NOAA Fisheries prior to the issuance of the Public Notice to incorporate some of our technical assistance recommendations into the draft LOP (e.g., 35% exceedence flow minimum skim floor recommendation). NOAA Fisheries formally commented on the Public Notice (January 7, 2003, letter from I. Lagomarsino, NOAA Fisheries, to K. Reid, Corps), however, the Corps did not choose to incorporate these comments in a subsequent draft of the LOP, but, rather, requested formal consultation on the November 29, 2002, draft of the proposed LOP 2003-2.

On March 14, 2003, the Corps issued the Public Notice for Granite Construction=s individual permit application to extract gravel from Huffman and Sultan bars on the Smith River and simultaneously requested formal consultation. We did not formally comment on the Public Notice.

Documents that pertain to gravel mining in Del Norte County that NOAA Fisheries used in this Opinion include the biological assessment prepared for Granite Construction (Berg 2003), the analysis of a flow-based minimum skim floor elevation for in-channel gravel mining in Humboldt County (NOAA Fisheries 2002), some of the fisheries monitoring reports completed as a condition of the prior LOP 96-2. In addition to these documents specific to Del Norte County rivers, NOAA Fisheries also used a large body of published and grey literature on the subject of gravel mining.

Past Non-Compliance Issues

As described previously in this section, gravel mining and associated activities in Del Norte County were authorized by LOP 96-2 between the years of 1997-2002. Some of the past non-compliance issues under LOP 96-2 that affected salmonid habitat, or did not comply with terms and conditions of the second amendment to the 2000 Opinion are important to describe. For example, a number of gravel operators extracted gravel during the years 1997-2002 without prior authorization from the Corps or, in some cases, other regulatory agencies (e.g., California Coastal Commission). Some of these unauthorized extractions caused alterations to the active river channel and have adversely affected SONCC coho salmon designated critical habitat. Despite going through a number of winters when bedload would be expected to replenish extracted areas, many of these areas remain in poor shape (i.e., loss of alluvial structure and associated pools and riffles) to the natural river channel which adversely affects coho salmon. Additionally, these unauthorized extractions have affected gravel extraction opportunities for adjacent gravel miners because of the lasting geomorphic alterations that are eroding and not replenishing and, therefore, affect natural bed forming processes both upstream and downstream from the alterations.

In addition, past compliance with required monitoring under LOP 96-2 has been inadequate or nonexistent; especially for areas extracted without authorization. This has severely limited the ability to assess the past effects of mining; both over the 1997-2002 term of LOP 96-2, and also annually.

II. DESCRIPTION OF THE PROPOSED ACTIONS

LOP 2003-2 and Granite Construction's application for an individual permit are described below in separate sections.

LOP 2003-2

The Corps requested consultation on the proposed action as described in the Public Notice for the proposed LOP 2003-2, dated November 29, 2002, and the following is based on the description found in the Public Notice.

As described in the proposed LOP 2003-2, the purpose of the LOP procedure is to streamline section 404 of the Clean Water Act (33 U.S.C. ' 1344) and section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. ' 403) authorizations of gravel excavation and related work in waters of the United States within Del Norte County, California, that would not pose substantial individual or cumulative adverse impacts to the aquatic environment. Through the Public Notice process for LOP 2003-2, the Corps proposes to modify the LOP 96-2 procedure, and intends to re-authorize the procedure, with amendments, until December 31, 2007. Thus, LOP 2003-2 shares many similarities with LOP 96-2, but modifies, or amends LOP 96-2. Authorization of the proposed LOP 2003-2 procedure until December of 2007 would include five gravel mining seasons. The permits issued under the LOP procedure will contain limitations intended to protect the environment, and natural and cultural resources. If necessary, the Corps may require the applicants to apply for individual permits.

Work authorized under LOP 2003-2 is limited to discharges of dredged or fill material associated with gravel mining activities in waters of the United States, including navigable waters of the United States, within Del Norte County, California. Activities that may be authorized include, but are not limited to, sand and gravel mining and work associated with these activities, such as temporary stock-piling of gravel on gravel bars adjacent to the wetted, low-flow channel and construction of temporary coffer dams and temporary channel crossings. Impacts to waters of the United States, including wetlands, shall be avoided or minimized (to the extent possible) through the use of practicable alternatives. Reasonable compensation for unavoidable adverse impacts to waters of the United States will be required. Work that would have unmitigatable adverse impacts on the aquatic environment or cause a substantial reduction in the extent of waters of the United States will not be authorized by the LOP. The activities authorized under the LOP 2003-2 procedure shall be part of a single and complete project.

A. Project Authorization

Under the LOP 2003-2 procedure, applicants must submit complete applications to the Corps for review prior to receiving authorization under the LOP 2003-2 procedure. Applications which pass these reviews will be permitted for three years. However, each permittee must also submit yearly monitoring data regarding extraction amounts, cross-sectional information, biological monitoring, and aerial photos.

Each year, in March, the Corps will conduct an interagency evaluation and coordination meeting with the Environmental Protection Agency (EPA), NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), California Coastal Commission (CCC), California Department of Fish and Game (CDFG), the California Regional Water Quality Control Board (RWQCB), and Del Norte County's hydrologist to review new applications and yearly compliance data of previously authorized activities. The Corps will authorize the proposed (new) activity if the activity meets the conditions of LOP 2003-2. If an authorized activity has met the conditions of LOP 2003-2, and there is assurance that its planned operation for the next season will meet LOP 2003-2 conditions, it will be allowed to continue for the next season under the existing authorization, until the applicant's LOP expires. The proposed LOP 2003-2 does not explain how continuation of authorization during the next season meshes with the need for annual review and recommendation, and annual Corps authorization based on annually changing river conditions.

Projects authorized under LOP 2003-2 are subject to the following restrictions:

Excavation

Excavation shall be limited to less than the amount of annual replenishment unless deviations are agreed to by agencies. The Corps will consider extractions from storage and NOAA Fisheries will review all extraction plans in excess of annual replenishment. There are no guidelines regarding how annual replenishment will be determined. However, we assume replenishment will be based on annual pre-extraction cross section surveys.

Proposed trenching areas should be located where geomorphic and riverine processes would normally result in pool formation and maintenance, as determined by a qualified hydrologist or geomorphologist. Runs may be utilized if it can be maintained as run habitat and not altered to unnatural pool habitat. Trenches will not be allowed in riffles and will be located a sufficient distance from riffles to minimize risk of trench head-cutting and consequent changes in riffle elevation and stability. Trenching shall be limited to the period from July 15 through August 30 to minimize and buffer against impacts to migrating or rearing adult and juvenile salmonids. Following extraction, all trenches created in the low flow channel shall have large woody debris or boulders placed within to provide habitat for holding or rearing juvenile and adult salmonids. Once instream gravel extraction is completed, and suspended sediment completely settles, the berm must be completely and entirely removed from the channel. Upon completion of instream gravel operations, a layer of gravel must remain on the bottom of the extraction area.

For sites above the active[2] channel, excavation shall proceed by skimming except for projects where the stream or river becomes dry during the summer months where excavation may proceed either by skimming or trenching. Operations outside the active channel shall remain above the elevation that corresponds to the 35% exceedence flow[3] for each site, on an annual

2 The active channel is not defined by the Corps. We assume the active channel is that portion of the channel below bankfull.

3 The 35% exceedence flow criteria was actually developed by NOAA Fisheries for rivers in Humboldt County, but the Corps included in the proposed LOP 2003-2 without discussing with NOAA Fisheries. NOAA Fisheries has since evaluated the 35% flow criteria for Del Norte County rivers and has determined that the same relationships

basis, and a minimum of one vertical foot elevation above the low-flow water surface. To aid compliance with these setbacks, the area of extraction shall be clearly flagged, painted, or staked. No extraction shall occur on the head of bar, which is defined as that portion of the bar from the widest point of the bar upstream, unless a hydrologist/geomorphologist and NOAA Fisheries personnel determine extraction on the head of bar is appropriate. If the bar is irregularly shaped, the head of bar shall be the upstream one-third of the bar.

All equipment must remain out of standing and flowing water except for building temporary channel crossings. However, equipment can reach into water to extract gravel.

All project applicants that propose diverting stream flow to a side channel must notify NOAA Fisheries, CDFG, and the USFWS prior to being approved by the Corps.

Excavated material may be stored on the gravel bar, but must be removed by October 1. On rivers listed under the Wild and Scenic Rivers Act, temorary stockpiling may occur during the active work week, Monday through Saturday, but must be removed on or before Saturday of each weekend. Work on gravel bars shall be limited to Monday through Saturday, 7:00 am to 6:00 pm. Modifications to excavation procedures may be made to increase fisheries and wildlife habitat with Corps approval. Haul roads shall follow the shortest route possible while avoiding sensitive areas such as riparian vegetation. The Corps may require that the haul road be scarified after extraction is complete to mitigate compaction of the gravel bar.

All riparian woody vegetation and wetlands must be avoided to the maximum extent practicable. Any riparian vegetation or wetland that is to be disturbed must be clearly identified by mapping. Disturbed woody vegetation that is part of a contiguous one-eighth acre complex, or is at least two inches diameter (5 cm) at breast height (DBH) must be mitigated. Impacts to other woody vegetation must be described and submitted to the Corps and CDFG with the gravel extraction plans. These impacts may require mitigation at the discretion of the Corps. Impacted areas which must be mapped consist of riparian vegetation which have drip lines within 7.6 m (25 ft) of excavation activities (excavation, stockpiling, parking, etc.) or wetlands which are filled, excavated or drained. Each permittee shall mitigate the impacts to wetlands and riparian zones in the following manner: (1) avoidance of impact, (2) minimization of the impact, (3) rectifying the impact, (4) reducing or eliminating the impact over time and, (4) compensating for impacts.

Gravel removal must remain a minimum distance of 500-feet (152 m) from any structure (e.g., bridge, water intake, dam) in the river. For bridges, the minimum setback distance is either the length of the bridge or 500 ft, whichever is greater. Gravel removal may encroach within this setback if prior approval is given by owners of these structures and the Corps.

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that were used to choose the 35% criteria for Humboldt County rivers actually occur at a higher flow (lower exceedence level) for the Smith River.

Re-grading
The project area must be re-graded before the water levels rise in the rainy season and must be completed by October 15. Re-grading includes filling in depressions, grading the construction/excavation site according to prescribed grade (a minimum of 2%), sloping downward from the upper buffer=s edge and/or downstream, and removing all temporary fill from the project area.

Timing
Unless the authorization is specifically modified, gravel extraction shall not commence until June 1, and shall cease by October 15 of each year. Re-grading procedures must be completed by October 15 of each year. Requests for extensions of these time periods will be reviewed by the Corps on a case-by-case basis. The applicant, however, must have re-graded the site before an extension can be authorized. Requests for extensions must include an approved CDFG Streambed Alteration Agreement (SAA) extension or exemption.

Stream crossings for gravel mining purposes
The size and number of stream crossings constructed to access gravel mining sites must be kept to a minimum. All main channel crossings must be spanned to the maximum length practicable using either a flatcar or bridge span, and must maintain at least a three foot elevation above the water surface. Culverts can be used in certain circumstances where the size and nature of the crossing indicates that culverts are more appropriate. Information describing the need for culverts must be provided with culvert requests and shall be supplied to the CDFG and the Corps. All crossings and associated fill must be identified as to the type (culvert or flatcar bridge) and location in the submitted yearly, pre-extraction information. All crossings and associated fill must be removed by October 15 of each year unless specifically modified in an extension authorized by the Corps.

Wild and Scenic Rivers
Sections of the Smith River and its tributaries and the Klamath River in Del Norte County are designated recreational, scenic, and wild. Corps authorization will not be given for sections of rivers designated "wild" under the Wild and Scenic Rivers Act. For new projects in recreational or scenic river sections, the applicant must provide information demonstrating that the activity will not degrade the fisheries, historical, scenic, or recreational values for which the river is designated. For example, LOP 2003-2 generally would not authorize new mining operations where new processing plants are to be constructed along portions of a scenic river.

Endangered Species
The streams and rivers of Del Norte County are designated critical habitat for SONCC coho salmon, a federally threatened species. To limit the adverse impacts to the species and their habitat, the permittee shall provide NOAA Fisheries and the Corps a copy of the proposed extraction plan simultaneously. NOAA Fisheries shall have the opportunity to review each extraction plan with special emphasis on the use of culverts, stream diversions, alternative extraction designs (wetland pits, alcoves, etc.) and trenching in secondary channels (those channels that have annual river flow except during the extraction season). Any temporary channel crossings will be placed after June 1 and removed by October 15 of each year. An extraction plan will not be approved to excavate gravel from the flowing river. All large woody debris found on the bar in the spring should be stockpiled during extraction and returned to the

gravel bar following extraction. Trenching proposals will be contingent upon a NOAA Fisheries approved fish relocation plan.

New projects
A new project is defined as any project which has not been previously authorized under the County or a Federally recognized tribe by vested rights, conditional use permit or exemption by written notice, as of April 1, 1996. For new projects, the applicant must submit a preliminary project description including excavation and processing locations on a United States Geological Survey (USGS) topographical map, estimated quantity of material proposed to be excavated, and the Endangered Species assessment to the Corps by February 1 of the extraction year. Projects removing 5000 cubic yards or more of material must also include aerial photos.

Additional special conditions may be added to LOP 2003-2 on a case by case basis to minimize adverse impacts.

Standard General Conditions
In addition to restrictions discussed above, projects authorized by LOP 2003-2 are subject to standard general conditions. Standard general conditions relevant to impacts on listed species and designated critical habitat include provisions requiring the applicant to minimize adverse impacts on water quality, fish and wildlife, and the natural environment, including adverse impacts to spawning and riparian areas. In addition, the project shall not significantly disrupt the movement of those species of aquatic life indigenous to the water body or those species that normally migrate through the project area.

B. Authorization from Other Agencies

The permittee is responsible for obtaining any additional Federal, state, tribal, or local permits that are required. The LOP procedure will be authorized under the terms of consultation with USFWS and NOAA Fisheries. Each permittee shall comply with all Reasonable and Prudent Measures (RPM) of the Incidental Take Statement (ITS), which will be included as Appendices to the final LOP 2003-2.

C. Pre- and Post-Extraction Requirements

Projects are divided into two categories based on quantity of material removed from the river basins: (1) Class A projects remove greater than 5,000 cubic yards of material per year from a river basin; and (2) Class B projects remove less than 5,000 cubic yards of material per year from a river basin. In general, projects that remove more than 100,000 cubic yards per year will not be considered eligible for authorization under LOP 2003-2.

Class A Projects
Class A projects remove greater than 5,000 cubic yards of material per year from a river basin. Project submittal must include a description of the project and at least the following information, unless modified by the Corps, on an annual basis:

$ A pre-extraction report shall be submitted to the Corps by May 15 of the gravel year, unless river levels and weather prevent data collection, at which point a deadline will be determined by the Corps. Pre-extraction reports shall include:

i. Cross-section Surveys: Monitoring and Extraction cross-section surveys shall be done according to Appendix C of LOP 2003-2, unless modified by the Corps in review with the County hydrologist. Applicants shall submit gravel extraction plans, approved by the County and the hydrologist, to the Corps for approval, prior to commencing gravel extraction operations;

ii. A CDFG section 1603 SAA or any extension signed by the CDFG, or a Riparian Protection and Surface Mining Permit signed by a Federally recognized Indian Reservation. Permits may be obtained concurrently with the Corps permit;

iii. A pre-extraction aerial photo of the project location. Photos shall be taken the spring of each year and shall include the entire project reach (extraction zone reach of the project site and immediate upstream and downstream reaches within one-half length of the extraction zone reach of the project, as measured along the thalweg (the bottom of the low-flow channel)). Pre-extraction photos are to be vertical photos at a scale of 1 inch equals 1000 feet. Photos shall only be taken after the river recedes and the water is clear enough to see the bottom;

iv. A mitigation report containing the mapped areas that are impacted (riparian vegetation and wetlands) and the mitigation proposed to minimize these impacts;

$ A post-extraction report shall be submitted to the Corps by November 1 of each year. Post-extraction reports shall include:

i. A post-extraction survey, which shall be conducted following cessation of extraction and before alteration of the extraction area by flow following fall rains, preferably before October 15. Post-extraction reports shall include the amount and dimensions of material excavated from each area mined, and must conform to the surveying requirements found in appendix C of LOP 2003-2;

ii. A longitudinal profile view of the thalweg for the active channel line along the project reach based on the monitoring cross-sections; and

iii. The biological monitoring report as described in Appendix D of LOP 2003-2 by January 1.

iv. A final report from the County hydrologist is due February 1. The hydrologist shall submit to the Corps the evaluation of the extraction sites, monitoring cross sections, impacts associated with previous extraction operations, and any definable changes to river morphology that may alter extraction prescriptions.

Class B Projects
Class B projects remove less than 5,000 cubic yards per year of material from a river basin. Class B projects must be physically separated from other gravel operations to be considered separate projects. Projects cannot be located on the same gravel bar, or on the same parcel number as other projects, and be considered as separate projects. The Corps reserves the right to elevate a Class B project to Class A project status.

Project submittal must include a description of the project and at least the following information, unless modified by the Corps, on a yearly basis:

$ A pre-extraction report, approved by the County appointed hydrologist, and submitted by May 15 of the gravel year, unless high flows prevent data collection, that includes:

i. Plan and cross-section view drawings of the project site on 8.5 by 11 inch or 11 by 17 inch paper. Drawings shall be labeled with dimensions, and quantities of material removed from each site. Plan views must map any salmonid spawning sites;

ii. A minimum of one monitoring cross-section and five extraction cross-sections per extraction site according to Appendix C of LOP 2003-2;

iii. A copy of the SAA signed by the CDFG, or a Riparian Protection and Surface Mining Permit signed by the Federally recognized Indian Reservation. Permits may be obtained concurrently with the Corps permit;

iv. Photos of the mining area before excavation. Photo location shall be mapped (location and direction) to maintain consistency with post-extraction report photos; and

v. Mapping and description, including size, species and number, of any riparian vegetation that will be removed, cut, or within 7.6 m (25 ft) of excavation, stockpiling or transport of gravel and any wetland that will be impacted. Also included in submittal shall be a mitigation plan to minimize any unavoidable impacts.

$ A post-project report, due by November 1 of extraction year, which shall include:

i. Post-extraction data for extraction and monitoring cross-sections according to Appendix C of LOP 2003-2;

ii. Photos of the mining area after excavation. Photos shall be taken from the same location as pre-project photos.

D. Required Mitigation

For all unavoidable impacts, a mitigation plan shall be submitted with applications for all projects that will adversely affect wetlands and riparian vegetation. Mitigation must consider the size and age of the vegetation removed or adversely impacted. All vegetative mitigation must be planted between November 1 and February 28 of the year following excavation and must have an approved survival rate over three growing seasons. Failure to meet the three-year survival

rate shall require replanting. Annual reports depicting vegetation survival are due by December 31 each year for three growing seasons after the planting year.

E. Anadromous Fish Monitoring for Class A Projects

The purpose of the biological monitoring is to verify that projects authorized under LOP 2003-2 do not pose significant adverse individual or cumulative impacts by mapping important resources such as fish habitat and riparian vegetation. These monitoring requirements are not a river management plan, but part of the Corps regulatory requirements to ensure protection of the aquatic ecosystem. The following is a description of the monitoring plan that is required as part of the proposed LOP 2003-2 procedure.

Each applicant shall study his/her project reach, which shall include the gravel extraction reach 1.5 meander lengths upstream and downstream of the extracted gravel bar. Modifications to the definition of the project reach may be made by the Corps for projects in close proximity to other gravel operators, and for projects that span large distances with relatively small excavations. Each Class A applicant shall submit the following biological monitoring data to be obtained by a qualified biologist. Each applicant is responsible for ensuring that all data submitted is accurate and obtained by qualified individuals. Failure to employ qualified individuals may require resurveying, and/or suspension of the permit.

1. An annual adult summer steelhead snorkeling survey shall be conducted once each year for three years. The annual survey shall be taken within the month of July and shall survey all pools within the project reach. Pools where fish are present shall be mapped.

2. Each project shall be mapped for fish habitat, in early summer, using the CDFG's Habitat Level III typing techniques, as provided in the CDFG California Stream Habitat Restoration Manual, at a final scale of 1 inch=500 feet. This mapping effort should use aerial photography and on the ground visual observations for ground truthing. When habitat mapping, the recorder shall make specific note of pool depths, eddies, deltas, key in-channel features formed by large woody debris, and unique substrate conditions that are of high importance to fish. Habitat typing shall be redone after three years.

3. 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.

4. Project reaches in the lower mainstem of rivers shall be annually surveyed using snorkeling or visual surveys over a three year period to document adult salmonid upstream movement patterns, use of holding areas, and how fish generally distribute themselves while they are migrating up the rivers. Project reaches downstream of the Highway 199 bridge on the Smith River, and downstream of the Humboldt Del Norte County line on the Klamath River shall be surveyed. Surveys shall begin October 1 and continue every fifteen days through December 1 as water

conditions permit. Any redds observed shall be mapped. Locations and dates shall be submitted to the Corps by December 31.

5. 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.

6. 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.

7. Salmonid Habitat Mapping Protocol is as follows: 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, and substrate. 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.

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

Polygons identified from 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 to measure and describe the specific habitat features.

8. NOAA Fisheries shall be provided color copies of all aerial photos, and all electronic copies of cross sections submitted under LOP 2003-2.

F. Extraction Methodologies

A variety of extraction techniques are could be implemented under LOP 2003-2. NOAA Fisheries expects that all of these gravel extraction techniques, e.g., bar skimming, dry trenching, wetland pits, horseshoe shaped skims, and alcove extractions could be implemented in any given year of the five year permits, as well as the very limited use of diversions of the low flow channel to implement wet trenching.

ASkimming@ or scalping of gravel from exposed gravel bars involves the use of excavating machinery to remove the uppermost layer of gravel. Prior to excavations, operators determine the depth of the proposed excavation by surveying elevations and determining the desired post-excavation elevations and contours. Skimming is done above the water surface elevation of the low flow channel, and on exposed (dry) bars, within the active channel that is typically inundated annually. After gravel is removed, the bar is lower, the channel is less confined, and the degree and direction of bar slope may have been altered. After skimming, the bar must be graded in order to be left smooth, free of depressions, and with a slope downstream and/or to the low-flow channel. Skimming involves having machinery and vehicles on the gravel bar, and materials are often stockpiled on the dry bar temporarily.

The dry trenching method of extraction may be either shallow and stay above the water table, or deep and extend below the water table. The dry trenching method involves gravel bar excavation on the exposed (dry) bar. A gravel berm may be constructed with materials on site to isolate the trench from the channel, or the trench may be far enough from the low flow channel to not require a berm. Material is then excavated from inside the trench to a depth that is limited by the Areach@ of the equipment, and by site specific recommendations provided CDFG, ACOE, NOAA Fisheries. After excavation, and when the sediment in the trench has settled, the berm is breached on the downstream end, and the trench is connected to the river to prevent fish stranding. Based on past implementation of LOP 96-2, NOAA Fisheries expects that trenching could be used at almost all of the sites.

The wet trenching method of extraction is used to excavate sediment directly from portions of the channel, after the stream flow has been diverted to a secondary channel location. As this method is complex and involves diversion of the stream flow, and the use of temporary coffer dams, we expect this to be authorized on a very limited basis by LOP 2003-2. NOAA Fisheries anticipates that the wet trenching method of extraction would only be used when there is the additional objective of improving instream salmonid habitat by the limited use of sediment removal.

Wetland pits are irregularly shaped excavations (to avoid excavating riparian vegetation) located on the 2 to 5 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 not extracted under LOP 96-2. Wetland pits will only re-fill with sediment during high flow events, on the order of every 2 to 5 years, and typically over a multi-year period.

Horseshoe shaped skims are used to extract gravel from the downstream portion of gravel bars, with 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 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 are 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.

G. Action Area

The action area is defined as: Aall 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). The action area for this consultation is within the rivers of Del Norte County that have gravel mining operations that were permitted during implementation of LOP 96-2, including: the lower Smith River from the mouth to approximately 3 miles above the HWY 101 Bridge, lower Rowdy Creek from the confluence of Rowdy Creek with the Smith River to approximately 3 miles upstream, and the lower Klamath River from the mouth to approximately six miles upstream to Blake's Bar.

The lateral extent of the action area for LOP 2003-2 includes the river channel, the floodplain and the contemporary river meanderbelt. The action area also includes adjacent tributaries and downstream habitat that may be affected by the proposed actions. The action area of LOP 2003-2 is more specifically defined by watershed in the *Environmental Baseline* chapter of this Opinion.

Based on information received from the Corps in both the proposed LOP 2003-2 and the request for formal consultation on LOP 2003-2, NOAA Fisheries expects that gravel mining authorized by LOP 2003-2 will occur at the locations described in Table 1, below.

Table 1. Gravel bar sites are listed from the most upstream site to the most downstream site, and are not necessarily contiguous.

Stream	Gravel Bar Site Name
Smith River	Lower Sultan Bar
	Simpco Bar
	Saxton Bar
	Woodruff Bar
	Crockett Bar
	Tedsen Bar
	Reservation Ranch Bar
Rowdy Creek	Maris Pit
	Lower Rowdy Creek
Klamath River	Blake's Bar

Granite Construction=s Individual Permit Application

Project Description

Granite Construction Company (Granite) is proposing to obtain an individual five-year permit from the Corps for the continued extraction of sediment from the Huffman and upper Sultan bars in the Smith River.

Extraction Season

Granite=s proposed action for gravel extraction on the Smith River is proposed to occur annually in accordance with all applicable permit requirements, Federal, state, and local regulations, and mitigation measures described below. The duration of the gravel extraction operations will be annually, during low flow periods, for a period of five years. Extraction activities generally occur between June 1 and November 1 annually, however, in practice, activities are permitted within this period to coincide with average, low-river flow. Granite also notes that they may apply for extensions for earlier start dates in the spring or later ending dates in the fall, and that extensions may be granted by the Corps on a site-specific and day-to-day basis.

To obtain an extension, Granite proposes an amended plan of operations, or extension work plan, which will include: the portions of the extraction site to be worked or reclaimed; how the operator will remove equipment, vehicles, and summer crossings when water begins to rise; what gauging method will be employed at the site to determine cessation of operations; and how the operator will maintain extraction slopes during extended activities to prevent depressions or berms. Granite also proposes to describe how and when post season monitoring activities will be conducted in order to verify compliance with the approved extraction plan and various agency requirements.

Extraction Planning

Granite=s proposed action describes the annual interagency review and recommendation process as the primary minimization measure to reduce the effects on aquatic habitat and associated fish and wildlife. NOAA Fisheries notes that, to date, this annual interagency review process has not been formalized, nor has it functioned as a cohesive process. Up until last year, the agencies (Corps, CDFG, NOAA Fisheries, and Del Norte County) have operated, for the most part, independently. In some cases, CDFG Stream Bed Alteration Agreements have been processed without agency consensus.

Proposed river monitoring activities include annual biological and physical monitoring. Bi-annual aerial photographs will be evaluated and compared and this information used along with annual surveying and comparison of recent and historic full-channel cross sections. The monitoring cross sections and aerial photos will be utilized by Granite to: (1) propose annual extraction volumes, (2) estimate the volume of replenished sediment, (3) identify changes in river alignment as well as bed elevation trends, (4) track vegetation growth, (5) locate and design extractions complimentary to the natural features of the river channel, and (6) track the conditions of previously extracted surfaces to better design future extractions.

Prior to extraction, a series of aerial photographs will be taken of the river channel and adjacent riparian areas. Enlarged photographs will be used to show morphologic alterations after winter storm flows and to identify vegetative succession or loss, pool/riffle sequences, potential extraction areas, and sensitive habitats. The photos, combined with site inspections, will also be used by Granite and biological consultants to identify sensitive habitat areas, vegetative communities and locate specific features of interest. Granite and their consultants will use the spring photographs to delineate extraction sites so that extractions can be located properly in relation to the river channel and sensitive areas. Much of the information within the review and extraction plan will be derived from the comparison of the annual historic photographic series and monitoring cross sections, coupled with field reviews.

Pre-extraction surveys are typically conducted during the months of April through June. When extractions are sited and designed near the active channel, a one-to two-foot minimum vertical offset from the surveyed low flow channel water surface (Alow flow@ is not defined by Granite) or a minimum horizontal offset must be incorporated depending on site-specific conditions. Granite does not specify in their individual permit application what the minimum horizontal offset is. Additionally, Granite has chosen to describe the minimum vertical offset as a range, thus NOAA Fisheries will assume that the minimum one-foot value of this range is the minimum vertical offset. Granite states that the offsets are required to maintain the integrity of the channel and prevent equipment and extraction materials from entering the main or secondary channels, which could potentially cause effects to water quality, reduction of channel area, disruption of fisheries habitat or otherwise affect fish and aquatic populations. Extraction equipment is not allowed to enter the low flow or wetted channel area unless permitted by the regulatory agencies for emergency fisheries habitat enhancement, rescue operations, or crossing installation and removal activities.

Granite or their consultants will conduct pre-extraction site reviews and monitoring surveys to identify potential extraction areas within the project boundaries. Several factors are considered during this preliminary extraction site selection process including site-specific determination of replenishment since the previous season, locations of gravel depositions, morphological changes caused by high flows and changes in sediment deposition patterns from the previous season, assessment of how extraction of selected features will potentially affect surrounding morphology when flows increase again, how the extraction can be blended to surrounding natural contours to minimize extraction-induced depressions and initiation of nickpoint erosion, assessment of whether riparian vegetation will be disturbed by the extraction activities, and the need for alternative extraction methods.

Once the potential extraction area(s) have been identified in the field and verified through the collection of monitoring survey data, the extraction boundaries, grades, and elevations are determined and estimated volume of the extraction is calculated. Complimenting the extraction design data is a written report describing the seasonal alteration of the site, estimated extraction volume, a physical description of the extraction proposal and the methods proposed to remove the sediment.

Granite proposes to continue using the interagency review process on an annual basis. As stated previously, NOAA Fisheries notes that this process has not functioned cohesively, but we expect this to improve. After the annual proposal is reviewed by the Corps, the Corps will issue an annual authorization for the site, and Granite can commence extraction activities in compliance with the operational requirements and conditions of the Corps.

Annual Implementation

Extraction designs are delineated on gravel bars or other geomorphic features by marking the extraction areas with stakes, flagging and non-toxic spray paint. Granite posts temporary stakes and hubs in or around the area of extraction indicating the boundaries and grades determined during the extraction plan review process. Typically, final surfaces are designed to be: (1) cross-sloped toward the river channel; (2) sloped downstream, parallel to the river and/or; (3) complimentary to surrounding natural contours, although Granite does not state the finished slope of the final bar surface.

Channel alignment and sediment deposits may change from year to year throughout the lower Smith River. Extraction locations and designs have been, and will continue to be, planned based on annual changes and the need to protect instream habitat while allowing gravel extraction. Granite=s primary goal is to operate using a Asustainable@ strategy that they state must include extracting sediment from areas that have the highest potential for replenishment (i.e., areas near the low-flow channel). Granite also states that minimizing impacts at the site and reach scale requires a level of flexibility in locating and designing extractions since the subject extraction areas (Huffman and Sultan bars) may change on an annual basis. Thus, Granite summarizes their proposed action as the extraction of sediment from these major geomorphic features (exposed bars, secondary channels and terraces) utilizing various extraction designs and annual site specific interagency review process. Historically, a variety of designs have been used to remove sediment from the subject extraction areas including skimming bars adjacent to the low-

flow channel, excavating instream trenches, and excavating alcoves. Equipment used includes scrapers, tracked bulldozers, front-end loaders and excavators.

Extraction Methodologies

Bar skimming is accomplished using the aforementioned equipment, which skim exposed gravel bars adjacent to the low flow channel at elevations above the groundwater table at specific slope gradients, sloping towards the low-flow channel edge (cross channel) or downstream during summer periods of low stream flows. Most extraction bars are inundated by average annual high flows. Granite states that gravel bars are skimmed, leaving sufficient vertical offset of the skim floor above the low flow water surface to preserve some low flow channel confinement. However, Granite does not define Asufficent vertical offset@, nor does Granite define what level of low flow channel confinement would be preserved. Providing a cross-channel or downstream-oriented skim floor slope (to mimic natural contours) and leaving the surface free of undulations helps provide for drainage following inundation by post-mining flow events. One-third of the upstream portion of the gravel bar (on a point bar) is typically left intact so that moderate flows will be directed around the bar feature.

Trench excavations are located outside, but immediately adjacent to, the low-flow channel. Trenching plan development requires Corps, NOAA Fisheries and CDFG design involvement and approval.

Site Specific Information

Granite included the following information in their description of the two gravel bars that are proposed for annual sediment removal.

Granite describes Huffman Bar as containing areas suitable for bar skimming. Granite describes previous skimming operations which operated on the upper one-third of the bar to protect riparian vegetation. Granite proposes to move riparian vegetation from the lower two-thirds of the bar and replant it on the upper 1/3rd of the bar so that there is no net loss of riparian vegetation on the bar. Granite states that extraction on Huffman Bar may not occur in 2003 so that survival of transplanted vegetation can be demonstrated. Granite also proposes to maintain flexibility with regard to extraction designs and methods in response to annual replenishment and bar morphology. In 2002, an alcove was constructed at the lower end of Huffman Bar, so this may be one of the techniques used on Huffman Bar in the future. Trenching in the low flow channel is proposed as an option in times of low replenishment, for fisheries enhancement, bank and channel stabilization, and erosion control. No stream crossing are currently used at the Huffman Bar site, but could become necessary in the future if channel morphology changes.

Granite describes Sultan Bar as containing areas suitable for skimming. Sultan Bar also has a secondary, or overflow, channel feature along the right bank which could be suitable for a deep skim at the downstream end which would create an alcove feature. Granite notes that adjacent landowners have been concerned with flood capacity in this reach and encourage extraction and removal of transient riparian vegetation that intermittently grows along the low flow channel.

Sultan Bar extraction sometimes requires the use of a temporary channel crossing over the secondary channel, but this channel has recently been dry at the time of operations. No description of the temporary channel crossing construction is included.

Post Extraction Activities
Seasonal reclamation activities on the gravel bars include smoothing and grading the extraction area eliminate depressions and berms. Unless an extension is granted for a particular operation or reach of channel, seasonal reclamation activities must be completed by October 15th of each year.

During the extraction season and following cessation of seasonal operations, the extraction site is visited and reviewed by agencies to document compliance with the approved extraction plans. NOAA Fisheries notes that this process has not been conducted in the past by a cohesive group comprised of all of the agencies involved in regulation of gravel mining. The operator is required to do additional reclamation/grading of the site if so determined during the post-extraction visit. Any mitigation measures that were proposed as part of the operators= annual extraction plan, will also be analyzed for compliance during the post-extraction visits.

Following extraction activities, the operator=s consultant conducts post-extraction cross-section surveys of the extraction site and any areas of the project site that were not accessible during the spring monitoring surveys. The post-extraction surveys of the extraction site and subsequent overlays of the post-extraction data onto the pre-extraction and design data (drafted cross-sections) assists in determining operator compliance with the seasonal extraction plan and shows those areas of the extraction site that need further grading. Post-season monitoring data are used to calculate actual extracted volumes of sediment. The fall post-extraction surveys then become the baseline for analyzing future sediment deposition and conditions when overlaid with the following season's spring monitoring surveys.

Extraction Volumes
Granite proposes to extract a total of 50,000 cubic yards (cy) of sediment from Huffman Bar and 25,000 cubic yards from Sultan Bar on an annual basis.

Other Related Activities
Changes in morphology may necessitate the installation of temporary crossings to access extraction areas where none were needed previously. Summer crossings typically consist of railroad flatcars placed across a narrow portion of channel, normally a riffle location. Installation requires one loader to cross through the active channel to construct the far-side gravel abutment and secure the flatcar. Often, sill logs or concrete abutments are placed beneath the ends of the railcar to provide support, clearance above the low flow channel, and to contain abutment fill.

Other related activities include use of haul roads, temporary stockpiling of gravel on the gravel bars and processing facilities. Granite=s haul roads and processing sites have been previously and recently used for these purposes. Haul roads may be maintained through grading existing road surfaces and rocking. Haul roads may extend from main haul routes onto gravel bars that are inundated on an annual basis. Haul roads may need to be re-graded on an annual basis prior to use. All temporary stockpiles are located away from the wetted channel and are removed prior to October 15th. Granite=s processing facility is located near the Smith River adjacent to Huffman Bar.

Mitigation

Granite describes their primary mitigation as "to operate using a sustainable strategy that includes extracting gravel from areas that have the highest potential for replenishment i.e., areas near the low flow channel."

Granite further describes their general sideboards for minimizing effects as: utilizing vertical off-sets to protect low flow channel confinement, removing temporary stockpiles and reclaiming sites prior to onset of winter flows, avoiding woody riparian vegetation and wetlands to the maximum extent practicable, mitigating for impacted vegetation and wetlands, timing gravel extraction to within low flow periods, minimizing the size and number of stream crossings and identifying crossings in pre-extraction reports, and removing temporary crossings by October 15. Additional special conditions by the Corps may be added on a case by case basis to minimize adverse impacts.

Granite includes the following suite of mining design features to reduce localized effects of gravel extraction:

- $ Skim boundaries are typically laid out as curvilinear benches along the outside of point bars as this usually provides a good replenishment configuration without preventing riparian colonization or encouraging braiding;
- $ Skim floors are sloped to provide for drainage following inundation (either directly toward the low flow channel, in a downstream direction, or somewhere in between) to reduce salmonid stranding potential;
- $ A vertical offset of the skim floor above the low water surface (typically 1-2 ft) is provided to retain sufficient low flow channel confinement;
- $ The upper one-third of a point bar is usually left undisturbed to preserve sufficient high flow confinement of flows entering the bend and to discourage braiding;
- $ In low recruitment years, alternative extraction designs such as an alcove creation or trenching would be proposed.

Physical and Biological Monitoring

Physical and biological monitoring will be conducted consistent with agency recommendations and terms and conditions (these are not defined in Granite's permit application). Physical monitoring will include full-channel monitoring cross-sections spaced through the project reach and surveyed annually to provide documentation of annual channel changes and long-term

channel trends. Temporary cross-sections will also be established and surveyed to document the extent of excavations, to estimate the volume of aggregate removed, and to establish the existing site morphology for use in planning extractions in subsequent seasons. Numerous site inspections are also conducted by Granite, consultants, CDFG, Corps, and NOAA Fisheries to obtain information on site characteristics for the extraction planning process. Biological monitoring will include instream habitat mapping, spawning surveys and presence/absence dive surveys. The habitat mapping documents existing conditions and will help track changes in habitat quantity and quality over time. Spawning surveys document locations and numbers of Pacific salmonid redds relative to extraction and bridge locations. Presence/absence dives determine whether fish are stranded in wetland pits. Monitoring reports will be submitted to the Corps, CDFG, and NOAA Fisheries as requested, by January 15, annually.

G. Action Area

The action area is defined as: Aall 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). The action area for this consultation is within the Smith River, and includes Huffman and Sultan bars, both of which are upstream of the Highway 101 bridge.

The lateral extent of Granite Construction's action area includes the river channel, the floodplain and the contemporary river meanderbelt. The action area also includes adjacent tributaries and downstream habitat that may be affected by the proposed actions. The action area is more specifically defined in the Smith River section of the *Environmental Baseline* chapter of this Opinion.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

The following listed threatened species and designated critical habitat occur in the action area and may be affected by the proposed action: SONCC coho salmon and SONCC coho salmon designated critical habitat. Table 2 presents a summary of the Federal Register Notice dates and citations, and geographic distribution. This section describes the status of critical habitat, and species life history and population trends at the ESU scale. Within the action area, more specific abundance and distribution information is provided in the *Environmental Baseline* discussion for each river reach.

Critical Habitat

This Opinion describes the effects of the proposed action on designated critical habitat for SONCC coho salmon. Critical habitat for SONCC coho salmon includes all accessible waterways, substrate, and adjacent riparian zones. Excluded are: (1) areas above specific dams identified in the FR notice; (2) areas above longstanding natural impassible barriers (i.e., natural waterfalls); and (3) tribal lands. The Klamath River portion of the action area is within the Yurok Reservation and, therefore, not designated SONCC coho salmon critical habitat.

In designating critical habitat, NOAA Fisheries considers the following requirements of the species: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing offspring; and, generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (see 50 CFR 424.12(b)). In addition to these factors, NOAA Fisheries also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation.

Current condition of critical habitat for SONCC coho salmon is discussed in the factors affecting the species section below. The *Environmental Baseline* section describes habitat conditions within the action area. Furthermore, the *Effects of the Action* section is largely organized around anticipated effects on fish habitat.

Table 2. The scientific name, listing status under the Endangered Species Act, Federal Register Notice citation, and geographic distribution of the Evolutionarily Significant Units (ESU) within the action area of the proposed actions: LOP 2003-2 and Granite Constructions' individual permit.

	SONCC coho salmon
Scientific Name	*Oncorhynchus kisutch*
Listing Status	threatened
Federal Register Notice	May 6, 1997, 62 FR 24588
Geographic Distribution	from Cape Blanco, Oregon, to Punta Gorda, California
Critical Habitat Designation	May 5, 1999, 64 FR 24049

Coho salmon Life History and Population Trends

General Life History

In contrast to the life history patterns of other Pacific salmonids, coho salmon generally exhibit a relatively simple three-year life cycle. Most coho salmon enter rivers between September and February. Coho salmon river entry timing is influenced by many factors, one of which appears

to be river flow. In addition, many small California stream systems have their mouths blocked by sandbars for most of the year except winter. In these systems, coho salmon and other Pacific salmonid species are unable to enter the rivers until sufficiently strong freshets open passages through the bars (Weitkamp *et al.* 1995). Coho salmon spawn from November to January (Hassler 1987), and occasionally into February and March (Weitkamp *et al.* 1995).

Although each native stock appears to have a unique time and temperature for spawning that theoretically maximizes offspring survival, coho salmon generally spawn at water temperatures within the range of 10-12.8EC (Bell 1991). Bjornn and Reiser (1991) found that spawning occurs in a few third-order streams, but most spawning activity was found in fourth- and fifth-order streams. Nickelson *et al.* (1992) found that spawning occurs in tributary streams with a gradient of 3% or less. Spawning occurs in clean gravel ranging in size from that of a pea to that of an orange (Nickelson *et al.* 1992). Spawning is concentrated in riffles or in gravel deposits at the downstream end of pools featuring suitable water depth and velocity (Weitkamp *et al.* 1995).

The favorable range for coho salmon egg incubation is 10-12.8EC (Bell 1991). Coho salmon eggs incubate for approximately 35 to 50 days, and start emerging from the gravel two to three weeks after hatching (Hassler 1987; Nickelson *et al.* 1992). Following emergence, fry move into shallow areas near the stream banks. As coho salmon fry grow, they disperse upstream and downstream to establish and defend territories (Hassler 1987).

Juvenile rearing usually occurs in tributary streams with a gradient of 3% or less, although they may move up to streams of 4% or 5% gradient. Juveniles have been found in streams as small as one to two meters wide. At a length of 38-45 mm, the fry may migrate upstream a considerable distance to reach lakes or other rearing areas (Godfrey 1965; Nickelson *et al.* 1992). Rearing requires temperatures of 20EC or less, preferably 11.7-14.4EC (Reiser and Bjornn 1979; Reeves *et al.* 1987; Bell 1991). Coho salmon fry are most abundant in backwater pools during spring. During the summer, coho salmon fry prefer pools featuring adequate cover such as large woody debris, undercut banks, and overhanging vegetation. Juvenile coho salmon prefer to over-winter in large mainstem pools, backwater areas and secondary pools with large woody debris, and undercut bank areas (Heifetz *et al.* 1986; Hassler 1987). Coho salmon rear in fresh water for up to 15 months, then migrate to the sea as smolts between March and June (Weitkamp *et al.* 1995).

The ideal food channel for maximum coho smolt production would have shallow depth (7-60 cm), fairly swift mid-stream flows (60 cm/sec), numerous marginal back-eddies, narrow width (3-6 cm), copious overhanging mixed vegetation (to lower water temperatures, provide leaf-fall, and contribute terrestrial insects), and banks permitting hiding places (Boussu 1954). The early diets of emerging fry include chironomid larvae and pupae (Mundie 1969). Juvenile coho salmon are carnivorous opportunists that primarily eat aquatic and terrestrial insects. They do not appear to pick stationary items off the substratum (Mundie 1969; Sandercock 1991).

Little is known about residence time or habitat use in estuaries during seaward migration, although it is usually assumed that coho salmon spend only a short time in the estuary before entering the ocean (Nickelson *et al.* 1992). Growth is very rapid once the smolts reach the

estuary (Fisher *et al.* 1984). While living in the ocean, coho salmon remain closer to their river of origin than do Chinook salmon (Weitkamp *et al.* 1995). Nevertheless, coho salmon have been captured several hundred to several thousand kilometers away from their natal stream (Hassler 1987). After about 12 months at sea, coho salmon gradually migrate south and along the coast, but some appear to follow a counter-clockwise circuit in the Gulf of Alaska (Sandercock 1991). Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as three year-olds. Some precocious males, called "jacks," return to spawn after only six months at sea.

Range-wide (ESU) Status and Trends of SONCC Coho Salmon
Available historical and recent published coho salmon abundance information are summarized in the NOAA Fisheries coast-wide status review (Weitkamp *et al.* 1995). The following are excerpts from this document:

> AGold Ray Dam adult coho passage counts provide a long-term view of coho salmon abundance in the upper Rogue River. During the 1940s, counts averaged ca. 2,000 adult coho salmon per year. Between the late 1960s and early 1970s, adult counts averaged fewer than 200. During the late 1970s, dam counts increased, corresponding with returning coho salmon produced at Cole Rivers Hatchery. Coho salmon run size estimates derived from seine surveys at Huntley Park near the mouth of the Rogue River have ranged from ca. 450 to 19,200 naturally-produced adults between 1979 and 1991. In Oregon south of Cape Blanco, Nehlsen *et al.* (1991) considered all but one coho salmon population to be at "high risk of extinction.@ South of Cape Blanco, Nickelson *et al.* (1992) rated all Oregon coho salmon populations as "depressed.@
>
> Brown and Moyle (1991) estimated that naturally-spawned adult coho salmon returning to California streams were less than one percent of their abundance at mid-century, and indigenous, wild coho salmon populations in California did not exceed 100 to 1,300 individuals. Further, they stated that 46% of California streams which historically supported coho salmon populations, and for which recent data were available, no longer supported runs.
>
> No regular spawning escapement estimates exist for natural coho salmon in California streams. California Department of Fish and Game (CDFG 1994) summarized most information for the northern California region of this ESU. They concluded that "coho salmon in California, including hatchery populations, could be less than six percent of their abundance during the 1940's, and have experienced at least a 70% decline in the 1960's.@ Further, they reported that coho salmon populations have been virtually eliminated in many streams, and that adults are observed only every third year in some streams, suggesting that two of three brood cycles may already have been eliminated.
>
> The rivers and tributaries in the California portion of this ESU were estimated to have average recent runs of 7,080 natural spawners and 17,156 hatchery returns, with 4,480 identified as "native@ fish occurring in tributaries having little history of supplementation

with non-native fish. Combining recent run-size estimates for the California portion of this ESU with Rogue River estimates provides a rough minimum run-size estimate for the entire ESU of about 10,000 natural fish and 20,000 hatchery fish.@

Schiewe (1997) summarizes updated and new data on trends in abundance for coho salmon from the northern California and Oregon coasts. The following are excerpts from this document regarding the status and trends of the SONNC coho salmon ESU:

> AInformation on presence/absence of coho salmon in northern California streams has been updated since the study by Brown *et al.* (1994) cited in the status review. More recent data (Table 3) indicates that the proportion of streams with coho salmon present is lower than in the earlier study (52% vs. 63%). In addition, the BRT [Biological Review Team] received updated estimates of escapement at the Shasta and Willow Creek weirs in the Klamath River Basin, but these represent primarily hatchery production and are not useful in assessing the status of natural populations.
>
> New data on presence/absence in northern California streams that historically supported coho salmon are even more disturbing than earlier results, indicating that a smaller percentage of streams in this ESU contain coho salmon compared to the percentage presence in an earlier study. However, it is unclear whether these new data represent actual trends in local extinctions, or are biased by sampling effort.@

NOAA Fisheries (2001) updated the status review for coho salmon from the Central California Coast (CCC) and the California portion of the SONCC ESUs. The following is a summary of the updated status review:

> In the California portion of the SONCC coho salmon ESU, there appears to be a general decline in abundance, but trend data are more limited in this area and there is variability among streams and years. In the California portion of the SONCC coho salmon ESU, Trinity River Hatchery maintains large production and is thought to create significant straying to natural populations. In the California portion of the SONCC coho salmon ESU, the percent of streams with coho present in at least one brood year has shown a decline from 1989-1991 to the present. In 1989-1991 and 1992-1995, coho were found in over 80% of the streams surveyed. Since then, the percentage has declined to 69% in the most recent three-year interval.
>
> Both the presence-absence and trend data presented in this report suggest that many coho salmon populations in this ESU continue to decline. Presence-absence information from the past 12 years indicates fish have been extirpated or at least reduced in numbers sufficiently to reduce the probability of detection in conventional surveys. Unlike the CCC coho salmon ESU, the percentage of streams in which coho were documented did not experience a strong increase in the 1995-1997 period. Population trend data were less available in the SONCC coho salmon ESU, nevertheless, for those sites that did have trend information, evidence suggests declines in abundance.

After considering this information, we conclude that the SONCC ESU is presently not at risk of extinction, but it is likely to become endangered in the foreseeable future. The conclusion is tempered by the fact that population trend data was limited, and further analysis may reveal declines sufficient to conclude that the California portion of this ESU is in danger of extinction.

Table 3. Summary statistics of historical and current presence-absence data for coho salmon from the California portion of the SONCC ESU (from Schiewe 1997).

Area	Streams historically inhabited by coho salmon	Streams recently surveyed	Number of streams with	Percent of streams with coho salmon present	
				New data	Brown *et al.* (1994)
Del Norte County	130	46	21	46	55
Humboldt County	234	130	71	55	69
Total	364	176	92	52	63

Based on the very depressed status of current coho populations discussed above as well as insufficient regulatory mechanisms and conservation efforts over the ESU as a whole, NOAA Fisheries concluded that the ESU is likely to become endangered in the foreseeable future (62 FR 24588).

Factors Responsible for the SONCC Coho Salmon Population Decline

The SONCC coho salmon ESU was listed as threatened due to numerous factors including several long-standing, human-induced factors (e.g., habitat degradation, harvest, water diversions, and artificial propagation) that exacerbate the adverse effects of natural environmental variability (e.g., floods, drought, poor ocean conditions). Habitat factors that contributed to the decline of coho salmon in the SONCC ESU include: changes in channel morphology, substrate changes, loss of instream roughness and complexity, loss of estuarine habitat, loss of wetlands, loss or degradation of riparian areas, declines in water quality, altered stream flows, impediments to fish passage, and elimination of habitat. The major activities identified as responsible for the decline of coho salmon in Oregon and California included logging, road building, grazing, mining, urbanization, stream channelization, dams, wetland loss, beaver trapping, water withdrawals, and unscreened diversions for irrigation (May 6, 1997, 62 FR 24588).

Forest management activities that influence the quantity, quality, or timing of stream flows affect fish habitat primarily through changes in the normal levels of peak flows or low flows (Sullivan *et al.* 1987; Chamberlin *et al.* 1991). Water outflow from hillsides to streams are affected through changes in evapotranspiration, soil water content, and soil structure. In general, timber management activities allow more water to reach the ground, and may alter water infiltration into forest soils such that less water is absorbed or the soil may become saturated faster thereby increasing surface flow. Road systems, skid trails, and landings where the soils become compacted may also accelerate runoff. Ditches concentrate surface runoff and intercept subsurface flow bringing it to the surface (Chamberlin *et al.* 1991; Furniss *et al.* 1991). Significant increases in the magnitude of peak flows or the frequency of channel forming flows can increase channel scouring or accelerate bank erosion. Changes in peak flow and sediment yield directly related to the removal of vegetation will typically persist for only a few years and tend to decrease over time as the watershed recovers and new vegetation grows. Changes associated with roads persist indefinitely as roads are maintained or abandoned without treatment. Stream channel responses may take decades or centuries to recover (Chamberlin *et al.* 1991; Furniss *et al.* 1991).

Since the adoption of the Northwest Forest Plan in 1994, there has been a significant decrease in the miles of new road constructed on Public lands in the range of the northern spotted owl, which includes the SONCC coho salmon ESU. Although there are few miles of new roads constructed in any given year, the existing road system has the potential to significantly further degrade SONCC coho salmon habitat. There are thousands of miles of legacy roads and skid roads, and thousands of culverts on Public lands within the SONCC coho salmon ESU. These roads are not only chronic sources of fine sediment, but during floods can deliver immense quantities of fine and coarse sediments to SONCC coho salmon spawning and rearing areas. Fine sediments can impair coho habitat by filling pools and reducing habitat complexity.

Improperly placed culverts can create barriers to migrating fish. Culverts with inadequate hydraulic capacity can restrict stream flows, often resulting in major contributions of sediment to streams when the culverts become plugged or overflow. When water overtops the road fill, the water may divert out of the stream channel and flow down the road or road-ditch and discharge onto hillslopes unaccustomed to heavy, overland flow and produce erosional consequences far removed from the crossing.

Tribal harvest (fishing) was not considered a major factor in the decline of coho salmon in the SONCC ESU. In contrast, over-fishing in non-tribal fisheries is believed to have been a significant factor (62 FR 24588). Disease and predation were not believed to have been major causes in the species decline, however, they may have had substantial impacts in local areas. For example, Higgins *et al.* (1992) and CDFG (1994) reported that Sacramento River pikeminnow have been found in the Eel River basin and are considered to be a major threat to native coho salmon. Furthermore, California sea lions and Pacific harbor seals, which occur in most estuaries and rivers where salmonid runs occur on the West Coast, are known predators of salmonids. Harbor seals are present year-round near Cape Mendocino. California sea lions are present near Cape Mendocino in the fall and spring. At the mouth of the Eel River, harbor seals

haul-out in large numbers (600-1,050 seals). More than 1,200 harbor seals have been counted in the vicinity of Trinidad Head. Coho salmon may be vulnerable to impacts from pinniped predation. In the final rule listing the SONCC coho salmon ESU, NOAA Fisheries indicated that it was unlikely that pinniped predation was a significant factor in the decline of coho salmon on the west coast, although they may be a threat to existing depressed local populations. NOAA Fisheries (1997) determined that although pinniped predation did not cause the decline of salmonid populations, in localized areas where they co-occur with salmonids (especially where salmonids concentrate or passage may be constricted), predation may preclude recovery of these populations. Specific areas where predation may preclude recovery cannot be determined without extensive studies.

Artificial propagation was also a factor in the decline of coho salmon due to the genetic impacts on indigenous, naturally-reproducing populations, disease transmission, predation of wild fish, depletion of wild stock to enhance brood stock, and replacement rather than supplementation of wild stocks through competition and the continued annual introduction of hatchery fish.

Existing regulatory mechanisms, including land management plans (e.g., National Forest Land Management Plans, State Forest Practice Rules), Clean Water Act section 404 activities, urban growth management, and harvest and hatchery management all contributed to varying degrees to the decline of coho salmon due to lack of protective measures, the inadequacy of existing measures to protect coho salmon and/or its habitat, or the failure to carry out established protective measures. Since the listing of the SONCC coho salmon ESU, no new threats have been identified.

IV. ENVIRONMENTAL BASELINE

In conducting section 7 consultation, NOAA Fisheries analyzes the effects of past and ongoing human and natural factors which have led to the current status of the species, its habitat (including designated critical habitat), and ecosystems within the action area. The action area is composed of the three river reaches extending from the uppermost extent of mining downstream to the Pacific Ocean. The extent of the action area for each river reach is more specifically defined in the discussion for each reach.

"*Effects of the action*" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR ' 402.02).

The environmental baseline first describes current and historic impacts to salmonids and salmonid habitat across the entire action area. Then, the general setting and impacts unique to each river reach in the action area are discussed. This discussion includes a description of habitat condition, salmonid trends, abundance and utilization of each reach. Finally, factors limiting the survival and recovery of ESA-listed salmonids in the action area are described. This final step recognizes that there are some factors that may be unique to a river reach, yet continue to limit the survival and recovery of a particular species at the ESU-scale.

Historic and Current Impacts to Salmonids Across the Action Area

Artificial Propagation

There are several salmonid production facilities in operation upstream of the action area. Currently, hatcheries are located on the Trinity River, Klamath River, and Rowdy Creek above the action area.

Hatcheries on the Pacific Coast have been used for more than a hundred years in an attempt to mitigate the effects of human activities on salmon and to replace declining and lost natural populations. These hatchery fish appear to have had substantial adverse effects on native fish populations. Artificial propagation threatens the genetic integrity, and diversity that protects overall productivity against changes in environment (61 FR 56138). The potential adverse impacts of artificial propagation programs are well documented (reviewed in Waples 1991; National Research Council 1995; National Research Council 1996; Waples 1999). These potential impacts are in three broad categories: disease, genetic, and ecological.

Disease Impacts
There are two important elements to consider in regard to the effects of disease as a result of artificial propagation: disease/pathogen amplification and disease/pathogen transmission. Amplification is simply the increase in disease (pathogens) from artificial propagation. Hatcheries may act as reservoirs of infection due to conditions (crowding or increased stress) or practices (handling) which increase the vulnerability of fish to infection and maintain pathogen populations at infective levels (Goede 1986). Disease problems may also persist in hatcheries because of contaminated water supplies and vertical transmission of pathogens. In addition, fish may carry latent disease from one generation to the next. Fish kept at high densities in hatcheries are prone to epidemics involving diseases that are uncommon in the natural environment, supplying strong selection for disease-resistant fish. These disease resistant fish subsequently can act as carriers for disease to the non-resistant wild population (National Research Council 1995).

Genetic Impacts
The potential genetic impacts that result from artificial propagation programs are both the most serious and the hardest to detect. Potential genetic impacts from artificial propagation can be classified as: (1) extinction of native genetic stocks, (2) erosion of diversity among populations,

(3) erosion of diversity within populations, and (4) domestication (Busack and Currens 1995). These impacts do not necessarily occur independently and may result either directly or indirectly from artificial propagation. Understanding and managing genetic impacts is imperative for both directing existing artificial propagation programs and for assessing the benefits and risks of new programs.

Ecological Impacts

Ecological interactions between natural and hatchery fish are complex and may occur at different biological levels from individual to community (National Research Council 1995). As such, an understanding of ecological processes and the interactive, biophysical attributes necessary for Pacific salmon survival is necessary to assess interactions between natural and hatchery fish. The ecological impacts of hatchery programs on natural Pacific salmon and their ecosystems may be classified as: (1) carrying capacity impacts, (2) competition, (3) predation, and (4) altered migration behavior. When considering these impacts, it is important to consider not only fish biology, but also the processes that influence ecosystems, including human influences. If a wild population is small because of habitat loss or alteration, the increased population density that results from augmentation can increase competition for food, space, or other functions the habitat provides. That competition can further reduce the size of the wild population. The migration and spawning timing of hatchery stocks of steelhead in northern California has been truncated since hatchery operations began due to hatchery selection of breeding stock from only the early part of the run (Busby *et al.* 1996). This shortening of spawning time limits the ability of the population to respond to stochastic events such as late onset of rains, large storm events, or unusual low flow periods. It may also condense the population in spawning grounds, stressing the individuals.

The National Research Council (1995, 1996) concluded that hatcheries altered behavior of fish, caused ecological problems by eliminating the nutritive contributions of carcasses of spawning salmon from streams, and probably displaced the remnants of wild runs. Hatcheries have also increased the effects of mixed-population fisheries on depleted natural populations. If fisheries respond to apparent abundance without considering the mixture of population portions from different stock sources or hatchery contributions the natural population will be overfished. Many problems arise when the goal of hatcheries is to provide substitutes for natural populations lost or displaced because of human development activities, and from insufficient incorporation of basic genetic, evolutionary, and ecological principles into hatchery planning, operation, and monitoring (National Research Council 1995, 1996). For instance, a hatchery program with mandated mitigation goals may therein be constrained from applying both advancements in technology and alternative management theory. Because of their possible deleterious impacts hatcheries should no longer be viewed solely as factories for producing fish. To reduce potential deleterious impacts, hatchery management and operations should be changed so that their goals are to assist recovery of wild populations and to increase knowledge about salmon. Although hatcheries have many potential problems, they are a useful tool that may assist in the recovery of listed fish (NMFS 1999; Waples 1999).

Floods

Major floods in 1955 and 1964 occurred during a period of intense land use, primarily related to timber harvest (CDFG 1997), which resulted in major adverse changes to the quantity and quality of salmonid habitat across the action area. Changes to spawning and rearing habitat, as a result of the floods, in combination with overfishing and poor ocean conditions, caused a decline in the coho salmon population from which they never recovered. In particular, the larger rivers in the action area are still impacted from these past events. Effects have been a decrease in the overall quality and complexity of habitat such as filling of pools and erosion of riparian vegetation and export of in-stream woody debris.

Timber Harvest

Forestry practices have limited production of anadromous salmonids in the action area. Habitat degradation by forestry activities has mostly occurred in tributaries, which affects spawning, incubation and rearing juvenile salmonids. Mainstem reaches have also been severely aggraded as a result of post 1955- and 1964-flood sediment inputs from harvested slopes. Major impacts to salmonid habitat, as a result of poor land use practices and large flood events, have reduced the function and capacity of mainstem habitat. Filled pools, degraded gravel quality, and reduced macro-invertebrate production have occurred due to accelerated sediment delivery to the mainstem reaches. These decreases in mainstem habitat quality have reduced juvenile rearing success by reducing available food, space, and cover. Spawning habitat and shelter for adult salmonids are also less than fully functional. Low flow and lack of riparian vegetation in the mainstem reaches produce poorly functioning critical habitat. The lack of recruitment of riparian vegetation in some portions of the action area will continue to have an effect on fish habitat in the future due to the lack of recruitment of large trees to stream channels that provides shelter for adult and juvenile salmonids. Tributary and mainstem habitats are limited by debris barriers, increased temperatures, massive siltation, loss of riparian cover diversity, loss of large woody debris, and road building and maintenance that causes increased sedimentation of fines and the filling of pools. USFS and BLM (1995) reports that current conditions do not provide fully functional refugia habitat for stocks at risk. These impacts limit population survival through reduced habitat quality and quantity.

Forestry management on non-Federal timberlands, which utilizes existing California Forest Practice Rules, falls short of providing adequate protections for salmonid habitats (65 FR 36074). Ongoing forest activities on non-Federal lands are likely to continue to degrade essential salmonid habitat values. Environmental impacts identified with timber harvest may include increased sediment production from roads and other sources, loss of large woody debris recruitment, reduced function of riparian areas, reductions in water quality and quantity, increased water temperatures and loss of channel complexity. Timber harvest activities have altered watershed conditions by changing the quantity and size distribution of sediment, leading to stream channel instability, pool filling by coarse sediment, or introduction of fine sediment to spawning gravels. These conditions may have contributed to a reduction in overall habitat complexity within the action area which in turn reduces the survival of salmonid populations.

Timber harvest continues to be a major economic use in the action area. It is reasonable to expect that negative effects from timber harvest and management will continue to occur. In the most recent designation of critical habitat (65 FR 7764), NOAA Fisheries noted that human activities in the riparian zone and upslope areas can harm stream function and salmonids, both directly and indirectly. These activities include timber harvests that can increase sediment inputs, destabilize banks, reduce organic litter and woody debris, increase water temperatures and generally decrease the value of the habitat for salmonids.

Historic and current salmonid fishery

The impact commercial and recreational ocean fisheries had on the decline of salmonids originating from the action area is difficult to determine. The various salmon stocks intermingle in the ocean and are primarily managed to meet the combination of NOAA Fisheries= requirements established through ESA section 7 consultations and the spawning escapement goals established for certain key stocks under the Pacific Coast Salmon Fisheries Management Plan. Key California stocks include those from the Klamath and Sacramento rivers. Management goals related to those stocks will have a direct effect on harvest of stocks originating from the action area due to the nature of the mixed stocks in the ocean. NOAA Fisheries issued biological opinions in 1996 and 1997 requiring reductions in ocean harvest impacts on Sacramento River winter-run Chinook salmon, and in 1998 and 1999 limiting the ocean exploitation rate on Oregon coho salmon and SONCC coho salmon and prohibiting retention of coho salmon in ocean fisheries off California. These reductions will reduce the incidental catch of coho salmon from the action area and will eliminate the intentional catch of coho salmon, as no coho salmon are currently allowed to be taken in California waters.

Reservoirs and Flow Regulation

Reservoirs and associated flow releases influence salmonids and their habitat on the Klamath River. In 2002, an estimated 34,000 adult Chinook and coho salmon died in the lower Klamath River primarily because of bacterial and protozoan diseases. Other non-salmonids were also lost, including green sturgeon. CDFG (2003) released a report that identified low flow conditions as a contributing factor to the development of unsuitable environmental conditions in the lower Klamath River that: 1) promoted increased pathogen populations and virulence, 2) increased susceptibility of fish to disease through immunosuppression, and 3) promoted increased aggregation due to depressed migration cues.

Iron Gate Dam

In addition to blocking historic access to upstream habitat, Iron Gate Dam operations continue to significantly impair the ability of SONCC coho salmon stocks to recover in the Klamath River basin. Alteration of streamflows has resulted in juvenile salmonid mortality for a variety of reasons: migration delays from insufficient flows or habitat blockages, loss of sufficient habitat due to dewatering and blockage, stranding of fish from rapid flow fluctuations, and increased juvenile mortality resulting from increased water temperatures. In addition to these factors,

reduced flows have negatively impacted fish habitat due to increased deposition of fine sediments into spawning gravels and decreased recruitment of new spawning gravels.

Lewiston Dam
In addition to blocking historic access to upstream habitat, Lewiston Dam operations continue to significantly impair the ability of SONCC coho salmon stocks to recover in the Trinity River basin. Alteration of streamflows has resulted in juvenile salmonid mortality for a variety of reasons: migration delays from insufficient flows or habitat blockages, loss of sufficient habitat due to dewatering and blockage, stranding of fish from rapid flow fluctuations, and increased juvenile mortality resulting from increased water temperatures. In addition to these factors, reduced flows have negatively impacted fish habitat due to increased deposition of fine sediments into spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas resulting in reduced available habitat.

Ocean Conditions

Cyclically poor ocean conditions and resultant downward trends in anadromous salmonid survival, fecundity, and growth rates are universal and may reduce annual recruitment. However, analysis of hatchery returns and return trends in other rivers, indicate that poor ocean conditions are not a primary limiting factor of salmonids in the action area. A recent review by Hare *et al.* (1999) suggests that these conditions could be part of an alternating 20- to 30-year long pattern. These authors concluded that, while at-risk salmon stocks may benefit from a reversal in the current climate/ocean regime, fisheries management should continue to focus on reducing impacts from harvest and artificial propagation, and improving freshwater and estuarine habitats.

Past Gravel Extraction

Gravel extraction has occurred throughout the action area in the past. The scope of gravel extraction is discussed in the impacts to salmonids for each individual river reach in the sections that follow.

Smith River
Information on the Smith River can be found in the document AEcosystem Analysis of Smith River at the Basin and Sub-basin Scales@ (USDA-FS 1995). Portions of this document have been compiled and are presented below.

> The Smith River drains a portion of the west slope of the Klamath geologic province, known as the Siskiyou Mountains. The basin is 719 square miles or 460,160 acres. 628 square miles of the basin are in California, and 91 are in Oregon. Approximately 3,100 miles of stream channel exists in the basin. Elevation in the basin ranges from sea level to 6424 feet at Bear Mountain in the Siskiyou Mountains. The sub-basins within the

Smith River basin include the North Fork (100,480 acres), Middle Fork (83,200 acres) and the South Fork (186,240 acres).

The Smith River drainage has the largest mean annual runoff per square mile of any major watershed in California (Rantz 1964). Lateral subsurface flow is the primary runoff process throughout the basin. The highest recorded peak flow was on December 9, 1964, at 228,000 cfs (cubic feet/second) during a 9-day storm in which 34 inches of precipitation was recorded. The Smith River is an uncontrolled drainage basin and is susceptible to periodic large-scale flooding. The record low flow of 160 cfs occurred on October 23 and 24, 1964. The highest annual mean discharge (7, 030 cfs) occurred in 1974 and the lowest annual mean discharge (975 cfs) occurred in 1977. The magnitude of streamflow is highly variable, but it does respond directly to rainfall.

The Smith River has approximately 176 miles of anadromous fish habitat and 114 miles of resident habitat (this is likely a very conservative estimate). Coho salmon are most abundant in the lower tributaries, especially in Mill Creek. Coho salmon migrate upstream and spawn in November and December. Based on cannery records and discussions with Tolowa tribal members, spring Chinook salmon, chum salmon, and coho salmon were much more abundant than at present.

Hatchery influence on the Smith River has been typical of northern California coastal streams: intensive stocking of coho, Atlantic salmon, Chinook and steelhead from other river sources throughout 1930s - 1960s. Stocked species appear to have never established reproducing populations, so remaining native stocks persisted during huge surges of artificial plantings. Currently, Rowdy Creek hatchery releases steelhead and Chinook salmon smolts. Existing wild stocks in Smith River appear to be viable, so restoration potential is high.

Human disturbance to streams in the Smith Basin is typical of west coast land use history, where beginning in the 1860s, some areas [had] splash dams and overland hauling in the lower plains which modified stream channels and devastated chum salmon and coho salmon habitat in the lower river. Gold, copper, and chrome were all mined intensively throughout the Smith River Basin from the 1850s to the 1940s. In 1865, hydraulic mining became the preferred method among miners because of increased production of ore, however, this caused extensive damage to streams and riparian areas. Mining in certain tributaries impacted channels where hydraulic mining washed down hillsides and removed or buried spawning gravel. Hydraulic mining also involved several water diversions, where de-watering of some channels occurred for extended time periods. Large amounts of sediment added to the stream negatively affected fish, herptiles, and other aquatic biota that require clear water to thrive in. The loss of riparian vegetation would have negatively impacted many riparian-dependent species.

The general trend of most of the basin is recovery with processes at various stages from recent to near complete from the period of intensive road-building and logging of the

'60s, '70s and '80s, as well as the natural disturbances of the 1955 and 1964 floods, as well as lesser floods of 1975, 1986 and perhaps 1994. The construction and maintenance of Highway 199 has caused landslides which eventually deposited large amounts of sediment into the stream channel. Highway 199, maintained by the California Department of Transportation, follows the Middle Fork Smith River from Hiouchi to Griffin Creek. Inner gorge landslide failures along this corridor have been mostly caused by the straightening of river meanders or relocation of sections of channel as part of the highway construction. Parts of the highway base replace previous riparian and streamside areas; rip rap and concrete prevent regrowth of riparian canopy. Also, current highway maintenance includes removal of young riparian or streamside tree stands that reduce line-of-sight around long sweeping curves.

The combined effects of floods, failed road crossings, mining, loss of an important riparian tree species in certain areas, and widespread reduction in old-growth streamside stands have contributed to declines in salmon rearing and spawning habitat conditions, and likely to decreases in salmon abundance (USDA-FS 1995).

The Smith River lowlands were the first area to be cleared and cultivated in the basin, creating a demand for export/import shipping facilities which often included channelizing, dyking, dredging, and clearing of debris from the river.

The estuary/slough network was modified and simplified by levees and extensive clearing of woody debris jams. This lower river/slough network possibly had high use by chum salmon and coho salmon prior to settlement. Currently, the lower river is being mined for aggregate material and is the primary aggregate source in the county. Removal of gravel has altered spawning habitat in some areas (USDA-FS 1995).

The Del Norte County Planning office completed a survey of operations in 1996 and reported an annual average extraction of approximately 120,000 cubic yards (cy) from 10 mining sites between 1991 and 1995, within the Smith River Watershed (USDA-FS 1995). Total extraction volumes increased over the period between 1997 and 1999. In 1997, 1998, and 1999 a total of 101,200, 176,620, and 201,487 cy, respectively were extracted. The majority of the extraction sites were skimmed, with the balance trenched, in all three years. Management of gravel extraction in the Smith River for at least the period 1997-2001 has been conducted with the primary focus of providing sufficient extraction volumes to meet contracts and for flood control (Larue 1997-2000). In some cases, extractions have been justified by the County hydrologist as a benefit to salmonids because instream trenching provides deep water habitat and there is a need to remove sediment from an aggraded system (Larue 1997-2000). However, our review of the County hydrologist reports indicates that extraction recommendations sometimes contradicted the needs of anadromous salmonids. For example, Larue (1998) documented that the "sharp bends" that exist because of gravel bar formation had scoured deep holes in the bed and this was characterized as causing a "problem."

Water diversion occurs between the Huffman bar site and the lower Sultan bar by a Ranney well that supplies the town of Crescent City with domestic, municipal, and industrial water. The Ranney well, installed in late 1950s, is permitted for 9.8 cfs or 7,095 acre feet per year.

Historic land and water management practices as described for Del Norte County above, contribute to the loss of habitat diversity within the Smith River. Early historic practices related to mining, land development, and fisheries impacted the existing salmonid populations. Current practices of road building and maintenance, gravel extraction, water diversion, timber harvest, urban development, and outdoor recreation continue to impact the anadromous fishery within the Smith River.

Historical land and water management practices throughout Del Norte County and in the Rowdy Creek watershed have impacted and contribute to the continuing loss of the habitat diversity. Urban development, timber harvest, agriculture, gravel extraction and cattle ranching continue to impact the watershed.

Current Habitat Condition

Habitat conditions and fishery presence surveys were documented within the lower Smith River where gravel extraction occurs by Galea Wildlife Consulting (1998). The habitat data indicate that the lower Smith River primarily consists of riffles, runs, and glides. Several pools associated with bedrock were also identified within the extraction reach. Surveys for fishery presence and impact analysis were conducted during early winter. Spawning in the late fall and early winter within the lower Smith River has been documented between 1993 and 1997. Although the origin of these redds is unknown, they are apparently fall-run Chinook salmon redds based on their mainstem location and the time of year in which they were documented.

In preparing this *Environmental Baseline*, we examined aerial photos from 1958, 1963, 1966 and 2002. This examination indicated that bar positions have remained relatively fixed along the extraction reach. In general, vegetation is sparse along the bars in the earliest photos when compared to conditions today. This is likely due to the 1955 and 1964 floods. Bar sizes are relatively similar among photos with notable exceptions being the Simpco and Woodruff/Crockett bars. The 2002 photos indicate the Simpco bar has diminished in extent from the 1960s. This is partly due to an instream trench along the margin of Simpco bar which reduced the streamward extent of the bar. Similarly, in the 1960s photos, the Woodruff/Crockett and Tedsen bars are part of one large bar feature with the low flow channel crossing over to the right bank at the upper extent of what is now a vegetated alcove. The 2002 photos show a much broader, straighter channel through this reach. Although we have not compared the stream flows occurring among the various photo years, the low flow channel appears narrower through the lower portion of the extraction reach in the 1958, 1963 and 1966 photos. However, based on the photos alone, we were unable to determine the overall suitability of the habitat for salmonids present in the 1950s and 1960s. The 2002 photos depict a broader, straighter channel through the Tedsen/Woodruff/Crockett complex whereas the 1960 photos show the low flow channel crossing the bar in a more narrow riffle or chute. Also of note is the much greater amount of

vegetation present on the Woodruff/Crockett complex and upstream, adjacent to the Bailey Hole, in the most recent (2002) photos.

We then reviewed the 2002 aerial photos to qualitatively assess the relationship between habitat and gravel bars along the lower Smith River. The 2002 aerial photos show eight distinct gravel bars along the lower Smith River, including the lowest two that are in the tidal zone and vary in extent depending on tidal stage. Of these eight bars, six have been mined and will continue to be mined as part of the proposed action. With the exception of the lowest bar in the reach, riffles appear generally at the upstream end of the bars where the flow crosses over to the opposite bank. However, the largest bars, Woodruff, Huffman and Sultan, direct the flow onto the opposite bank to such a degree that a narrow, high velocity riffle-run complex is generated the entire length of the bar with a pool at the lower end. These areas also appear to represent the greatest habitat diversity on the lower reach due to the steep banks opposite the bars, a wide range of velocities, and greatest localized topographic variation. Notable bedrock influences occur at the Bailey Hole and along the bank opposite Huffman and Sultan bars.

Coho salmon Distribution, Trends and Abundance in the Smith River

Distribution

Coho salmon are distributed throughout the Smith River watershed. Coho salmon in the Smith river watershed rely heavily upon tributaries for rearing and spawning. The extent of coho salmon use of the mainstem and mainstem forks of the Smith River for spawning and rearing is unknown, but, in general we expect limited use of the mainstem for spawning, primarily because of the substrate size, but use for rearing could be significant. Because of the lower stream gradient and alluvial nature of the action area (i.e., gravel extraction reach), we expect use for rearing would be greatest in this reach. An August 17, 1998, survey of a portion of the extraction reach identified 6 juvenile coho salmon which suggests use of the mainstem for rearing (Galea 1999). In addition, R. Quinones, Humboldt State University graduate student, observed juvenile coho salmon yearlings during sampling of the Smith River estuary from the time sampling began in May until the 2nd week of June (R. Quinones, pers. comm., 2003). Because rapid growth and exposure to salinity gradients is very important for the physiological transfomation of juvenile coho salmon as they transition to seawater residence, use of the Smith River estuary by juvenile coho salmon is likely very important.

Population Abundance and Trends

There is a paucity of information with regard to coho salmon populations in the Smith River and trend information is very limited. The best information regarding coho salmon abundance and trends was collected during Chinook salmon spawning surveys on an index reach of the West Branch of Mill Creek by Jim Waldvogel, Sea Grant Advisor for Del Norte County (Table 4). No negative or positive trend is apparent from these data.

Table 4. Adult coho salmon observed during Chinook salmon spawning surveys conducted on an index reach of the West Branch Mill Creek from 1980-2002 (source: Jim Waldvogel, Del Norte County Sea Grant Advisor).

Year	Number	Year	Number
1980	11	1992	7
1981	2	1993	22
1982	4	1994	9
1983	3	1995	21
1984	6	1996	11
1985	28	1997	3
1986	11	1998	3
1987	27	1999	8
1988	5	2000	16
1989	13	2001	14
1990	2	2002	25
1991	7		

Rowdy Creek

Rowdy Creek is a tributary to the Smith River; therefore, much of the environmental baseline information for the Smith River also pertains to Rowdy Creek. As such, this portion of the environmental baseline for Rowdy Creek will be abbreviated.

Rowdy Creek is a major producer of salmon and steelhead in the Smith River basin, with over 23 stream miles of anadromous habitat (SRAC 2002). Rowdy Creek's confluence with the Smith River is near the upper extent of saltwater intrusion. The lower one-fourth to one-half mile of Rowdy Creek typically flows subsurface during summer months.

The watershed is approximately 33 square miles with the land ownership predominantly private. The USFS, however, manages most of Copper Creek and sections of the headwaters of Rowdy and Savoy creeks are contained in the Smith River National Recreation Area. Approximately one square mile of the Rowdy Creek headwaters is located in Oregon.

Rowdy Creek, which flows through the town of Smith River, is in the heart of Del Norte County agricultural lands. The lower two miles of Rowdy Creek are managed for agriculture, cattle

production and gravel extraction. Other major land uses in the basin include residential housing developments and timber production. Rowdy Creek Fish Hatchery is located adjacent to the confluence of Rowdy and Dominie creeks, just downstream of Highway 101 in the town of Smith River. Rowdy and Dominie creeks are highly channelized near an old timber mill site just east of Highway 101.

Current Habitat Condition in the Extraction Reach

Habitat in Rowdy Creek is in generally poor condition. Most of Rowdy Creek upstream of the extraction reach has been extensively logged and is reflected in Simpson (2002) which describes Rowdy Creek as having the lowest LWD amounts of 16 sampled streams and only 5.6% of the pools have structural cover. Upstream logging and road construction has generally resulted in high fine sediment inputs and limited LWD delivery to the extraction reach. The extraction reach flows through an urban and agricultural setting and is generally impacted from channelization, disconnection from its floodplain, and loss of riparian habitat.

Coho salmon Distribution and Habitat Utilization in Rowdy Creek

Coho salmon are distributed throughout Rowdy Creek. The extent of use of lower Rowdy Creek (extraction reach) by coho salmon is unknown except that all juvenile and adult coho salmon must pass through this reach during some portion of their lives. Coho salmon spawning habitat is present in the reach, but use by coho salmon is unknown. Population trends and abundance are also unknown.

Klamath River

Current Habitat Condition

The Klamath River, from source to mouth, is listed as water quality impaired (by both Oregon and California) under section 303(d) of the Federal Clean Water Act. In 1992, the State Water Resources Control Board (SWRCB) proposed that the Klamath River be listed for both temperature and nutrients, requiring the development of Total Maximum Daily Load (TMDL) limits and implementation plans. The United States Environmental Protection Agency (USEPA) and the North Coast Regional Water Quality Control Board (NCRWQCB) accepted this action in 1993. The basis for listing the Klamath River as impaired was aquatic habitat degradation due to excessively warm water temperatures and algae blooms associated with high nutrient loads, water impoundments, and agricultural water diversions (USEPA 1993).

In 1997, the NCRWQCB updated the 303(d) list and added dissolved oxygen as an additional limiting factor for aquatic habitat in the Klamath River (NCRWQCB 1998). The impairment listing regarding dissolved oxygen was prompted by a 1997 USFWS report. The USFWS= concerns included the current status of salmonid populations in the Klamath River, the effects of past and current land use on water quality, annual fish and temperature monitoring data, documented fish kills, and current water quality monitoring data which indicate that acute and

chronic values for temperature and dissolved oxygen are observed in the mainstem Klamath River, particularly during some summer periods (USFWS 1997b). The Klamath River is scheduled to have TMDLs established for temperature, nutrients, and dissolved oxygen by December 31, 2004.

The fact that the Klamath River is listed for temperature, nutrients and dissolved oxygen is especially important due to the relationship between these three water quality parameters. As described by Campbell (1995), increased water temperatures and lower saturated oxygen concentrations typically occur in the Klamath River during summer months, the same time of year that the growth and respiration cycles of aquatic plants affect dissolved oxygen concentration. These three parameters interact synergistically, and can have a much greater impact on water quality and salmonids than either temperature or dissolved oxygen alone (Campbell 1995).

Gravel Mining

Gravel mining has occurred in the lower Klamath River watershed since the 1930s. Aggregate extraction rates from the Klamath River have averaged 350,000 cy per decade (ACOE 1995), however in recent decades, extraction has exceeded this average (Table 5).

Table 5. Klamath River gravel extraction rates (ACOE 1995).

Period of Extraction	Total Quantity of Gravel Extracted
1960-1969	430,000 cy
1970-1979	900,000 cy
1980-1989	600,000 cy
1980-1993	350,000 cy

The Resighini Rancheria was mined by an agent of the Bureau of Indian Affairs (BIA), in 1986 and 1987. A total of 360,000 CY was removed. Other gravel extraction projects in the Klamath River include the following: In 1986 and 1987, the BIA and Tudor-Saliba-Perini were authorized to extract 360,000 CY of aggregate from the gravel bar adjacent to the proposed project site. In 1992 and 1993, Kiewit Pacific was authorized to remove 350,000 CY from the Blake Bar, approximately 1.5 miles upstream from the Resighini Rancheria. Hunter Creek, a tributary of the lower Klamath River was actively mined for a number of years. Operator, Lowell Martin, was authorized to remove 15,000 CY, annually from Hunter Creek. In 2001 Hunter Creek gravel extraction operations ceased.

The effects from past gravel mining on the Klamath River are unclear; little or no monitoring information is available. However, the level of mining does not appear to have been excessive and alluvial structure in the lower Klamath river remains stable and intact.

Coho Salmon Distribution, Trends and Abundance in the Klamath River

The Klamath River Basin historically supported abundant coho salmon runs (Weitkamp *et al.* 1995). However, runs are now greatly diminished and are comprised largely of hatchery fish, although there may be remnant populations remaining in some tributaries (CDFG 1994).

Limited information exists regarding coho salmon abundance in the Klamath River Basin. Adult coho salmon have been counted in a few Klamath River tributaries; however, coho salmon information was incidental to the objective of determining fall-run Chinook salmon escapement. Further, these data would not account for coho salmon that spawn below the weirs. Once the counting of fall-run Chinook ends, the counting weirs are removed prior to high winter flows and therefore counting efforts may not include a portion of the coho salmon migration. In addition, some juvenile trapping occurs on the Klamath River and tributaries. Unfortunately, these counts are also focused on fall-run Chinook and are therefore incomplete with regard to sampling for coho salmon juveniles. As such, both adult and juvenile counts are valuable for documenting the presence of coho salmon in specific areas during key time periods, but less valuable for determining population status or trends. However, they do highlight the low abundance and precarious status of coho salmon populations in the Klamath River Basin (Table 6).

Table 6. Percent of surveyed streams in the historic range of coho salmon in the Klamath River watershed (189 streams) with coho salmon present for four, 3-year time intervals: 1989-1991, 1992-1994, 1995-1997, and 1998-2000 (NMFS 2001).

Time Interval	Number surveyed[1]	Coho present[2]	Coho absent[3]	No Data[4]
1989-1991	62	95%	5%	127
1992-1994	105	90%	10%	84
1995-1997	61	70%	30%	128
1998-2000	72	69%	31%	117

[1] Total number of streams surveyed at least once within the three-year interval
[2] Percentage of surveyed streams where coho were present in one or more years during the interval
[3] Percentage of surveyed streams where coho were absent in all years of survey during the interval
[4]Number of streams that were not surveyed.

Coho Salmon Adult Data

Adult salmon counting weirs are operated in Bogus Creek and the Shasta and Scott rivers. In addition, coho salmon adult counts are also made at the Trinity River weir in Willow Creek. Between 1981 and 1986 (four sample years), an average of five coho salmon adults per year (range: 0-12) were counted in Bogus Creek (CDFG unpublished data). Between 1992 and 2000 (nine sample years), an average of four coho salmon adults per year (range: 0-10) were counted in Bogus Creek (CDFG unpublished data).

Weir and video observations of coho salmon in the Shasta River have yielded an average of approximately eight coho salmon adults per year (range: 0-24) between the years 1991-2000

(CDFG unpublished data). During the 1991-2000 period, coho salmon have been observed at the Shasta River weir as early as September 25 (CDFG unpublished data). These adult counts during two years out of nine account for approximately 44 percent of the fish during this period and there was only one or zero fish counted during four of the ten years (CDFG unpublished data).

Further evidence of the decline of the Shasta River coho salmon population is found in a comparison of counts from the 1970s with counts from the 1990s during years when trapping began and ended at about the same time (began first week of September, ended second week of November). During the years 1970, 1972, 1973, and 1977, an average of 217 adult coho salmon per year were counted (CDFG unpublished data). During the years 1991-1993 and 1995, an average of seven adult coho salmon were counted (CDFG unpublished data). These data suggest a dramatic decline in the status of Shasta River coho salmon.

Weir counts in the Scott River averaged 25 adult coho salmon (range: 5-37) during the 1982-1986 period (CDFG unpublished data), and 4 adult coho salmon (range: 0-24) between the years 1991-1999 (CDFG unpublished data). Again, this information should include a qualification that one year accounted for approximately 65 % of the total number of coho observed during the 1991-1999 period and zero coho were observed in four of the nine years (CDFG unpublished data).

Adult coho salmon counts at the Trinity River weir better reflect the total number of adult coho salmon found in the Trinity River because the counts are made relatively low in the system below much of the spawning habitat. Unfortunately, these counts are incomplete as well because the weir is typically removed by the second week of November and trapping does not occur every day. Therefore, the trapping effort may not include a portion of the run and even relatively small day to day differences in fish counts may skew the results. In addition, the majority of the fish trapped are of hatchery-origin, and 100 % marking of hatchery coho salmon has only recently occurred so estimates of naturally-produced coho are only available since the 1997 return year (CDFG 2000). The results of counting from these three years yields an estimated 198, 1001, and 491 naturally produced adult coho salmon for the 1997-1998, 1998-1999, and 1999-2000 seasons, respectively (CDFG 2000).

Synthesis of adult coho salmon information

CDFG (1994) reported that coho salmon populations have been virtually eliminated in many streams, and that adults are observed only every third year, suggesting that two of three brood cycles (cohorts) may already have been eliminated. The limited adult coho salmon data indicates that there is high variance in abundance from year to year in the Klamath basin. This high variance in adult coho from one year to the next makes the population more vulnerable to anthropogenic or natural perturbations, and therefore the population is at greater risk of extinction then a population with less year to year variance.

Coho Salmon Juvenile Data

In 1997, the USFWS completed a report that described the life history periodicities for anadromous salmonids, including coho salmon, in the Klamath River Basin (USFWS 1997). The USFWS determined, both through the operation of juvenile outmigrant traps and review of relevant literature, that coho salmon fry are present in the mainstem Klamath River from at least April through late July and coho yearlings are present from mid-March through August. Both coho salmon yearlings and fry have been observed in every month of the summer. Also, both USFWS (1997) and CDFG (1994) indicated that coho salmon fry emigrated from some tributaries to the mainstem Klamath River soon after emergence. The USFWS (1997) concluded that coho salmon juveniles likely rear year-around in the mainstem Klamath River between Iron Gate Dam and Seiad Creek.

The USFWS operates downstream juvenile migrant traps on the mainstem Klamath and Trinity rivers. Again, the incomplete trapping record provides limited information in terms of abundance or trends, but does indicate the presence of coho at different life stages during certain times of the year. Indices of abundance (expanded from actual numbers trapped) for coho salmon smolts from trapping conducted on the Klamath River at Big Bar yielded an average of 548 naturally-produced smolts per year (range: 137-1268) for the 1991-2000 period (USFWS 2001). Trapping at Willow Creek on the Trinity River yielded an average of 2,975 coho salmon smolts (range: 565-5084) for the same period (USFWS 2001). These low numbers do provide insight into the limited size of coho salmon populations in the Klamath River Basin, although some early outmigrants may be missed. Even if these numbers were doubled to account for time when trapping did not occur, these populations are extremely low.

Synthesis of Juvenile Coho Salmon Data

In summary, information on coho salmon population status or trends in the Klamath River Basin is incomplete, but what information exists suggests that adult populations are low to nonexistent in some years, and that juvenile abundance of coho salmon is low relative to historic numbers. Data suggest that approximately 2-3% of juvenile coho salmon migrate to the ocean and then return as adults to spawn. Given the low numbers of juvenile coho salmon in the Klamath basin, it is crucial that the anticipated low escapement of returning adult coho salmon are able to successfully reproduce. If the population of both adult and juvenile coho salmon in the Klamath River continue to decline, factors such as mate-choice and sex ratio, along with random events, will play more of a role in their survival.

Coho salmon use of the Action Area

Specific information on coho salmon use of the action area is limited. Coho salmon probably do not spawn in the action area because of a lack of suitable habitat. Juvenile coho salmon are likely rearing in the action area during all months of the year, albeit at low levels during the summer months. Migrating adult coho salmon move through the action area, but some holding for short periods of time likely occurs as well.

V. EFFECTS OF THE ACTION

This Opinion addresses the Corps' proposed LOP 2003-2 procedure for gravel mining in Del Norte County and Granite Construction's application for an individual permit for gravel mining on two sites in the Smith River. NOAA Fisheries provided an overview of the proposed LOP 2003-2 procedure and an overview of Granite Construction's proposed individual permit application in the *Description of the Proposed Action* section of this Opinion. In the *Status of the Species* section of this Opinion, NOAA Fisheries provided an overview, at the ESU scale, of SONCC coho salmon and their designated critical habitat. In the *Environmental Baseline* section of this Opinion, NOAA Fisheries summarized the effects of past and present Federal, State, local and private activities on SONCC coho salmon and their designated critical habitat. The *Environmental Baseline* section established that numerous human activities occurring upstream of, within, and downstream from the action area have adversely affected SONCC coho salmon and their designated critical habitat and the distribution and abundance of this species in the action area.

In this section of the Opinion, as required by the ESA and its implementing regulations (50 CFR § 402), NOAA Fisheries assesses the direct and indirect effefcts of the proposed action and any interrelated and interdependent actions on SONCC coho salmon and their designated critical habitat. The purposes of this assessment are to determine if the proposed action: (1) is likely to have effects on SONCC coho salmon that appreciably reduce their likelihood of both survival and recovery in the wild (the jeopardy standard identified in 50 CFR 402.02); or (2) is likely to destroy or adversely modify the designated critical habitat of SONCC coho salmon in the wild.

Assessment Approach

To conduct our assessment of the proposed actions, NOAA Fisheries considers the direct, indirect and interrelated and interdependent effects of the proposed actions and any activities associated with the proposed action on the area, connectivity, and quality of habitats that support listed species as well as effects that result in injury or death to listed species. NOAA Fisheries uses published and unpublished data and studies of interactions between gravel mining operations and listed species or their habitats to estimate the likelihood of future effects. There is an extensive amount of published literature on the relationship between changes in habitat quantity, quality, and connectivity and the persistence of animal populations. For detailed summaries of this literature, readers can refer to the work of Fiedler and Jain (1992), Gentry (1986), Gilpin and Soule (1986), Nicholson (1954), Odum (1971, 1989), and Soule (1986, 1987). With respect to listed species, NOAA Fisheries bases its assessment on the relationship between habitat and species populations and assumes that an activity that destroys or adversely modifies habitat listed species are dependent upon will be followed by a demographic response (e.g., changes in birth rates, death rates, or other vital rates, abundance, etc.) and assume this response will result in a substantial reduction in the diversity of the ESU.

Diversity of salmonid populations includes both genotypic and phenotypic diversity. Regardless of whether the diversity is genetically controlled or not, diversity allows greater exploitation of a variety of habitats and, therefore, leads to greater abundance and increases resilience by spreading risk and providing redundancy in the face of unpredictable catastrophes and

environmental stochasticity (NRC 1995). For example, coho salmon in the action area return as adults to spawn over a number of months during the fall and winter. This variability in run timing reduces the risk that complete loss of a years adult return would occur in the event of a catastrophe and also allows exploitation of habitats that might otherwise be unavailable.

A fundamental assumption used in this effects analysis is that coho salmon are limited by habitat in the action area and that adverse effects on habitat equate to adverse effects on coho salmon populations. Gregory and Bisson (1997) stated that habitat degradation has been associated with greater than 90% of documented extinctions or declines of Pacific salmon stocks. This assumption is also supported by Lichatowich (1989) who identified habitat loss as a significant contributor to stock declines of coho salmon in Oregon's coastal streams. Beechie *et al.* (1994) estimated a 24% and 34% loss of coho salmon smolt production capacity of summer and winter rearing habitats, respectively, in a Washington stream since European settlement. Beechie *et al.* (1994) identified three principal causes for these habitat losses, in order of importance, as hydromodification, blocking culverts, and forest practices. Several authors have found positive relationships between habitat complexity, LWD in streams, and salmonid populations (McMahon and Holtby 1992, Reeves *et al.* 1993, Tschaplinsky and Hartman 1983). Nickelson and Lawson (1997), in modeling extinction risk of coho salmon along the Oregon coast, found that probability of extinction was inversely related to habitat quality for starting populations of 50 and 100 individuals. Furthermore, Nickelson and Lawson (1997) found that there would be a substantial increase in risk of extinction for Oregon coast coho salmon in basins with poor habitat quality if habitat quality declines by 30-60% over the next century.

Thus, if our assessment determines that gravel mining operations under the proposed LOP 2003-2 and/or Granite Construction=s proposed individual permit application are likely to result in adverse effects to coho salmon habitat in the action areas, we assume that it would be reasonable to expect that SONCC coho salmon would experience demographic changes (that is, changes in population size, distribution, reproduction, mortality, etc.) as a result of the proposed actions. Then, if we conclude that these adverse effects rise to a level that can reasonably be expected to significantly destroy or modify the quantity or quality of habitat, we expect those activities to appreciably reduce the likelihood of survival and recovery of coho salmon that require that habitat to survive.

Additionally, our assessment must consider the effects of maintaining or inhibiting recovery of habitat conditions that led to the initial listing of coho salmon under the ESA. If we determine that habitat conditions will be maintained in a degraded condition and, therefore, will limit potential for recovery or substantially decrease the rate of recovery of coho salmon populations, then we must consider the increased risk that genetic, demographic, and environmental stochasticity will further negatively affect populations. In essence, if the action maintains habitat in a degraded condition or inhibits its recovery, then it also decreases the probability that species will survive over the long-term (NRC 1995).

The effects of the action are considered in six parts. First, we describe the general effects associated with gravel extraction in river channels. Second, we consider the short-term, direct

effects of the proposed actions on coho salmon. These include effects that occur at the time of mining such as bridge construction and use, heavy equipment operation near the wetted channel and the short-term impacts of the various extraction methods. We then describe the general long term effects associated with gravel extraction. These effects primarily occur as changes in channel form and function and are described in terms of expected changes to stream habitat types used by salmonids for various life history stages. These longer-term effects are considered separately for each of the stream reaches in the action area. We then assess the effects of interrelated and interdependent actions that would not otherwise occur in the absence of the proposed actions. Prior to synthesizing the effects of the action, we consider the cumulative effects that are reasonably certain to occur in the action area.

Finally, we integrate and synthesize the effects of the action combined with the interrelated and interdependent actions and cumulative effects. In this step, we consider the aggregate of effects on the populations of the SONCC coho salmon and its designated critical habitat. The expected response of coho salmon populations is determined by assessing any potential reductions in the numbers, reproduction, or distribution of coho salmon populations in the action area. We then determine whether any reductions in numbers, reproduction or distribution will appreciably reduce likelihood of survival and recovery of SONCC coho salmon. These final steps take into account the status and trends of the coho salmon population or ESU, the factors currently and cumulatively affecting them, and the role the affected population likely plays in the ESU.
To conduct our assessment of the proposed actions, NOAA Fisheries considers the direct and indirect effects of each activity associated with the proposed actions on the area, connectivity, and quality of habitats that support listed species. NOAA Fisheries uses published and unpublished data and studies of interactions between gravel mining operations and listed species or their habitats to estimate the likelihood of future effects. There is an extensive amount of published literature on the relationship between changes in habitat quantity, quality, and connectivity and the persistence of animal populations.

General Discussion of Effects

Impacts from gravel mining on physical channel conditions have been well documented in the published literature. Brown *et al.* (1998) and Pauley *et al.* (1989) conducted studies that include biological effects of gravel mining. Brown *et al.* (1998) compared mined sites to reference reaches in gravel bed streams and found that total fish densities in pools were higher in reference reaches than in mined sites and downstream reaches. Biomass and densities of invertebrates were higher in reference reaches. Bankfull channel widths were significantly increased at mined sites; and distance between riffles was increased, resulting in fewer pools in reaches downstream of mined sites. Although the Pauley *et al.* (1989) study was short duration and their sample size not large enough for statistical testing of some effects, the authors were able to make inferences regarding changes in channel form and resultant impacts to habitat function for salmonids from gravel bar skimming, including: decreased channel confinement, with widening and shallowing of the low flow channel and decreased water depths over riffles which created adult salmonid migration barriers, obliteration of side channels with complex habitat on skimmed bars and formation of secondary channels that lack complex habitat features, resulting in reduced habitat

for salmonids, and channel instability at the top of skimmed bars, with an increase in the probability of redd scouring.

The proposed instream gravel extraction operations of this Opinion impact listed salmonids, and their habitats, within the action areas. These impacts include: (1) direct effects, which are those effects that occur at the actual time of mining; and (2) indirect effects, which are those effects to the species that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Examples of effects that occur at the time of mining include mortality during heavy equipment use in the wetted channel, disruption of rearing, holding and migration patterns by heavy equipment noise and vibration disturbance, and elevated turbidity/sediment from connection of dry trenches to the wetted channel. Examples of indirect effects include greater width to depth ratio, and decrease in channel confinement over a range of flows; simplification of pool and riffle habitats; and reduction in food sources. Some of the impacts from gravel mining are reduced through project design features (e.g., project timing restrictions). Other impacts may be chronic in nature, and occur incrementally with, subsequent to, and offsite from the mining activity (e.g., reduction of substrate size, and the decline in spawning gravel quality, and associated increase in redd scour). The potential impacts of the proposed actions are discussed in detail in the sections below.

Direct Effects

Stream Crossing Construction and Use

Temporary channel crossings, usually bridges, but occasionally culverts, are placed at or near riffles for access of sediment hauling equipment. The placement and removal of temporary channel crossings can directly affects salmonids and their habitat by: a) injury or death from equipment contact; b) increases in turbidity and sedimentation from pushing up bridge approaches and abutments; c) attraction of spawning adults and redd building by changes to local channel form; d) reduction in the quality of migratory habitat; e) noise and vibration disturbance from heavy equipment use; f) introduction of petroleum products; and, g) reduction of invertebrate production at temporary channel crossing locations.

Injury or Death from Equipment Contact
Sediment removal operations require heavy equipment and often need to access gravel bars across the low flow wetted channel. Interactions with equipment can be potentially harmful or lethal to salmonids by several mechanisms, as explained below. Although much of this information is based on salmonids and not specific to coho salmon, we expect coho salmon to respond similarly unless otherwise described.

Salmonids select gravel substrate in shallow water with intra-gravel flow, typically the crests of riffles, to bury their fertilized eggs. The number of days required for eggs to hatch varies from about 19 days to about 90 days depending on species and water temperature. Alevin then emerge from the gravel two to three weeks after hatching (Barnhart 1986). Once they emerge, alevin disperse to occupy available low-velocity portions of the stream and areas with cover (Raleigh *et al.* 1984). During this early life stage, juveniles usually occupy shallow water along the stream banks (Barnhart 1986). Steelhead also use riffles and other areas not strongly associated with cover which provide increased foraging opportunities (Bradford and Higgins 2001) and large pore spaces in the stream bed. In one experiment using artificial stream channels, over 50% of juvenile

steelhead 31-44 mm in length were located in riffle habitat (Bugert and Bjornn 1991). They remain in these rearing areas throughout the summer, with some shift in habitat use as they age and as conditions change (Chapman and Bjornn 1969).

Cover is an important habitat component for juvenile salmonids, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Salmonid juveniles will balance their use of cover and foraging habitats based on their competing needs for energy acquisition and safety (Bradford and Higgins 2001). Critical forms of cover include submerged vegetation, woody debris, and the interstitial spaces of streambed gravel substrate (Raleigh et al. 1984). Steelhead juveniles will respond to threats of predation, including overhead motions, by huddling together and/or fleeing to nearby cover (Bugert and Bjornn 1991). Few young of the year (YOY) salmonids are found more than one meter from cover (Raleigh et al. 1984). Juvenile steelhead, particularly the younger, smaller individuals, have a notably docile response to disturbance; they rely on nearby substrate particles (i.e., gravel) for cover more than other salmonids (Chapman and Bjornn 1969; Everest and Chapman 1972; Wesche 1974). 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. Although juvenile steelhead may be at greatest risk of crushing by heavy equipment, Chinook salmon juveniles are also at risk of crushing at riffle locations. Temporary channel crossings can also be located at other shallow, narrow channel locations, such as areas upstream and downstream of riffles, and in runs where juvenile salmonids are present.

Frequently disturbed stream channels have relatively less abundance and diversity of cover habitat for juvenile salmonids. Therefore, in sediment removal areas, hiding in substrate pores may be the main response to threats (Chapman and Bjornn 1969, Wesche 1974, Everest and Chapman 1972). Even where other forms of cover are present, YOY will respond to noise, movement, and other disturbances by entering pore spaces in the streambed at riffles (Shirvell 1990, Meehan and Bjornn 1991).

Heavy equipment used to construct temporary stream crossings for access to sediment removal areas usually cross wet stream channels where water depth is shallowest, at riffles. Because this is an important habitat for salmonid juveniles (Bradford and Higgins 2001), where these fish occur in areas of channel crossing, a portion of the juveniles in the path of equipment would likely take cover within the gravel and be crushed as the equipment passed over. Multiple observations by NOAA Fisheries biologists (D. Free, pers. comm., 2003) indicate that even wading fishermen can crush juvenile salmonids hiding within gravel substrate. Therefore, scaring, herding, or chasing juveniles from stream crossings ahead of equipment is difficult, with poor confidence that the tactics adopted are fully effective. For example, Halligan (2002) documented the death by suffocation of at least 48 steelhead fry during the May 29, 2002, berm construction operations for the Humboldt Bay Water District on the Mad River, despite significant efforts to herd fish to safer locations. Halligan observed steelhead fry readily using interstitial spaces between gravel and cobbles for cover and rescued many fish by turning over cobbles, capturing the fish, and moving them to the main flow.

Larger salmonid juveniles are less prone to crushing from heavy equipment crossings. They will likely flee the area because the substrate size is not large enough to provide cover for them.

However, these juveniles could flee into areas of higher predator concentration or lower quality instream habitat, resulting in injury to rearing juveniles. Timing of temporary channel crossing construction is important to reduce the number of juveniles that may be crushed or otherwise injured. Delaying the construction of temporary channel crossings until June 15th would provide some time for juvenile coho salmon growth and would reduce the number of juveniles that would seek cover in substrate.

In order to better understand how channel crossings are constructed and removed, and the potential effects of these activities to listed salmonids, we observed channel crossing construction and removal over the past few years. NOAA Fisheries (L. Wolff, pers. comm., 2002) observed that the minimum number of times that heavy equipment crosses the channel is at least two times per installation/removal.

NOAA Fisheries expects that adherence to strict timing of crossing construction and removal would reduce the potential that salmonids in the project area would be killed during crossing construction/removal. The proposed LOP 2003-2 limits the season of crossing construction and removal between June 15 and September 15 for the Smith River and between June 15 and October 15 for all other rivers. Granite Construction proposes to remove channel crossings by October 15 on the Smith River, and that extraction activities would generally begin June 1.

NOAA Fisheries expects that adults, smolts, and older juveniles should be able to avoid or flee areas when loaders are building/removing channel crossings as authorized under LOP 2003-2 and does not expect coho salmon to be present where crossings are typically located (i.e., at riffles). NOAA Fisheries expects that adults and smolts should be able to avoid or flee areas when loaders are building/removing channel crossings under Granite Construction=s proposal.
Therefore, based on the timing restrictions in the proposed actions which ensure fish will be large enough to avoid equipment and the limited use by coho salmon of riffles where crossings are typically located, we do not expect coho salmon to be injured or killed by heavy equipment contact during stream crossing construction.

Increases in Turbidity and Sedimentation from Temporary Bridge Construction and Removal (Episodic) and Bridge Use (Chronic)
Turbidity and sedimentation occurs during construction and removal of temporary bridge abutments and approaches, as well as during use of the bridges. Turbidity may also occur if abutments are constructed of native gravel bar sediments and are not protected by brow logs, concrete blocks or large cobble. The following describes the effects of episodic and chronic turbidity.

Turbidity is generally highest in streams during the first high flow of the flood season. However, various instream sediment disturbance or removal actions may increase turbidity caused by suspended sediment at different time periods. Careful scheduling to avoid inflicting adverse effects on anadromous salmonids may alleviate most episodic turbidity concerns. Extraction of sediment from wet stream channels suspends fine sediment during times of the year when concentrations are normally low and the river is less able to assimilate suspended sediment (Weigand 1991).

Sediment removal or disturbance above the wetted stream may still create a persistent source of turbidity from the crossing of streams by heavy equipment, from activities associated with bridge construction, and from use of the bridges by heavy equipment during the summer low-flow period. Stream crossing and bridge building activities are likely to cause short-term increases in turbidity during periods of low stream flow when salmonids are present and may be stressed by other environmental factors such as high water temperatures. Bridge use by heavy equipment results in chronic inputs of fine sediment over the extraction season during the low-flow summer period causing chronic increases in turbidity and deposition of fines on stream-bottom substrate.

The severity of impacts to fish from suspended sediment pollution is generally acknowledged to be a function of sediment concentration and duration of exposure. Newcombe and Jensen (1996) demonstrated increased ill effects with increasing suspended sediment concentration and duration of exposure. If feeding is affected, growth could be reduced which could reduce smolt to adult survival (Sigler *et al.* 1984; Ward and Slaney 1988; Holtby *et al.* 1990; Newcombe and Macdonald 1991).

Gravel mining can result in elevated turbidity and suspended sediment levels through installation, removal, and use of temporary channel crossings. Elevated turbidity/sediment levels can affect stream biota, including salmonids, in numerous ways: stream primary productivity can be reduced if sunlight can not reach the substrate, benthic macro-invertebrate production can be hindered, salmonid feeding opportunities can be reduced, and suspended sediment may deposit on redds, suffocating incubating salmonid eggs. When background turbidity levels are low, typically during the low flow season, sediment inputs cloud otherwise clear waters making salmonid prey and predator detection difficult, and may harm redds and reduce invertebrate production when the sediment settles.

Aquatic macroinvertebrates are the principal food source for most juvenile salmonids (Spence *et al.* 1996). Immature mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera), referred to collectively as EPT, are considered the most productive, preferred, and available foods for stream fishes (Waters 1995). Indeed, the abundance of these three groups of aquatic macroinvertebrates is commonly used as a food availability index (Lenat 1988). The diversity and abundance of EPT can be affected by sediment removal operations because they are dependent upon substrate conditions (Benke *et al.* 1987).

The EPT group typically inhabit the interstitial spaces of coarse substrates (gravel to cobble sized particles), although some species of mayfly and certain other aquatic insects (*e.g.*, midges) prefer highly organic fine sediments. Sands and silt are the least productive substrates for aquatic macroinvertebrates (Hynes 1970) and are more easily mobilized, making them unsuitable because they are less stable (Fields 1982). Therefore, sediment intrusion that reduces the interstitial spaces of cobbles and gravel directly decreases the habitable area for EPT (Bjornn *et al.* 1974; Bjornn 1977).

Changes in the biomass and structure of macroinvertebrate assemblages can adversely affect the salmonid populations dependent on them. The importance of abundant food sources becomes even greater when stream temperatures are at the upper tolerance limits for steelhead and Chinook salmon and coho salmon. Fish may respond to thermal stress by decreased growth rates (Brett *et*

al. 1982) and reduced survival (Rich 1987). Since food conversion efficiencies decline at elevated temperatures, and metabolic demands increase, fish must eat more food simply to maintain homeostasis (Smith and Li 1983). Increased foraging to maintain homeostasis also costs more energetically and may increase predation risk if fish are forced to range farther or increase feeding in the presence of predators. Therefore, reductions in food availability due to streambed sedimentation, or other changes to substrate sizes, can compound adverse affects of elevated water temperatures. As stated previously, decreases in growth and consequent decreases in smolt size will result in decreased smolt to adult survival.

Impacts to aquatic macroinvertebrates may be protracted. The average life cycle of EPT species is one year, although several species have two-year life cycles. Fine sediments intruded deeply into the bed require mobilization of the bed itself to remove fines (Beschta and Jackson 1979, Diplas and Parker 1985). Bed mobilizing flows generally do not occur annually, so there is potential for the aquatic invertebrate food base to be diminished for some time and for some distance downstream from sediment removal areas. Brown *et al.* (1998), who sampled substrates upstream, downstream, and within an in-stream gravel mining project area, found that upstream from the disturbance: (1) biomass densities of all invertebrates were higher, (2) total fish densities in pools were higher, and (3) silt-sensitive fish species were more abundant, than within the project area or downstream.

Channel crossing construction and removal methods may reduce the amount of fine sediment associated with these activities. LOP 2003-2 requires that the use of temporary channel crossings is minimized, and removal is timed and located to avoid most of the upstream migration of adult coho salmon. If encroachment into the low flow channel is necessary to span the wetted channel, then abutments shall be constructed from washed cobbles, brow logs, large concrete block, or other appropriate materials that can be placed and removed with minimal effects. Native gravel can be used if the bridge will span the wetted channel, and all abutment materials will be removed from the site upon bridge removal. Thus, NOAA Fisheries does not anticipate that fine sediment from stream crossing construction and removal under LOP 2003-2 will adversely affect coho salmon in the action area.

Granite Construction has proposed the use of one temporary crossing each year at the Sultan Bar for crossing an overflow channel, which will be removed by October 15. This channel may be wet or dry, depending on flow conditions in the Smith River. Although Granite states that often, sill logs or concrete abutments will be placed beneath the ends of the railcar to provide support, clearance above the low flow channel, and to contain abutment fill, there is no firm commitment to reduce the amount of fine sediment associated with temporary crossings in their proposed action, (e.g., observation of abutments constructed on the Mad River by Granite Construction in 2002 showed native bar materials being used without containment in the low flow channel, with continual entry of fine sediment into the wetted channel from abutments). Therefore, we anticipate that fine sediment may be mobilized in the stream due to the single temporary crossing in Granite Construction=s proposed action. NOAA Fisheries anticipates that the fine sediment associated with temporary bridge construction, use, and removal under Granite Construction=s proposed action will cause behavioral and forage-based effects similar to those described above except that behavioral modification associated with bridge construction and removal will be more temporary than that for bridge use.

Bridge use is not addressed in LOP 2003-2 or Granite Construction=s proposal. The method of stream channel construction under LOP 2003-2 will minimize sediment entrainment from sloughing of bridge abutments because abutments will be constructed out of clean materials. However, a significant amount of sediment may be released to the stream from use of the bridge during hauling. NOAA Fisheries anticipates that fine sediment inputs to the stream channel from bridge use under LOP 2003-2 and Granite Construction=s proposal will significantly reduce invertebrate production for approximately 100 meters downstream of bridges and will result in behavior modification of juvenile coho salmon downstream of crossings. Coho salmon will avoid the immediate area when turbidity is present and may impinge on other rearing salmonid=s territories, thereby resulting in energy expenditure through territorial defense, reduced feeding potential, and increased predation potential as a result of interactions between individual fish. This effect will be increased at the single bridge site under Granite Construction=s proposal because of sediment that will slough from bridge abutments that encroach into the wetted channel.

Reduction in the Quality of Migratory Habitat
Use of temporary culverts rather than temporary bridges may reduce the quality of migratory habitat by hampering or eliminating fish passage through a culvert. Culverts associated with gravel mining were seldom approved by the Corps during the period of 1996-2002. Information describing the need for culverts must be provided with culvert requests and shall be supplied to the CDFG, NOAA Fisheries and the Corps. NOAA Fisheries anticipates that during the life of LOP 2003-2, the Corps will seldom approve culverts as temporary channel crossings. If culverts are approved by the Corps, we anticipate that based on the requirement of providing the culvert request to NOAA Fisheries and CDFG, that the Corps intends to follow fish passage guidance supplied by NOAA Fisheries and CDFG, and that they would be used in either secondary channels, or if used in the main channel would be sized for fish passage of all life history stages of listed salmonids present during the time the culvert is in place. Thus, potential impacts caused by temporary channel crossings to migratory habitat under LOP 2003-2 should not occur. Temporary culverts are not proposed as channel crossings in Granite Construction=s individual permit application.

Noise and Vibration Disturbance from Heavy Equipment Use
Noise and vibration produced by use of heavy equipment adjacent to and over the wetted low flow channel (channel crossings) may disrupt migration and holding patterns by harassing or frightening fish. Habitat types, salmonid holding locations, and run timing within the action area have been documented during previous seasons of LOP 96-2 implementation (Galea 1997-2001). The data from these reports showed that salmonids were holding in suitable habitat, regardless of whether or not extraction operations were occurring nearby. Extraction reaches have not been compared with non-extraction reaches, therefore the relative abundance of holding salmonids in the action area is not known.

The above monitoring suggests that salmonids are able to hold and migrate through active gravel extraction areas despite noise and vibration. Therefore, although there may be some undetected delay or disruption, NOAA Fisheries does not anticipate that noise and vibration from active gravel extraction will adversely affect adult coho salmon in the action area.

Introduction of Petroleum Products
All sediment removal operations use equipment powered by diesel fuel and lubricated by other petroleum products that are potentially hazardous to listed salmonids. With the use of this equipment, there is potential for spill of hazardous compounds in the stream, on bars in contact with the hyporheic zone, or at nearby processing sites. The risk of potential chemical pollution should be considered significantly higher near or in streams because of the proximity of sensitive aquatic species and because of the role of water in transporting contaminants to sensitive receptors. The magnitude of potential petroleum product introductions associated with implementation of LOP 2003-2, and Granite Construction=s individual permit application is unknown at this time.

Direct Effects of Trenching

Trenching was used as an extraction method in the Smith River during the implementation of LOP 96-2 (1996-2002), and is also included in LOP 2003-2 as a potential extraction technique that may be authorized during the next five years of gravel mining under both LOP 2003-2 and Granite=s proposed action. Because of the restrictions on trenching under LOP 2003-2, we expect trenching could occur in the Smith River and Rowdy Creek, but not the Klamath River. Past trenching operations included both wet and dry bar trenching. Wet (or instream) trenches were sometimes excavated without proper authorization and methodology hasn't always been consistent. In some cases, flow was diverted around the trenching site by the use of k-rails or bladders. In other instances a berm of native gravel was pushed out into the channel and the excavation proceeded behind the berm. Trenches excavated on the dry bar are excavated and then typically the trench is connected to the wetted channel to prevent salmonid stranding.

LOP 2003-2 also allows for very limited use of diversion of the low flow to a secondary channel, and installation of temporary coffer dams, which would allow for excavation of the low flow channel area (Awet trenching@). Diversion of the low flow would potentially be approved by the Corps after discussion with other resource agencies. Both dry and wet trenching have effects that occur at the time of mining, which are described as follows.

Increased Turbidity/Sediment
The effects of increased turbidity are as described above under the section on AStream Crossing Construction." Increased turbidity would also result from the connection of a dry trench to the wetted channel, or diversion of stream flow and wet trenching. Project design features that reduce the amount and duration of turbidity are typically used when connecting a dry trench to the low flow channel. These include the use of berms to separate the trench from the low flow channel, and waiting for settling of fine sediment in the trench before connection to the wetted channel. However, during connection of the dry trench a pulse of turbidity is released to the otherwise clear, low flow river. Based on observation of the magnitude and duration of the pulse of turbidity associated with dry trenches, and the number of dry trenches or wet trenches that are expected to be implemented under both LOP 2003-2 and Granite Construction=s proposed action, NOAA Fisheries anticipates that the pulse of turbidity from trenching will have adverse effects on coho salmon in the action area. The adverse effects of increased turbidity and sedimentation were previously described in the section on temporary channel crossing construction and removal.

Injury or Death from Equipment Contact
On a very limited basis, heavy equipment may be authorized under LOP 2003-2 to divert the low flow to a secondary channel for channel excavation. The effects associated with equipment use in the wetted channel are described in the above section on AStream Crossing Construction." NOAA Fisheries expects that adults, smolts, and older coho salmon juveniles should be able to avoid or flee areas when loaders are diverting the low flow channel if authorized under LOP 2003-2. However, young juveniles may still be killed. The NOAA Fisheries expects that the number of young juveniles that may die due to channel diversion under LOP 2003-2 will be similar to the construction and removal of stream crossings, depending on the footprint and depending on when the diversion is conducted.

Death or Injury and Behavioral Changes Due to Diversion of the Low Flow
LOP 2003-2 allows for very limited use of stream flow diversion and placement of temporary coffer dams in order to excavate the low flow channel. However, the requirement to remove salmonids before stream flow diversion is not included in LOP 2003-2. Therefore, we expect that some juveniles would be killed during dewatering activities, and that injury may also occur from displacement of juveniles. Displaced fish may impinge on other rearing salmonid=s territories, thereby resulting in energy expenditure through territorial defense, reduced feeding potential, and increased predation potential as a result of interactions between individual fish.

Decreased Invertebrate Production from Habitat Change
Habitat change occurs due to both wet and dry trenching and diversion of the low flow. These habitat changes include changes in substrate composition, and resulting changes in aquatic macroinvertebrates as is described in the above section on AStream Crossing Construction.@ NOAA Fisheries expects that these changes in the food base will be substantial as a result of wet trenching because of dramatic reductions in invertebrates in the dewatered section and change in habitat in the trenched areas because of reduced flows, changes in substrate, and lag in re-colonization by invertebrates. This reduced food base will result in a reduction in the juvenile salmonid carrying capacity in the dewatered and excavated stream section. NOAA Fisheries anticipates that invertebrates in the temporary channel will be unlikely to provide any substantial amount of forage. NOAA Fisheries expects minimal change to invertebrate production as a result of dry trenching because sediment replenishment is expected to be rapid and trenches will unlikely significantly affect existing adjacent habitats.

Increased Susceptibility to Predation
Trenches that are constructed in the active channel, whether by stream flow diversion and excavation in the low flow channel, or by dry trenching on the gravel bar with connection to the wetted channel, have the potential to attract migrating adults for holding opportunities during fall migration periods, as well as rearing juveniles during the summer and fall seasons. If the newly excavated trenches do not provide cover and hiding opportunities, then a potential increase in predation of juveniles would be expected, as well as the potential for an increase in susceptibility to poaching of adults. LOP 2003-2 requires boulders or LWD to be placed withing excavated trenches so poaching is not likley to be increased in trenches. Similarly, provision of cover will decrease juvenile predation.

Indirect Effects

Gravel extraction has numerous potential indirect effects on coho salmon, primarily by modifying the stream habitat that various life stages depend upon. Sediment removal from streams can result in destruction of spawning, feeding, and resting habitats. Other undesirable physical effects include bed degradation, bank erosion, channel and habitat simplification, and reduced effectiveness of geomorphic processes such as pool maintenance, sediment sorting, and sediment intrusion. Adverse biologic effects include reduced egg and alevin growth and success, reduced riparian vegetation and all associated aquatic benefits, reduced water quality, and mortality of juveniles.

In order to understand the mechanisms by which stream habitat may be affected by gravel extraction, we first discuss the general attributes of alluvial rivers pertinent to salmonid habitat in the action area in part A. Next, in part B, we describe how changes in physical processes, such as streamflow and sediment transport, affect channel form and function. Then, we describe how these physical changes may influence specific salmonid habitat elements. In part C, we describe the general effectiveness of the proposed actions (both LOP 2003-2 and Granite Construction) at reducing impacts to habitat. These three sections are intended to provide the background for the indirect effects of the proposed actions for each river reach in the action area.

General attributes of alluvial rivers in the action area

Stream channel dimensions and forms are a function of stream discharge and the production, transport, and deposition of sediments within a watershed (Leopold *et al.* 1964; Schumm 1977). Removal of a stream=s bedload disrupts the sediment mass balance and can alter a stream channel=s geometry and elevation. From geomorphic principles, we can predict that sediment removal should induce relatively predictable channel responses and corresponding changes to riverine habitats.

Channel geometry and geomorphic features within channels are the products of interactions among flow, sediment delivered to the channel, the character of the bed and bank material, and vegetation. A stream that is free to develop its own geometry evolves through time to develop a channel shape, dimensions and planform pattern (together termed morphology) that reflect a balance between the sediment and water inputs, the stream=s relative energy and the dominant characteristics of the sediments forming the bed and banks. Self-formed channels also adjust their conveyance capacity so that flow inundates the surrounding floodplain on average every 1-2 years. Streams in which the channel geometry and capacity are adjusted in this way are said to be in dynamic equilibrium. The concept of morphological adjustment towards dynamic equilibrium is fundamental to the theory and management of stream corridor processes.

The individual attributes of alluvial rivers in the action area that are pertinent to salmonids and their habitat are described below. This will provide the framework for understanding how changes in channel processes affect channel form and function with consequent changes in stream habitat.

Bar Formation

Alternate bars, and the alternating pools and riffles that form, are the fundamental geomorphic unit found in alluvial channels. It is useful to consider that bars Agrow@ from incipient condition to maturity, and can recover from disturbance to maturity. This view of bar dynamics allows the conceptual connection to valuable fish habitat that disturbed bars can provide if allowed to recover. Bars develop a maximum height corresponding to the elevation that the stream flow (Church *et al.* 2001) can carry gravels, often near normal flood water levels. Once vegetation becomes established on the bartop, sediment is more rapidly trapped and the bar top approaches the elevation of the adjacent floodplain.

Mature bars in undisturbed channels are connected to the adjacent floodplain, having elevations corresponding to the water surface elevation associated with the bankfull stage. In altered channels, Amature@ bars can adjust their heights to correspond to other benchmarks including the dominant discharge, and possibly to heights associated with extreme flood events. Bar formation drives many of the other attributes of alluvial rivers described below. Our analysis of aerial photos of the Smith River indicates that bars are relatively fixed in location and appear to be the dominant control on physical habitat conditions in the adjacent reach.

Sinuosity and Meandering

Undisturbed alternate bars deflect flows less than bankfull around them, thus creating a sinuous flow pattern at discharges up to high, over-bank flood events. The flow field converges as it flows around the alternate bars, then it diverges as it flows over the riffles (Keller 1971). The degree of meandering is indicated by the sinuosity B which is the ratio between the actual length of the flow path and the equivalent straight-line distance. In nature, sinuosity and energy slope are adjusted towards achieving dynamic balance between discharge and sediment load. Therefore, in undisturbed alluvial channels, bank erosion is, on average, balanced by deposition at the inside of bends, so that the channel width remains about constant.

Over time, a dynamic equilibrium is achieved where the wavelength and radius of curvature of meanders and channel slope reflects the characteristic sediment-discharge regime. Meandering streams shift and migrate to rework entire valley bottom widths over short geologic time spans. Meandering and alternate bar formation are consequently the dominant process of floodplain development, with overbank deposition of fine sediment the secondary process. Therefore, changes in sediment load and/or discharge would be expected to cause changes in sinuosity and floodplain configurations. The combination of bars and channel meandering drive many of the habitat-forming processes that salmonids depend on for various life stages by guiding the path of stream flow. Complex morphologic and well-sorted sediment features (salmonid habitat) are maintained by the convergence and divergence of the flow (e.g., Keller 1971; Keller and Melhorn 1978; Andrews 1979; Lisle 1979).

Sediment Sorting

In addition to the general progressive downstream reduction in size (fining) of particles forming the bed of alluvial channels, local sorting occurs related to the local distribution of stream forces. Channel bed topography causes flow to diverge at riffles and converge in the narrower cross-sections at pools (Keller 1971). Convergent and divergent patterns of flow paths can be inferred from map views of stream channels, and from the shapes and ratios of cross-section width to depth. Undisturbed bars and their associated pools and riffles are arranged in an alternating pattern of

convergence and divergence zones. Complex topographic and sedimentary features are maintained by the convergence and divergence of the stream=s flow field (e.g., Keller 1971; Keller and Melhorn 1978; Andrews 1979; Lisle 1979).
The non-uniformity of energy dissipation in the zones of convergence and divergence sets up particle sorting mechanisms, and diverse habitat features result (Trush *et al.* 2000). Where the apex or maximum width of an alternate bar is intrinsically linked with the zone of highest flow convergence, the increased depth and turbulence in the flow field form relatively deep scour holes that contain the coarsest bed particles. Such coarse-bedded scour holes form the pool habitats important to fish and the trophic food base of the ecosystem at lower flows. During low summer flows, when pools are most readily observed, a fine-grained veneer may cover the coarse bed.

Where flow diverges over riffles, the flow depth and velocity-field become more uniform, providing conditions conducive to the formation of well sorted patches of gravel. It is these gravel patches, combined with the gradient of the hyporheic flow field (subsurface water), which provide optimal substrates for spawning salmonids (Groot and Margolis 1991).

Pools and Riffles
The long-profile of the bed of a natural stream channel usually displays a systematic pattern of alternate deep and shallow reaches termed pools and riffles. Pool-riffle formation can be thought of as a vertical expression of the same processes that drive meandering in the horizontal plane. Pools combine with alternate bars to confine the most frequent flows, those less than bankfull, into relatively narrow cross-sections. The greatest channel confinement occurs adjacent to the widest points of alternate bars, where the thalweg lies close to the opposite stream bank. Strong secondary currents and plunging flow occur at these locations, accentuating pool scour to provide important fish habitat.

Pools are an essential habitat element for salmonids (Bjornn and Reiser 1991). Pools provide a complex of deep, low velocity areas, backwater eddies, and submerged structural elements that provide cover, winter habitat and flood refuge for fish (Brown and Moyle 1991). During their upstream migrations, adult salmonids typically move quickly through rapids and pause for varying duration in deep holding pools (Briggs 1953; Ellis 1962; Hinch *et al.* 1996; Hinch and Bratty 2000). Holding pools provide salmon with safe areas in which to rest when low-flows and/or fatigue inhibit their migration.

Pools are the preferred habitat of juvenile coho salmon (Hartman 1965; Fausch 1986; McMahon 1983. Pools with sufficient depth and size can also moderate elevated water temperatures stressful to salmonids (Matthews *et al.* 1994). Deep, thermally stratified pools with low current velocities, or connection to cool groundwater, provide important cold water refugia for cold water fish such as salmonids (Nielsen *et al.* 1994).

Decreased bar heights caused by sediment removal, increases the possibility of sediment intrusion in redds, siltation of riffles, filling of pools. The removal of the armor layer provides a source of fine sediment that would be otherwise unavailable. Also, the lowering of the bar surface creates a surface that is inundated earlier during storm flows. The combined effect is introduction of increased volumes of fine sediment at lower storm flows than would otherwise occur.

Between the alternate bars, riffles form where the stream crosses from one bank to the other and the channel cross-section is substantially wider. Riffles are composed of relatively coarse bed material. Fine sediment is flushed through riffles, while the gravel and cobble material comprising the riffles is mobilized and reworked less frequently, resulting in well-sorted, clean substrate. Gravel beds within riffles provide important spawning habitat for salmonids. For the Smith River, riffles are commonly located at the upper end of the bars.

Armor Layer

Undisturbed bars and channel bottoms are typically armored with a layer of large cobbles that overlies mixtures of finer-grained deposits. The armor layer is formed by the winnowing of finer sediments during receding flows leaving a coarse sediment layer overlying the finer, unsorted material below. Areas of heavy armor can provide valuable fish habitat during high flows (Church *et al.* 2001) because of low near-bed velocity, and productive benthic habitat whenever inundated (Bjornn *et al.* 1977). On unaltered bars a coarse surface layer Aarmor@ develops on the bar surface which hinders or prevents erosion (Leopold and Emmett 1976).

Hyporheic Zone

The hyporheic zone is the subsurface stream flow and shallow groundwater environment known to be critical for stream ecosystems. Water in the hyporheic zone moves down valley through interstitial spaces in floodplain and stream bed sediments and is connected to stream waters. As described in the *Environmental Baseline* section, for example, numerous cold water seeps from adjacent tributaries provide important cool water refugia to salmonids in the action area.

General Effects of Sediment Removal on Habitat and Salmonids

In this section we describe the general effects of sediment removal on salmonids and their habitat based on changes in the various alluvial river attributes discussed previously.

A naturally functioning channel, with mature alternate bars, has two efficiencies; a lower conveyance efficiency when flows are contained within and steered around alternate bars, and a higher efficiency when flood flows significantly overtop the bars. Sediment removal projects that decrease bar elevation (*e.g.*, bar skimming) cause bar overtopping to occur at lower discharges. One result is greater flow velocities within the channel during lower discharges that occur in early winter. Channel bed shear stress relations show that reducing sinuosity through reductions in bar heights can result in erosion of the channel in locations where it would not naturally occur. This local erosion increases the delivery of sediment to downstream areas (Olson 2000). Consequently, the changes in channel geometry and flow energy resulting from sediment removal can cause sediment accumulation in pools and erosion from riffles; which is the opposite of what normally occurs at habitat-shaping flows. The reduced convergence and divergence results in a more simplified channel with less concentrated and less effective particle-sorting processes. Therefore, reductions in bar height will simplify stream habitat by causing decreases in the area of spawning beds and reductions in pool area and depth.

In addition to this overall simplification of stream habitat, sediment removal can have additional impacts on specific salmonid habitat attributes. These specific habitat elements are:

1. Loss of pool habitat quantity and quality
2. Increased riffle instability and migration blockage at riffles
3. Loss of velocity refugia
4. Increased water temperatures
5. Elevated turbidity and sediment loads
6. Increased stranding of salmonids on extraction surfaces

1. Loss of Pool Habitat Quantity and Quality
Sediment removal from stream reaches in the action area will decrease the overall quality and quantity of pools. This reduction in pool quantity and quality may occur in three ways; (a) increased width-to-depth ratio (W/D), (b) channel degradation, and (c) reduced riparian vegetation.

(a) Increased Width to Depth Ratio. Increased channel width to depth ratio is created by skimming, and to a lesser degree by in-channel trenching if the trench dimensions are large enough to remove portions of the bar. When bars are lowered, the channel is effectively widened at low and moderate flows and migrating gravel particles are, therefore, more likely to continue moving through the riffle and accumulate in pools where the shear stress has been locally reduced due to the increased width. As a result, pool maintenance processes will be impaired where alternate bars are removed, or reduced in height/size through skimming or trenching. We expect sediment removal from bars to create a wider, more uniform channel cross section with less lateral variation in depth, and reduced prominence of the pool-riffle sequence (Collins and Dunne 1990). As a result, channel morphology is simplified as a result of increases in W/D following sediment removal (Church *et al.* 2001). In other instances, a braided channel may result from increased W/D. The braided configuration contains less pool area and habitat complexity in general.

Changes in W/D ratio should be considered in the appropriate spatial scale. The relevant spatial scales for the W/D ratio is both the low-flow channel and the high flow channel. Potential changes in the high-flow W/D ratio may be constrained by resistant valley walls such as on portions of the Smith and Klamath rivers where there is a finite limit to the amount of channel widening that may occur. Conversely, channels in wide, alluvial valleys are relatively less constrained and have the potential to affect larger areas as the channel is free to migrate via bank erosion. Therefore, changes in the high-flow W/D ratio would cause changes in habitat at the larger reach scale. Multiple habitat elements would be affected by the changing channel configuration in these settings. This is in contrast to changes in the low flow W/D ratio where increases would be more confined to individual habitat elements. Thus, repeated sediment removal at a site has the potential to affect habitat at both the reach and site scales depending on the overall confinement of the channel in the valley.

The relationship between high W/D and habitat values are well documented in the literature. Stream channels in sediment removal areas typically become progressively wider as the channel is less stable. Salmonid habitat is reduced in unstable channels (e.g.; Newport and Moyer 1974; Benke 1990; Kanehl and Lyons 1992; Hartfield 1993; Waters 1995; Brown *et al.* 1998) and the associated riparian habitat deteriorates (Rivier and Seguier 1985; Sandecki 1989).

(b) Channel Degradation. Sediment removal can result in localized or reach-scale bed degradation. Over time, stream channels adjust towards equilibrium between the sediment load and dominant

sediment transporting flows. A gradual migration of the channel by eroding the outside of bends and depositing equal volumes on the inside of bends creates the dynamic equilibrium condition where the bed and banks are not net sources of sediment. Therefore, the equilibrium stream channel is efficient at maintaining its geomorphic form and pattern although the system remains dynamic as it responds to cyclic floods and sediment delivery events. Dunne *et al.* (1981) stated *Abars are temporary storage sites through which sand and gravel pass, most bars are in approximate equilibrium so that the influx and downstream transport of material are equal when averaged over a number of years. If all the sand and gravel reaching such a bar is removed, the supply to bars downstream will diminish. Since sand and gravel will continue to be transported from these downstream bars by the river, their size will decrease.@*

If stream bed lowering increases bank heights to the degree that banks become unstable, rapid bank retreat may occur, further destabilizing the width but supplying the channel with sediments that make good the transport-supply imbalance, to prevent further degradation until they are flushed out (Knighton 1984; Little *et al.* 1991). Thus, sediment removal from a relatively confined reach can trigger erosion migrating upstream, causing erosion of the bed and banks which increases sediment delivery to the site of original sediment removal. Channel morphology is simplified as a result of degradation following sediment removal (Church *et al.* 2001). Also, Simon and Hupp (1992) show there is a positive correlation between bed lowering and channel widening, or bank retreat. As discussed above, channel widening can simplify habitats (Collins and Dunne 1990) and increase bank erosion, which can deliver sediment to downstream sites (Olson 2000), further reducing the quality of pools. Repeated sediment extraction at a certain percent of natural sediment replenishment rates, such as what will occur as a result of the proposed actions, will also deplete sediment sources and impact habitats downstream.

Therefore, the effects of the actions, particularly in reaches where multiple excavations occur, will cause bed lowering downstream of the excavation sites. This bed lowering, as discussed above, will promote continued simplification of in-stream habitat elements as the extent of habitat-forming bars are decreased. Therefore, the removal of sediment can be expected to both lower bed elevations and increase lateral instability through bank erosion (Simon and Hupp 1992), each of which tends to simplify stream habitats.

As implied above, increases in W/D ratio and bed degradation due to sediment removal are inter-related. Where extraction occurs in excess of rates of natural replenishment, bars may become smaller, the channel may widen and/or the channel bed may degrade. The specific response(s) will depend on the confinement of the river in the valley, the volume of extraction relative to natural replenishment rates, and the methods of extraction. Where the river is confined in the valley, changes would occur in the form of bed lowering and decreases in bar size. Where the channel is unconfined, changes in all three aspects of channel form could occur. We note, though, that all these changes in channel form lead to similar effects on pool habitat; that of simplification and reduction in overall quantity and quality.

(c) Reductions in Riparian Vegetation Quantity and Size. Pool quality in the action area is strongly influenced by the presence of riparian vegetation. Riparian vegetation provides bank stability which may locally resist scour and form deeper pools. Overhanging vegetation and vegetation that is recruited directly into the channel provides an important cover element for

salmonids. Annual bar skimming removes riparian vegetation that would otherwise colonize a portion of gravel bar surfaces. Extraction sites also increase vehicular access resulting in increased removal of woody debris. In the stream reaches that are not confined by levees or naturally resistant boundaries, long-term or repeated modification of gravel bars at low elevations promotes frequent channel shifting that precludes the establishment of riparian vegetation to provide these functions. As discussed above, stream channels in the Action Area can be expected to become progressively wider and less stable with consequent deterioration of adjacent riparian habitat (Rivier and Seguier 1985, Sandecki 1989). Where sediment removal exceeds sediment input, resulting in channel degradation, the water table may decline, further reducing the ability of riparian vegetation to become established on bar surfaces.

Mature vegetation provides additional benefits to juvenile salmonids in the form of physical structure. Structure in the form of large woody debris (LWD), when recruited into the active channel promotes localized scour, pool formation and is, itself, utilized as cover. Cover is also provided to juvenile salmonids by overhanging vegetation, submerged vegetation and exposed roots. The cover provided by complexities in structure can increase survival rates for salmonids rearing in summer, overwintering, and as outmigrating smolts (Meehan 1991).

Ecological energy is typically derived from detritus in streams (Cummins *et al.* 1973; Vannote *et al.* 1980) and is processed by different organisms (Anderson and Sedell 1979) in a continuum from larger to smaller particles (Boling *et al.* 1975). Riparian vegetation provides important nutrient inputs to streams such as leaf litter (Cummins *et al.* 1973) and terrestrial invertebrates that drop into the stream. Such Aallochthonous inputs@ can serve as the principal source of energy for higher trophic levels in stream ecosystems (Reid 1961; Gregory *et al.* 1991). Leaf litter provides the trophic base for aquatic macro-invertebrate communities that in turn are the fundamental food source for salmonids (Hawkins *et al.* 1982; Beschta 1991; Bretscko and Moser 1993;).

Decreases in pool quality and quantity will impact both adult holding by reducing the ability of pools to provide for cool water and cover, and by an overall reduction in the number of pools available for holding. Decreases in pool quality and quantity will also reduce juvenile rearing success through decreases in the overall amount of habitat available, and reductions in available food base and cover. Juvenile salmonids are morphologically, behaviorally and ecologically different which results in differential interspecific exploitation of riverine habitats (e.g., pools) (Bisson *et al.* 1988). For example, coho salmon are dorso-laterally compressed and have larger fins which enables maneuverability in slower velocity pool habitats (Bisson *et al.* 1988). Steelhead, in contrast, are more cylindrically-shaped and have smaller fins which enables utilization of higher velocity habitats such as riffles and runs (Bisson *et al.* 1988). These morphological differences demonstrate one reason why coho salmon are found in pools and steelhead are typically found in higher velocity habitats. Coho salmon out-compete juvenile steelhead for preferred pool habitats, but are unable to compete with steelhead in higher velocity habitats (Hartmann 1965). If pool quality and quantity declines, competitive interactions between coho salmon and steelhead will increase and steelhead will gain a competitive advantage. Increased overlap between steelhead and coho salmon in habitats where steelhead hold a competitive advantage is likely to result in decreased growth of coho salmon (Harvey and Nakamoto 1996) which can effect size of smolts and subsequent smolt to adult survival (Ward and Slaney 1988; Holtby *et al.* 1990).

2. Increased Riffle Instability and Migration Blockage at Riffles
Sediment removal has three principal effects on riffle habitats; (a) impacts to spawning habitat, (b) impacts to rearing habitat, and (c) increased migration blockage. Additional impacts to spawning habitat resulting from increased sedimentation are described in a following section discussing the impacts of elevated turbidity and sediment loads.

(a) Impacts to Spawning Habitat. Similar to decreases in pool quality, sediment removal also initiates channel instability that has consequent effects on the stability and quality of riffle habitats. Sediment removal, particularly in-stream trenching, can cause bed lowering to propagate both upstream and downstream, thereby scouring spawning areas. Increased channel instability, either through degradation or lateral migration, increases the risk that salmonid redds will be destroyed. For example, the loss of egg inoculated gravel from riffles was documented by Pauley et al. (1989), who concluded the eggs were scoured because bar skimming reduced bar heights, increasing shear stress over riffles. Where flow diverges over riffles, the flow depth and velocity-field become more uniform, providing conditions conducive to the formation of well sorted patches of gravel. It is these gravel patches, combined with the gradient of the hyporheic flow field (subsurface water), which provide optimal substrates for spawning salmonids (Groot and Margolis 1991). Where habitat is simplified and the pool-riffle sequence is less pronounced as noted by Collins and Dunne (1990), spawning habitat quantity, and more importantly, quality, will be reduced. Sediment extraction at a site has also been demonstrated to reduce the overall substrate size. Therefore, in lower rivers, where larger particles may be in short supply, extraction at a site could reduce the quality of spawning habitat by reducing the size of spawning substrate needed for various salmonids, particularly Chinook salmon, and by increasing the shear stress at riffles. Decreased particle size and increased shear stress due to sediment removal activities would both lead to increased bed mobility and a higher likelihood of premature redd scour.

(b) Impacts to Rearing Habitat. As described in the *Channel Form and Function* section, the shallow, swift flows over riffles are also important habitats for numerous species of invertebrates, many of which are important food sources for salmonids. Reductions in the quality of riffles occurs by a decrease in overall substrate size by chronic sediment removal (especially in locations with a high density of mining), resulting in changes, and overall reductions, in macro-invertebrates, decreasing food availability for rearing juvenile salmonids. Riffle quality will also be reduced by increased shear stress and scour potential due to a less confined channel and a shortened flow path over a more easily inundated skimmed bar. Decreased food availability will result in smaller juveniles. Decreases in smolt size, or overall fitness, at the time of ocean entry has been shown to decrease ocean survival, and thus reduce the abundance of returning adults (Ward and Slaney 1988; Holtby *et al.* 1990).

(c) Increased Migration Blockage. Thompson (1972) provided minimum depths and maximum velocities that enable upstream migration of adult salmon species, criteria that have been widely cited (Bovee 1982; Bjornn and Reiser 1991). According to those recommendations, Chinook salmon, the largest salmonid species, requires minimum riffle depths of 24 cm and, for successful passage, this depth should be provided "on at least 25% of the total [*cross-sectional*] transect width and a continuous portion equaling at least 10% of its total width." Sediment removal operations that increase W/D ratios (particularly bar scalping) increase the probability that shallow flows at riffles will form migration barriers. Increased W:D ratios (particularly from bar scalping) increase

the probability that shallow flows at riffles will form migration barriers. Pauley *et al.* (1989) and Woodward-Clyde (1980) verified that flow depths decreased over riffles, creating barriers to upstream-migrating adult salmonids, adjacent to and upstream from skimmed bars.
Coastal rivers in the action area are typically at very low flows at the onset of adult migration. Some of the riffles in the mined reaches on the Smith River and Rowdy Creek may be too shallow to allow adequate adult upstream migration. The extent to which the presence of shallow, migration-blocking riffles is due to past mining is difficult to determine.

Migration blockages may be created through two mechanisms. First, where a skim floor is taken down to the level of an adjacent riffle at low-flow, rising flows will not be confined. Therefore, during the first rising flows of the fall, river width would increase rapidly while depth would increase very little and the riffle continues to be a migration barrier.

A second mechanism by which migration would be impeded is through longer-term increases in W:D ratio due to repeated sediment removal at a site. As discussed previously, various sediment extraction methods can increase W:D ratio at the site. Channel degradation has been accompanied by channel widening (Simon and Hupp 1992). This occurs as bars are removed and stream habitat becomes less complex. The habitat simplification that occurs as a result of sediment removal produces a greater amount of Aflat water@ habitat, with an overall decrease in topographic complexity. Adult migration may be impeded if long stretches of flat water habitat absent holding cover are present (Thompson 1972).

In addition to reducing stream depths over riffles (as a result of increasing W:D ratio), sediment removal operations can increase current velocities and reduce flow-field complexity, thereby forcing migrating salmonids to expend additional energy from their finite energy reserves. Reduced flow-field complexity and increased migratory velocities, particularly reduced edge-water eddies and low velocity zones, result from reduced sinuosity, increased W/D ratio at bars, and reduced topographic complexity of geomorphic features. This can affect adult salmonids during their upstream migrations across riffles, and juvenile salmonids will face challenges finding and using velocity refuges during high flows in simplified, hydraulically smoother channels. Adult salmonid migration can also be adversely affected when sediment removal activities diminish the size and frequency of main stem pools; habitat used for resting.

3. Loss of Velocity Refugia
Sediment removal can alter the distribution of velocity refugia in extraction reaches. These may occur through (a) reach-scale changes in habitat quality, (b) changes in channel bed roughness, and (c) reductions in riparian vegetation.

(a) Reach-scale Changes in Habitat Quality. Pools provide a complex of deep, low velocity areas, backwater eddies, and submerged structural elements that provide cover, winter habitat and flood refuge for fish (Brown and Moyle 1991). During their upstream migrations, adult salmonids typically move quickly through rapids and pause for varying duration in deep holding pools (Briggs 1953; Ellis 1962; Hinch *et al.* 1996; Hinch and Bratty 2000). Holding pools provide salmon with safe areas in which to rest when low-flows and/or fatigue inhibit their migration. Pools are also the preferred habitat of juvenile coho salmon (Hartman 1965; McMahon 1983; Fausch 1986. Pools with sufficient depth and size can also moderate elevated water temperatures stressful to salmonids

(Matthews *et al.* 1994). Deep, thermally stratified pools with low current velocities, or connection to cool groundwater, provide important cold water refugia for cold water fish such as salmonids (Nielsen *et al.* 1994). Degradation initially creates a deeper, narrower channel. Back channels are cut off and river-edge wetlands are de-watered. Initially complex channels tend to degrade to less complex channels with a decrease in the pool/riffle expression of topographic complexity; these effects amount to reduction in habitat diversity (Lisle et al. 1993). Lack of both margin and topographic complexity reduces important velocity refuge in the lower main stem rivers of the action area.

(b) Changes in Channel Bed Roughness. Reductions in exposed particle size result from the removal of overlying coarse sediments and abrasion and particle breakage caused by the passage of heavy equipment. Coastal watersheds in the action area are composed of sedimentary and low-grade metamorphic rocks. Particles that easily break into smaller particles when moving downstream, and when heavy equipment crushes them, dominate the coarse sediment load in these streams. As a result of disrupting the natural armoring process and mechanical crushing, disturbed bar surfaces are typically finer-grained than undisturbed bar surfaces.

Areas of heavy bed armor can provide valuable fish habitat during high flows (Church *et al.* 2001) because of low near-bed velocity, and productive benthic habitat whenever inundated (Bjornn *et al.* 1977). Loss of pool quality discussed above is one manner in which important velocity refugia can be reduced or eliminated. In addition, riffles with course substrate such as cobble and small boulders provide velocity refuges for juvenile salmonids (Hartman 1965; Raleigh *et al.* 1984; Hearn and Kynard 1986; Nielsen *et al.* 1994). As described previously, sediment removal results in finer substrate sizes, and increased shear stress at riffles, increasing bed mobility. Increased bed mobility will result in less stable velocity refugia.

(c) Reductions in Riparian Vegetation Size and Distribution. Vegetative structure increases hydraulic boundary roughness resulting in relatively lower velocities near the flow-substrate interface (Beschta and Platts 1986), and increases channel and habitat stability (Lisle 1986). These low velocity zones provide refuge habitat to salmonids during high-flow events. Many salmonids seek out low velocity areas close to high velocity areas in order to optimize foraging and maximize net energy gain (Fausch 1984).

4. Increased Water Temperatures

Riparian vegetation protects stream temperatures from rising unduly by providing canopy that shades the water and reduces direct solar radiation reaching the water surface (Beschta 1991; Hetrick *et al.* 1998). Stream temperatures are affected to a lesser degree by ambient air temperatures (Spence *et al.* 1996). In addition, riparian vegetation lessens the temperature differential between the air and the water by creating a cool and moist microclimate near the water surface.

As streams get larger, they typically get wider. The resulting increase in surface area exposes the water to more insolation and more heat gain (Beschta *et al.* 1987). The influence of riparian vegetation decreases in proportion to the fraction of the water=s surface shaded by trees adjacent to the watercourse. The influence of heat energy transfer is also diminished as stream flows increase (Beschta *et al.* 1987). This decreases the cooling influence of shade on main stem waters,

particularly those that have higher than normal summer flows, because of releases from upstream storage reservoirs. However, recent temperature modeling efforts (Ligon *et al.* 2001) indicate that the Russian River, a relatively large stream in Sonoma County, is well below the channel width threshold that would nullify the temperature mitigating influence of riparian vegetation. Stream temperature is also influenced by season, latitude, elevation, topography, orientation, and local climate (Spence *et al.* 1996). Despite this, the relative contribution of riparian vegetation and its inverse relationship to channel width, as represented in this model, indicates that a channel width roughly seven times greater than tree height is needed before changes to insolation are reduced to insignificance.

Increased water temperatures due to losses of riparian vegetation are of particular concern, given that salmon and steelhead prefer relatively cold water habitats with water temperatures less than about 15°C. Water temperature influences juvenile steelhead growth rates, population densities, swimming ability, ability to capture and metabolize food, and disease resistance (Barnhart 1986; Bjornn and Reiser 1991). Upper lethal temperature limits generally range in the vicinity of about 23-25°C, although many salmonid species can survive short-term exposures to temperatures as high as 27-28°C (Lee and Rinne 1980). Fluctuating diurnal water temperatures also help salmonids survive short episodes of high temperature (Busby *et al.* 1996). Large, thermally stratified pools, springs, and cool tributary inflow can also provide cold water refuges that help juveniles survive hot summer temperatures (Nielsen *et al.* 1994).

5. Elevated Turbidity and Sediment

Sediment generated from upstream eroding banks or eroded off of freshly skimmed bar surfaces can smother incubating salmonid embryos. Sediment intrusion resulting from the excavation of in-channel bars is likely a transient process that occurs when an altered bar is initially overtopped and flushed of its fine-grained surface layer. This process, in terms of increased sediment load, is difficult to detect, especially in streams with high background sediment concentration. Increased sedimentation of riffle habitats reduces the interstitial spaces of cobbles and gravel, directly decreasing the habitable area for aquatic invertebrates, an important food source for juvenile salmonids (Bjornn *et al.* 1974; Bjornn 1977).

Removal of an armor layer, which protects the stream bed or bar from sediment transport, creates a less stable bed or bar and can be transported earlier in a given flood season. The finer-grained disturbed surfaces, which are at a reduced elevation, create a new source of fine sediment within the active channel that can be mobilized by the first freshets during late fall or early winter. The first freshets may entrain the fine-grained surface material but lack the magnitude or duration to transport the locally derived fine sediment sufficiently downstream.

Fine sediments generated during sediment removal operations contribute to the anthropogenic-induced concentration of sand and fines that is known to be a factor contributing to the decline or loss of salmon and steelhead populations (Cordone and Kelley 1961). Increased levels of fine sediment have been shown to have direct impacts on salmonid behavior, physiology, growth, reproductive success and the availability of food (Bjornn *et al.* 1974; 1977; Sigler *et al.* 1984; 1988; Waters 1972). Newcombe and Jensen (1996) and Newcombe (2001) discuss response curves for various fish species, life stages, and sediment exposures.

Sedimentation of streambeds is caused by the settling of suspended particles in low velocity areas and by the process of sediment intrusion. McDowell-Boyer *et al.* (1986) identified two mechanisms by which porous substrates can become clogged with fines: particle straining, and the formation of surface cakes. Jobson and Carey (1989) defined particle straining as the process where fine particles move through the porous media until they encounter pore spaces too small for passage.

The potential for particle penetration is a function of the effective pore diameter of the stream bed surface media and the size distribution of the particles moving in occasional contact with the bed (Beschta and Jackson 1979). Beschta and Jackson (1979) also found that most intrusion occurred quickly, during the first 15-20 minutes of experimental fine sediment input events. These experiments were probably detecting the simple geometric relationship between pore-space and particle diameter. Essentially, entrained particles can enter the streambed if the particles are smaller than the pore spaces and there is occasional bed contact.

Surface caking is the filling of pore spaces of gravel/cobble beds from the bottom up. Surface caking experiments were conducted by Einstein and Chien (1953), Simons *et al.* (1963), and Einstein (1968). These authors examined the transport of well-graded material and observed fine sediment (sand to small gravel) accumulations on the bed surface following injection of large concentrations. The accumulated material was then selectively removed as the supply was decreased. When selective removal ceases, the fine sediment trapped in the near bed layer will probably be retained even if upwelling flow is present (Jobson and Carey 1989). Gravel deposits choked with fines have decreased hydraulic conductivity that contributes to diminished oxygen concentrations in subsurface flow and resulting impacts to incubating embryos (Kondolf and Williams 1999).

Besides inhibiting the emergence of alevins, one of the principal means by which fine sediment reduces survival of salmonid embryos is by reducing intra-gravel water flow, thereby reducing the amount of dissolved oxygen available for respiration (Bjornn and Reiser 1991). Temporary sedimentation episodes, as described above, can exceed the ability of embryos to cope with such conditions (Alderice *et al.* 1958). The transitory natures of these effects make them difficult to detect and monitor. The least desirable situation for sediment removal would combine large disturbed areas with a location in or immediately upstream from spawning habitat.

6. Increased Stranding on Extraction Surfaces

Gravel extraction surfaces (i.e., skimmed bars, trenches, horseshoe skims, alcoves and wetland pits) all have an increased potential for salmonid stranding after inundation and subsequent receding flows. Increased stranding potential can occur in the following ways: 1) if skimmed bars have been left with closed undulations or depressions; 2) if trenches have not been connected to the wetted channel; 3) if sediment berms form at the mouths of alcoves, horseshoe skims and connected trenches; and, 4) during inundation of wetland pits (wetland pits are discussed in the separate section below). As described in the *Proposed Actions* section of this Opinion, skimmed surfaces must be final graded to provide a free draining surface, although a slope percentage is not specified. NOAA Fisheries expects that the increased potential for stranding on skimmed surfaces will be low, but that in some cases not enough slope was left for free drainage, or small depressions may be left on the skimmed surface. Additionally, trenches, alcoves, and horseshoe skims are

connected to the wetted channel. However, during storm events sediment berms may form at the mouths of these excavations, increasing the potential for stranding. NOAA Fisheries expects that there will be a moderate increase in stranding potential with trench, alcove and horseshoe skim excavations.

General Effectiveness of the Proposed Actions at Reducing Effects

General Effectiveness of LOP 2003-2 Project Standards

The *Description of the Proposed Actions* section of this Opinion contains a thorough description of the proposed LOP 2003-2. This section provides an overview of the ability of project standards contained in LOP 2003-2 to reduce the general effects of gravel mining. The more specific effects, by river reach, are discussed below in the *Effects of the Proposed Action by River Reach* section.

LOP 2003-2 proposes to set minimum skim floor elevations to correspond to the water surface elevation of the flow that is exceeded 35% of the time in the historic record of daily average flows for rivers in Del Norte County. The 35% exceedence flow is the flow where significant movement of bed load material begins in the rivers of Humboldt County (NMFS 2002) and is a relatively low flow. However, the 35% exceedance flow is not a good indicator of where bed load begins to move in the Smith River. Information regarding bed load movement in the Smith River indicates that the corresponding flow is between 12 and 18%. Observations of water surface elevation during flows corresponding to the 12% exceedance flow indicates that some bars will be unavailable for skimming, but others would have ample exposed bar for skim-type mining.

Spawning depths for large salmon have been noted between 6 and 14 inches (Meehan 1991). Most main-stem spawning occurs near riffles or at the pool tail just upstream of the riffle. Ten inches of water over the riffle crest in an undisturbed river should be sufficient to provide unimpeded fish passage. However, in disturbed channels fish expend additional energy to migrate through simplified and reduced pool-riffle structures. Frequently disturbed rivers are often missing some of the important attributes of a natural river that allow unimpeded migration or spawning. Those attributes include channel margin complexity, bed roughness, and vegetative cover. Additional flow depth beyond the cited minimums can help offset the lack of habitat complexity. A flow depth over riffles of 20 inches during migratory flows, twice the cited minimum, may help offset the lack of channel complexities that aid in migration and spawning (NMFS 2003b).

As described above, we expect that gravel mining under LOP 2003-2 will minimize the likelihood of migration blockages at riffles by containing the low flow channel to approximately 20 inches. However, this low flow channel confinement is not sufficient to protect the hydraulic processes that sort substrate particles and determine water velocities that maintain and form quality riffle habitat for spawning and rearing. We anticipate that riffle habitats will continue to be less stable, and more easily scoured under implementation of LOP 2003-2, and that rearing and spawning habitat quality will be maintained or decreased in Rowdy Creek.

It is important to note that the minimum skim floor elevation should be used in conjunction with limits on gravel volume extracted, area disturbed and with consideration for specific geomorphic features. The 35% exceedence flow is below the flow that moves significant sized bed material, which would be considered a channel forming flow. The flow based extraction limit at the 35% exceedence flow will not provide for maintenance of all morphological features of a stream or for

the reconstruction of degraded morphological features, particularly if too large of an area is skimmed, or too large a cumulative volume is mined. Bar elevations considerably above the minimum extraction elevation are necessary to drive the hydraulics necessary to form essential channel morphology (e.g., deep pools and the related riffle structure, moderate flow meanders, velocity diversity, and all other associated geomorphic features).

LOP 2003-2 mainly relies on the requirement that "excavation shall be limited to less than the annual amount of replenishment" to constrain extraction volumes and relies on CDFG and NOAA Fisheries to reduce site specific geomorphic impacts.

NOAA Fisheries expects that the gravel mining as authorized under the proposed LOP 2003-2 will reduce the likelihood of bed degradation in the Smith River, which has a high density of mining sites, because of the controls on gravel volume provided by restricting mining to less than annual replenishment. However, current pool and riffle conditions will either be maintained, or there will be a decrease in the quality and quantity of pool and riffle habitat in river reaches because geomorphic controls will be compromised. NOAA Fisheries expects that mining under LOP 2003-2 on one bar in the Klamath River will have only local effects, immediately adjacent to the mined bar and a short distance downstream. Mining on Rowdy Creek, as proposed, will maintain current degraded conditions adjacent to the bars, primarily at the Maris Pit site, over the five-year period.

LOP 2003-2 requires that disturbance of woody riparian vegetation greater than 2 inches diameter or that is part of a 1/8 acre contiguous complex be mapped and either avoided or re-planted. LOP 2003-2 recommends that large woody debris found on the bar prior to mining be stockpiled and replaced after mining. LOP 2003-2 does not require the protection of newly emergent, or potentially emergent riparian vegetation. We expect that gravel mining, as authorized under LOP 2003-2, will maintain, or further degrade, the current condition of riparian vegetation and large woody debris function, especially in the Smith River which has a high density of mining.

As described in the ADirect Effects@ section of this Opinion, elevated turbidity associated with temporary channel crossings should be reduced by the implementation standards and guidelines described in LOP 2003-2.

General Effectiveness of Granite Construction's Project Standards
The *Description of the Proposed Actions* section of this Opinion contains a thorough description of Granite Construction's proposed action. This section provides an overview of the ability of project standards contained in Granite's proposed individual permit application to reduce the general effects of gravel mining in the Smith River. The more specific effects to the Smith River are discussed below in the *Effects of the Proposed Action by River Reach* section.

Granite Construction proposes a minimum skim floor that is one vertical foot above the low-flow water surface elevation. The low flow water surface elevation is not defined in their proposal, but based on past implementation, NOAA Fisheries assumes that Granite will use the lowest flow of the summer season to measure the one vertical foot offset from. Granite's minimum skim floor elevation will likely increase W/D ratios and lateral instability by removing the hydraulic controls provided by the adjacent bars. We expect that current pool quantity and quality would be decreased with this minimum skim floor elevation, and that the amount of channel confinement

proposed by Granite will decrease the ability of the Smith River to form and maintain quality riffle habitat, causing an over-all decrease in topographic complexity.

Granite proposes to mine 50,000 cubic yards annually from the Huffman Bar and 25,000 cubic yards from the Sultan Bar. This "hard target" annual volume is not consistent with a sustained yield management strategy or the dynamic nature of sediment transport in the Smith River. NOAA Fisheries expects that the gravel mining as proposed by Granite will likely increase the likelihood of bed degradation and habitat simplification in the Smith River since the annual extraction target is not expressly linked to estimates of deposition in the extraction reach. Additionally, there is likely to be a decrease in the quality and quantity of current pool and riffle conditions near Granite's two gravel bars.

Granite's proposed action states that they will avoid woody riparian vegetation and wetlands to the maximum extent practicable, and that they will mitigate for impacted vegetation and wetlands. However, no additional information on avoiding riparian vegetation or how to mitigate for disturbance of riparian vegetation is included. Granite does not propose to protect or stockpile large woody debris found on the bar prior to mining, or to replace large woody debris after mining. Nor does Granite require the protection of newly emergent or potentially emergent riparian vegetation. We expect that gravel mining, as conducted under Granite's proposed action will maintain, or further degrade, the current condition of riparian vegetation and large woody debris function in the Smith River.

Granite proposes to relocate riparian vegetation on the lower two-thirds of the Huffman Bar to the upper one-third of the bar. The riparian vegetation proposed for removal is closer to the stream flow than the proposed relocation site. NOAA Fisheries met with Granite in the fall of 2002 to discuss future mining and potential relocation of riparian vegetation. At that time, NOAA Fisheries acknowledged the need to protect the upper one-third of the bar where mining had previously occurred and suggested that some riparian vegetation could be relocated to consolidate fragmented patches of riparian vegetation found on the lower two-thirds of the bar and provide cover for the recently created alcove feature (Dan Free, NOAA Fisheries, pers.comm.). However, Granite's proposed vegetation relocation plan will provide less riparian function because vegetation will be located farther from the channel. In addition, scouring of the upper 1/3rd of the bar will likely reduce the survival of relocated vegetation. Differences in water table elevation at the upper bar site may also reduce the viability of relocated vegetation.

The low flow channel confinement provided by Granite is not sufficient to protect the hydraulic processes that sort substrate particles and determine water velocities that maintain and form quality riffle habitat. We anticipate that riffle habitats will continue to be less stable, and more easily scoured during Granite's five year proposed action, and that rearing habitat quality and quantity will be decreased.

As described in the *Direct Effects* section of this Opinion, elevated turbidity associated with one temporary channel crossing will not be reduced by the implementation standards and guidelines described in Granite's proposed action. Additionally, minimum skim floor elevations one vertical foot above the low flow water surface elevation will not reduce the effects of additional fine bed load material entrained from skimmed bar surfaces.

General Effects of Wetland Pits
Wetland pits have generally not been implemented in Del Norte County. It is unclear if they are allowed under LOP 2003-2, but reference to their potential use is made in the Public Notice. Granite Construction does not propose to use wetland pits, but there may be opportunities to use this extraction method on the Huffman Bar. Excavating a wetland pit in a frequently inundated floodplain (2-5 year floodplain) may be a relatively low risk method for producing high quality aggregate outside the bankfull stream channel. The frequency of fish interaction is lower than within the bankfull channel, however both adult and juvenile salmonids can become trapped in pits. The risk of stranding adult salmonids is lower than the risk of stranding juveniles, primarily because juveniles are susceptible for a greater length of time and they utilize floodplain habitats more. In addition, the sediment volumes excavated from wetland pits must be accounted for in the total annual extraction volumes in order to reduce the effects of cumulative over-extraction, such as bed degradation and pool/riffle simplification.

Pit size should consider conservative bedload estimates so that the stream can refill pits during floods without starving downstream habitats of coarse sediment. Therefore, pit size and elevation should be designed relative to the flow frequency and magnitude that can be expected to refill the sediment trap. A reliable sediment budget, and inundation frequency analysis, are therefore required to design a wetland pit excavation that reduces the total volume-related effects, such as bed degradation at the reach scale.

The increased risk, above natural levels, of stranding of juvenile and adult salmonids in wetland pits occurs during recession of high flow events. During high flow events, wetland pits will likely be at, or near, channel margins, where both adult and juvenile salmonids will be seeking velocity refugia. However, wetland pits reduce the risk of fish that may be stranded by their location on the 2-5 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 2-5 year floodplain to reduce potential salmonid stranding.

NOAA Fisheries anticipates that there will be small losses of coho salmon by stranding as a result of wetland pit excavations on the Smith River. Wetland pits are probably not a viable option on Rowdy Creek and are not proposed for the Klamath River. However, we anticipate that the probability of adult stranding is very low. Small numbers of juvenile coho salmon are expected to be stranded in wetland pits during the five year duration of the proposed actions, and NOAA Fisheries expects that a low number of juveniles will perish due to stranding in pits. Based on past implementation, wetland pits are expected to be used on a limited basis, so that we anticipate that the take of juveniles through wetland pit stranding will be low compared to the total number of juveniles rearing in the river systems of the action area.

Reach-Specific Effects of the Proposed Actions

<u>Effects of gravel Extraction on the Smith River</u>

Past gravel mining, historic land management practices (e.g., logging and road building), flood control projects (e.g., levees), and reclamation of tidal wetlands for agriculture have contributed to loss of habitat diversity within the lower Smith River. Existing conditions indicate that the lower Smith River has limited rearing habitat due to a dramatic decrease in the size and ecological function of the estuary and habitat simplification from the effects of levy construction and gravel mining. Fishery data indicate that natural populations of coho salmon persist, at below historic levels, in the Smith River.

Gravel extraction has occurred at up to nine areas on the lower Smith River. The actual annual extraction volume for the 1997-2002 period is at least 120,000 cubic yards, but reporting has been insufficient to accurately determine extraction amounts. Extraction has predominantly been accomplished by bar skimming and trenching, but, more recently, alternative extraction designs such as alcoves have been implemented.

Pool Quantity and Quality

(a) Expected increases or maintenance of Width/Depth ratio. The extraction reach of the lower Smith River is characterized, in general, as having a moderately high W/D ratio. In between major floods, we would expect development of an improved W/D ratio, but NOAA Fisheries thinks that annual extraction activities impede channel recovery. The moderately high W/D ratio of the lower Smith River promotes habitat conditions dominated by relatively shallow pools and poorly pronounced riffle crests. Shallow Aflatwater@ habitat dominates the lower Smith River River (Galea 1998), and provides poor conditions for juvenile rearing. Most of the higher quality pools that provide depth, cover, and velocity refuge appear to occur when the low flow channel abuts bedrock outcrops. Historically, pools also occurred where the low flow channel abutted higher elevation bars (e.g., Woodruff Bar). However, gravel mining occurs or has occurred in recent years on all of the bars in the lower Smith River which has simplified adjacent habitat. Bars approaching bankfull height are capable of providing somewhat higher quality habitat features, including alcove habitats, at moderately high flows, than locations where the low flow channel is unconstrained by these highest bars.

Past skimming and extraction in excess of replenishment has likely exacerbated this problem, by not allowing sufficient bar height recovery to allow for low flow channel confinement. Continued skimming on the lower Smith River bars will likely perpetuate the lack of adult holding and juvenile rearing habitat in the absence of sufficient bar height recovery. To some extent, this effect will be reduced by constraining skim widths, protecting the upper portion of the bar, and implementation of alternative extraction designs (e.g., trenching) as has been implemented in the past as a result of site-specific review.

(b) Channel Degradation. Evidence of channel degradation in the lower Smith River is not available. Overall, the amount of annual extraction appears to be excessive with respect to recruitment, although mean annual recruitment for the lower Smith River has been previously estimated at 340,000 cubic yards. However, this only accounts for the amount of material entering the reach. Some accounting for sediment that passes through the reach should be made to establish what would be available for mining. Given the high transport capacity of the leveed lower Smith River, we expect sediment transport through the reach could comprise a substantial fraction of the sediment budget.

We expect that the Smith River above Highway101 may be more resistant to channel instability than the reach below Highway 101 because the channel is more confined and bedrock provides significant control over channel morphology. However, we expect extraction in excess of sustained yield will have impacts to channel morphology and degradation of habitat, principally through reductions in bar size.

(c) Reductions in Riparian Function. Historic removal of larger streamside vegetation has largely eliminated large woody debris sources. Reductions in large woody debris sources have likely contributed to the decreased quality and quantity of pool habitat along the Smith River. Localized habitat complexity is provided by: (1) vegetation patches in the active channel; (2) eroding alluvial banks; and (3) bedrock outcrops. These locations will continue to provide a valuable source of riparian function and habitat complexity. However, we expect that, given the moderately high W/D and potential for channel instability in some localized areas of the Smith River, continued erosion of alluvial forms will reduce the amount of habitat afforded by riparian vegetation.

Additionally, we anticipate that the effect of gravel extraction, particularly skimming, will suppress riparian succession at the individual mining sites. Where a site is repeatedly skimmed, the effect is a chronic reduction in the quantity of vegetation. Therefore, on average, we expect a lesser extent of riparian vegetation in the immediate vicinity of the extraction sites. This will reduce the extent of habitat complexity afforded by vegetation and reduce allochthonous inputs occurring in the vicinity of the extraction sites. Effects to fish from this reduction in habitat complexity and ecological changes from interrupting the processes of energy transformation from plant to animal will be manifested in a reduced yield of eggs to adults.

In summary, the paucity of pool habitat is likely to be perpetuated under LOP 2003-2. Granite's individual permit is unlikely to change the amount of pool habitat because of the bedrock controls adjacent to their bars, but could reduce the quality of pool habitat. Continued extraction along the lower Smith River under LOP 2003-2, specifically skimming, will likely perpetuate the lack of adult holding and juvenile rearing habitat in the absence of sufficient bar height recovery. Furthermore, we expect reductions in riparian vegetation may affect juvenile coho salmon by reducing growth rates and survival rates.

Riffle Stability and Migration Blockage at Riffles

(a) Impacts to Spawning Habitat. Information presented in the *Environmental Baseline* section indicates that the lower Smith River provides spawning habitat for Chinook salmon, but coho salmon are unlikely to spawn there. The effects to Chinook salmon spawning habitat are further discussed in the EFH consultation.

(b) Impacts to Rearing Habitat. The effects to riffles from mining (i.e., decreased particle size, increased susceptibility to erosion, and increased instability) also decrease the quality of rearing habitat at riffles by affecting aquatic macroinvertebrate (food) availability for rearing juvenile coho salmon. An overall decrease in riffle stability will lead to a decrease in the quality and quantity of juvenile rearing habitat at riffles adjacent to the mined sites. NOAA Fisheries expects that the proposed actions will maintain or further degrade riffle habitat, which will reduce the carrying capacity for juvenile salmonids.

(c) Migration Blockage. NOAA Fisheries does not expect significant adult migration impediment as a result of LOP 2003-2 or Granite Construction's proposed actions. Past mining may have affected adult Chinook migration passage at the Crockett/Woodruff bar complex, but we do not expect that later arriving coho salmon will be affected because flows are typically higher.

Effects on Velocity Refugia

(a) Impacts due to Habitat Changes or Maintenance of Existing Habitat. Given the currently simplified habitat of the lower Smith River, existing velocity refugia in the form of complex pools, off-channel habitat, and topographic complexity are limited. We expect that continued gravel extraction, in the absence of habitat recovery, will have the effect of maintaining this reduced habitat condition near the individual extraction sites. The effects of continued lowering of the downstream ends of bars and impeding the development of natural alcove and backwater habitat will be manifested in reduced fry habitat and high-flow refuge. Alternative extraction methods such as alcove trenching may provide short-term refuge and fry rearing sites. Instream trenching may provide increased topographic relief.

(b) Changes in Bed Roughness. The characteristic particle size distribution along the lower Smith River is largely dominated by gravel and cobbles, and courser sediment such as boulders, depending on the habitat type. Sediment sizes generally decrease in a downstream direction. Trenches created on dry bars and within the wetted channel from past gravel extraction often have a greater percentage of fine materials (sand and pea-sized gravel). The larger substrate sizes found in the lower Smith River likely provide critical velocity refugia. Where gravel extraction occurs, particularly skimming, and a larger portion of the coarse armor layer is removed, we expect localized reductions in high-flow velocity refugia to occur. However, we do not expect a decrease in survival of coho salmon fry in the lower Smith River because course substrate refugia does not appear to be limiting.

(c) Changes in Riparian Function. Smaller patches of younger vegetation (typically willows) in the active channel and along eroding alluvial banks will continue to provide valuable velocity refugia. However, given the instability of alluvial features in the lower Smith River, primarily below the highway 101 bridge, continued decreases in bar size and lateral shifts in the channel will continually erode young vegetation and reduce the amount of velocity refuge afforded by riparian vegetation. Any increases in channel migration rates will reduce the overall age and size of vegetation able to provide velocity refugia. In addition, skimming will continually repress development of new vegetation, thereby reducing the probability that a migrating channel will intercept riparian vegetation.

Given the lack of larger vegetation and lack of complex habitats in the form of pools and off channel habitats we expect that any smaller riparian vegetation located within the active channel provides important velocity refugia in the lower Smith River. Therefore, continued sediment extraction that promotes lateral channel migration and represses riparian development will continue to reduce the amount of this habitat.

We expect the loss of velocity refugia to primarily affect newly emergent coho salmon fry because fry are highly dependent upon edgewater and submerged riparian vegetation. However, since most

spawning occurs in tributaries, we expect the number of fry present in the action area will be low. Therefore, we do not expect that the loss of velocity refuge will result in a reduction in the overall number of fry that survive to the smolt stage.

Effects to Water Temperature

The current W/D ratio of the lower Smith River allows for low flows to spread out over the bar surface and experience increased insolation over what would be expected in a more confined setting. We expect the proposed action will continue to maintain or increase W/D ratio in the Smith River and perpetuate this effect. However, temperatures in the Smith River are not considered a limiting factor for coho salmon survival, therefore we do not expect temperatures to increase such that adverse effects to coho salmon would occur.

Effects of Turbidity and Sedimentation of Adjacent and Downstream Habitat

Proposed bar skimming along the lower Smith River will allow inundation of unarmored bar surfaces. Trenching will mobilize fine sediment in the bed materials. We expect the effect will be to add additional fine sediment to the river. However, we do not expect that the additional fine sediment that will be mobilized will measurably affect sheltering in interstitial spaces in substrate. There may be minor increases in turbidity and minor decreases in invertebrate production downstream from mined sites, but we do not expect these effects to decrease coho salmon survival.

Trenching will result in increased turbidity and sedimentation downstream of the extraction. This has been previously discussed in the *Direct Effects* section and, therefore, will not be covered here. We do not expect turbidity or sedimentation to be increased other than during, or immediately following, the trench excavation.

Effects on the Estuary

The environmental baseline describes the Smith River estuary as degraded due to a dramatic reduction in size by diking and filling. As such, the remaining estuary is extremely fragile with respect to functioning ecologically as an estuary. The estuary begins at the upstream extent of tidal influence, which is currenly not defined, but at least coincides with the Woodruff/Crockett bar complex.

The effects of mining on the estuary are difficult to determine. Upstream dikes have likely increased the transport capacity of the channel and consequent sediment delivery to the estuary. We expect any decrease in allochthonous inputs in the upstream extraction reach will adversely affect the detrital-based food web of the estuary (Sibert *et al.* 1977; Sibert 1979; Healey 1982; Shreffler *et al.* 1992) which could affect growth and survival of coho salmon. Any decrease in growth during the critical stage when juvenile fish are in the estuary would reduce the smolt to adult survival of individual coho salmon.

Smith River Summary

The high intensity of extraction along the Smith River portion of the action area creates a reach that will be cumulatively affected by the proposed actions. Although discerning the specific differences in effects resulting from the two proposed actions is difficult, we expect Granite's proposed action to result in greater local effects than LOP 2003-2. We base this on the greater extraction volume, lower skim floor elevations, and vegetation management proposed by Granite. The dominant concern for coho salmon in the lower Smith River is a chronic simplification of juvenile rearing

habitat. Coho salmon, probably more than other salmonids, require complex habitats for growth and survival during freshwater rearing. Our analysis of effects indicates that decreased alluvial structure will maintain currently degraded and simplified conditions. The extraction reach comprises most of the low gradient, alluvial habitat in the mainstem Smith River that would be most conducive for juvenile coho rearing. Additionally, the extraction reach is the lowest portion of the Smith River and all of the Smith River adult and juvenile coho salmon must use this area at some point during their lives. However, most tributary habitat appears sufficient to support recovered (i.e., no longer requiring ESA protection) populations. The effects of the proposed actions will impact juvenile coho salmon rearing and holding habitat primarily through simplification. We also expect greater overlap between coho salmon and other salmonids, primarily steelhead, in more homogeneous, simplified habitat that would favor other species over coho salmon. Coho salmon juveniles that rely on the pools of the lower Smith River will be displaced to more marginal habitats possibly resulting in increased predation and reduced growth rates in the more exposed and simplified habitats.

Effects of Gravel Extraction on Rowdy Creek

Historic land management practices (e.g., logging and road building) have contributed to loss of habitat diversity within Rowdy Creek. Existing conditions indicate that Rowdy Creek has limited rearing habitat due to habitat simplification from the effects of these land management activites. Spawning habitat for coho salmon is present. Information indicates that natural populations of coho salmon persist, at below historic levels, in Rowdy Creek.

Gravel extraction has occurred at up to three areas on Rowdy Creek. The average total volume authorized by the Corps for extraction between 1997 and 2002 is less than 5,000 cubic yards. Extraction does not appear to have been excessive. Extraction has predominantly been accomplished by bar skimming.

Pool Quantity and Quality

(a) Expected increases or maintenance of Width/Depth ratio. The extraction reach of the lower Rowdy Creek appears to be relatively unconfined. One section, at the Maris Pit extraction site, appears to be wider than what would normally be expected and this area contains multiple channels. This could be a result of the stream exiting a confined reach and depositing much of its sediment load in a naturally wider cross-section, but it may also be a result of past skimming in this area which would exacerbate the natural condition. We expect that continued skimming in this area would promote the current braided channel condition. Other extraction areas in Rowdy Creek are confined and are unlikely to drastically change as a result of gravel mining.

(b) Channel Degradation. Evidence of channel degradation in Rowdy Creek is not available. Overall, the amount of annual extraction does not appear to be excessive with respect to expected recruitment.

(c) Reductions in Riparian Function. Historic removal of larger streamside vegetation has largely eliminated large woody debris sources. Reductions in large woody debris sources have likely contributed to the decreased quality and quantity of pool habitat along Rowdy Creek. Localized habitat complexity is provided by vegetation along banks. We do not expect this to decrease under the LOP 2003-2.

We anticipate that the effect of gravel extraction, particularly skimming, will suppress riparian succession at the Maris Pit location. Where a site is repeatedly skimmed, the effect is a chronic reduction in the quantity of vegetation. Therefore, on average, we expect a lesser extent of riparian vegetation in the immediate vicinity of the extraction sites. This will reduce the extent of habitat complexity afforded by vegetation and reduce allochthonous inputs occurring in the vicinity of the extraction sites. It may also effect development of a single channel in this braided section. Effects to fish from this reduction in habitat complexity and ecological changes from interrupting the processes of energy transformation from plant to animal will be manifested in a reduced yield of eggs to adults.

In summary, pool habitat changes caused by past gravel extraction are likely to be perpetuated under LOP 2003-2. Continued skimming at the Maris Pit site will promote the current braided condition.

Riffle Stability and Migration Blockage at Riffles

(a) Impacts to Spawning Habitat. Coho salmon spawning habitat is present in Rowdy Creek. The Maris Pit location is likely one of the more desirable sections for spawning, except that the channel is unstable and braided. Continued skimming at this location will promote this instability. Redds constructed in this area would likely be subject to increased scour under LOP 2003-2. Upstream and downstream degradation propagation from trenching could also result in redd scour.

(b)Impacts to Rearing Habitat. The effects to riffles from mining (i.e., decreased particle size, increased susceptibility to erosion, and increased instability) also decrease the quality of rearing habitat at riffles by affecting aquatic macroinvertebrate (food) availability for rearing juvenile coho salmon. An overall decrease in riffle stability will lead to a decrease in the quality and quantity of juvenile rearing habitat adjacent to the Maris Pit site. NOAA Fisheries expects that the proposed actions will maintain or further degrade riffle habitat in the action area.

(c) Migration Blockage. Migration could be impeded at the Maris Pit site. However, migration is naturally impeded downstream where Rowdy Creek forms a delta at its confluence with the Smith River, which also impedes migration. Promotion of the current braided conditions at the Maris Pit site by skimming could impair migration of early arriving coho salmon, depending upon rainfall and stream flows at the time of migration. This could result in adult coho salmon spawning in less favorable conditions if delayed, requiring increased energy to negotiate shallow areas, or making them more susceptible to disease if crowded; therefore reproduction success could be decreased.

Effects on Velocity Refugia

(a) Impacts due to Habitat Changes or Maintenance of Existing Habitat. We do not expect detectable changes to velocity refugia from implementation of LOP 2003-2 because the scope of the mining is limited.

(b) Changes in Bed Roughness. We do not expect detectable changes to bed roughness from implementation of LOP 2003-2 because the scope of the mining is limited.

(c) Changes in Riparian Function. Smaller patches of younger vegetation (typically willows) in the active channel and along eroding alluvial banks will continue to provide valuable velocity refugia. Skimming will continually repress development of new vegetation at the Maris Pit site.

We expect the loss of velocity refugia to primarily affect newly emergent coho salmon fry because fry are highly dependent upon edgewater and submerged riparian vegetation. However, we expect that this minor loss is unlikely to have a detectable effect on fry survival.

Effects in Water Temperature
We do not expect any changes in temperature as a result of implementation of LOP 2003-2 on Rowdy Creek primarily because of the coastal influence and the limited scope of mining.

Effects of Turbidity and Sedimentation of Adjacent and Downstream Habitat
Proposed bar skimming along Rowdy Creek will allow inundation of unarmored bar surfaces. Trenching will mobilize fine sediment in the bed materials. We expect the effect will be to add additional fine sediment to the river. Coho salmon will be impacted by a reduction of interstitial spaces in the channel bed available for sheltering, decreased invertebrate production, and impaired feeding ability in the turbid water. However, we do not expect individuals to be killed as a result of these effects, but some coho salmon juveniles could be injured, primarily through reduced growth.

Trenching will result in increased turbidity and sedimentation downstream of the extraction. This has been previously discussed in the *Direct Effects* section and, therefore, will not be covered here. We do not expect turbidity or sedimentation to be increased other than during, or immediately following, the trench excavation.

Rowdy Creek Summary
The low intensity and volume of extraction along Rowdy Creek portion of the action area minimizes the cumulative effects. The dominant concern for coho salmon in Rowdy Creek is the potential effects to spawning habitat. The Maris Pit location appears to be the most sensitive location to the effects of gravel extraction. We expect some habitat simplification adjacent to mined sites. The effects of the proposed action will have minor impacts on juvenile salmonid rearing and holding habitat primarily through simplification which will reduce the carrying capacity of this habitat. Although much of Rowdy Creek is degraded and lacks habitat complexity, this additional effect results in a reduction in the coho salmon population that would otherwise occur there.

<u>Effects of Gravel Extraction on the Klamath River</u>
Historic land management practices (e.g., logging and road building) have contributed to the lack of diversity in the lower Klamath River. Water flows also influence habitat and water quality. Existing conditions indicate that the mainstem lower Klamath River has limited rearing habitat mainly due to poor water quality conditions. Fishery data indicate that natural populations of anadromous salmonids persist, at below historic levels, in the Klamath River.

Gravel extraction has occurred historically, but only one site is actively mined today. The Resighini Rancerhia mines an overflow channel approximately 1 mile downstream of the only

mining site (Blake's Bar) currently proposed under LOP 2003-2 for the Klamath River. Mining volume is permitted at up to 100,000 cubic yards annually, but is limited if replenishment does not occur (J. Simondet, NOAA Fisheries, pers. comm.). Mining volumes in 2000 and 2001 were 50,000 and 71,000, respectively (J. Simondet, NOAA Fisheries, pers. comm., 2003).

Since only one site is proposed for mining on the Klamath River under LOP 2003-2, we do not expect significant cumulative effects downstream. Rather, we expect any effects will be manifested locally, i.e., within 100 meters upstream and downstream of Blake's Bar.

Pool Quantity and Quality
(a) Expected increases or maintenance of Width/Depth ratio. We expect a minor increase in width to depth ratio could occur adjacent to the mined site. However, provision of the head of bar buffer and the confined nature of the active channel will result in an insignificant increase in width to depth ratio.

(b) Channel Degradation. We do not expect channel degradation to occur as a result of mining of one Klamath River bar under LOP 2003-2 because the proposed extraction volume is much less than the annual sediment budget.

(c)Reductions in Riparian Function. Although gravel extraction, particularly skimming, will suppress riparian succession at mining sites, we do not expect extraction on the vegetated portion of the bar. Therefore, we do not expect a decrease in riparian vegetation as a result of implementation of LOP 2003-2.

Riffle Stability and Migration Blockage at Riffles
(a) Impacts to Spawning Habitat. Coho salmon spawning habitat is not present at the site.

(b)Impacts to Rearing Habitat. Minor, localized decrease or simplification of rearing habitat may occur as a result of the proposed action. However, this is not expected to reduce the survival of juvenile coho salmon in the Klamath River, primarily because water quality, and not habitat, is likely the limiting factor for juvenile coho salmon survival in the Klamath River.

(c) Migration Blockage. NOAA Fisheries does not expect migration to be affected by the proposed action.

Effects on Velocity Refugia
(a) Impacts due to Habitat Changes or Maintenance of Existing Habitat. A minor reduction in pool depth could occur as a result of the proposed action, but we do not expect this to have a measurable effect on velocity refugia as a result of the proposed action.

(b) Changes in Bed Roughness. We expect a decrease in size of the bar material as the armor layer is removed during extraction. However, restricting mining to the lower half of the bar and above the 35% exceedence flow level will minimize the impact of this reduction. Given the limited scope of the proposed action, we do not expect this reduction to decrease survival of coho salmon fry.

(c) Changes in Riparian Function. We do not expect any effects to riparian function.

Effects in Water Temperature
We do not expect any effects to water temperature from implementation of the proposed action on one bar in the Klamath River because of the moderating influence of the coastal zone.

Effects of Turbidity and Sedimentation of Adjacent and Downstream Habitat
Proposed bar skimming along Blake's Bar will allow inundation of unarmored bar surfaces. We expect the effect will be to add additional fine sediment to the river. Coho salmon could be impacted by a reduction of interstitial spaces in the channel bed available for sheltering, decreased invertebrate production, and impaired feeding ability in the turbid water. However, we expect this to be minor given the limited scope of mining in the Klamath River.

Klamath River Summary
Because of the limited extent of mining proposed on the Klamath River, we expect that the effects to coho salmon will also be limited. The greatest potential for effects will occur immediately adjacent to the mined bar. We expect a minor increase in width to depth ratio, and, potentially, a minor effect to the downstream riffle. However, we do not expect these effects to result in a decrease in the coho salmon population in the Klamath River.

Other Indirect Effects of the Proposed Action

The following effects are expected to occur as a consequence of the proposed actions. These occur primarily due to increased vehicle access at Huffman Bar resulting in removal of woody debris and changes in channel configuration which result in bridge and bank stabilization projects.

Removal of woody debris

LWD is an important component in pool formation, in providing cover for salmonids, and for habitat complexity in general. Although much of the debris currently supplied to reaches in the action area is readily transported at high flows, our review of the aerial photos, site visits and published information (Abbe and Montgomery 1996), indicates that many debris accumulations provide functional habitat elements at low and moderate flows. Even at the highest flows, rafts of debris may create important slack water environments for salmonids. Gravel extraction operations can decrease the availability of LWD to the lower mainstem rivers by increasing vehicular access to river bars through unlocked gates on roads specifically constructed and maintained for gravel extraction, where LWD that has been deposited on gravel bars is then collected by private individuals for firewood or lumber. Huffman Bar is currently the only bar that is open for public access, but Granite Construction has suggested this access may be closed in the future. NOAA Fisheries personnel (D. Free pers. comm., 2003) has observed evidence of removal of LWD from the Huffman Bar.

A project design feature taken to minimize the loss of LWD is stockpiling of LWD material on the edges or upstream of extraction bars prior to bar skimming, which may allow for the natural

redistribution of LWD during winter storms. This may be of limited benefit because vehicular access and firewood cutting is not restricted. Therefore NOAA Fisheries anticipates that the loss of LWD will still occur as a result of Granite's proposed action, possibly continuing declines in habitat quality in the action area and downstream reaches, reducing the survival of adult or juvenile salmonids.

Increased need for rock slope protection

The lateral instability, i.e., bank erosion, evident in the lower Smith River, primarily at the Crockett/Woodruff Bar complex could result in significant erosion of the stream banks and levees. Channel bed degradation has also raised concerns over the stability of area bridges and at the water intake facilities. This could require further bank stabilization or other instream activites to address these concerns. Numerous effects on salmonids are associated with these types of projects. Short-term effects associated with these projects include increased turbidity, equipment access in the low-flow channel, and dewatering of the channel during construction. Longer-term effects occur as reduced interactions of streamside vegetation with the active channel. This results in less overhanging vegetation and decreased recruitment potential of woody debris. We expect that most of these projects will be permitted through the ACOE and effects to salmonids reduced.

VI. INTERRELATED AND INTERDEPENDENT ACTIONS

In considering the effects of the proposed action, NOAA Fisheries analyses the effects of any interrelated or interdependent actions that are likely to occur. No interrelated or interdependent actions have been identified for analysis in this Opinion.

VII. CUMULATIVE EFFECTS

NOAA Fisheries must consider both the effects of the action and the cumulative effects of other activities in determining whether the action is likely to jeopardize the continued existence of a covered species or result in the destruction or adverse modification of critical habitat. Under the ESA, cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

NOAA Fisheries believes that listed SONCC coho salmon and their habitat may be affected by numerous actions by State, tribal, local, or private entities that are reasonably certain to occur in the action area. These actions include, but are not limited to, those discussed below. Although each of the following actions may reasonably be expected to occur, we lack definitive information on the extent or location of many of these categories of actions. The following discussion provides available information on the expected effects of these activities on covered species. More detailed discussions of other ongoing activities occurring in the action area are provided in the baseline section for each river system.

Timber management

Timber management, with associated activities such as harvest, yarding, loading, hauling, site preparation, planting, vegetation management, and thinning, is the dominant human activity in the action area. Future timber harvest levels in the action area cannot be precisely predicted, however, it is assumed that harvest levels on private lands in Del Norte County in the foreseeable future will be within the approximate range of harvest levels that have occurred since the listing of the northern spotted owl in 1992.

Implementation of Timber Harvest Plans under the California Forest Practice Rules (FPRs) has not consistently provided protection against unauthorized take in relation to Pacific salmonids listed under the Act by NOAA Fisheries. NOAA Fisheries has informed the California Department of Forestry (CDF) of its ongoing concern over the lack of specific provisions for Pacific salmonids in the FPRs. Discussions continue on this issue between NOAA Fisheries, CDF, and California Resources Agency. Recent revisions to the FPRs address many concerns related to salmonids. However, until these issues are resolved, unauthorized take from direct, indirect, and cumulative effects of salmonids from timber harvest and its associated activities may be occurring and likely will continue to occur. The extent and amount of any unauthorized take of coho salmon is unknown.

Reasonably foreseeable effects of timber management activities may also impact designated critical habitat for SONCC coho salmon. Within the action area, direct, indirect, and cumulative effects of timber harvesting may degrade the habitat features identified as essential for coho salmon critical habitat. The extent of the effect to critical habitat is unknown given the uncertainty of protective measures in THPs.

Control of wildfires

Control of wildfires may include the removal of modification of vegetation due to the construction of firebreaks or setting of backfires to control the spread of fire. An undetermined amount of suitable habitat for covered species may be removed or modified by this activity. During the past 10 years, an undetermined number and acreage of fires have occurred in the action area. We expect that the annual number of fires and acreage burned will not substantially change over the five-year permit period. The effects of wildfires and wildfire suppression activities range from increased sediment inputs to streams, further degrading habitat, to the effects of fire retardants and other chemicals associated with fire suppression.

Construction, reconstruction, maintenance, and use of roads

While the level of construction of new roads and reconstruction of old roads on private and state lands cannot be anticipated, it is expected to continue at a pace similar to the current pace. The increased emphasis on protection of aquatic resources is expected to result in higher standards for road construction, reconstruction, maintenance, and use as compared to historical standards.

Improvement of environmental conditions related to roads throughout the action area is expected over the long term. Noticeable improvements in the short term are unlikely due to a projected increase in the number of road miles per square mile of land, the lack of comprehensive road standards, existence of numerous older, legacy roads within the action area, and lack of routine inspections and maintenance of existing roads. These trends will be especially noticeable on industrial timberlands.

Gravel mining, quarrying, and processing

In addition to the gravel extraction activities covered in this Opinion, other sediment extraction activities occur in more upland settings that ultimately have the potential for affecting the Action Area. The effects of quarries and rock mines on aquatic resources in the action area depend on the type of mining, the size of the quarry or mine, and distance from waters. Rock mining can cause increased sedimentation, accelerated erosion, increased streambank and streambed instability, and changes to substrate. Surface mining may result in soil compaction and loss of the vegetative cover and humic layer, increasing surface runoff. Mining may also cause the loss of riparian vegetation. Chemicals used in mining can be toxic to aquatic species if transported to waters. Because the effects of quarries and rock mines depend on several variables, the effects of quarries and other commercial rock operations within the action area on covered species are unknown. Commercial rock quarrying will continue to be under the regulation of Del Norte County and the California Coastal Commission (for those activities conducted within the Coastal Zone).

Habitat restoration projects

It is anticipated that, as monitoring information accumulates on past projects, the focus of stream restoration projects will gradually shift toward more effective restoration actions. Because such activities are usually coordinated with one or more of the resource agencies, it is anticipated that all applicable laws will be followed. Restoration activities conducted through CDFG's Fisheries Habitat Restoration Program authorized take of coho salmon through a section 7 consultation with the COE, and are therefore not considered a cumulative effect. Restoration activities that are not conducted pursuant to CDFG's program may cause temporary increases in turbidity, alter channel dynamics and stability, and injure or scare salmonids if equipment is used in the stream during restoration projects. Properly constructed stream restoration projects may increase habitat complexity, stabilize channels and streambanks, increase spawning gravels, decrease sedimentation, and increase shade and cover for salmonids. It is unknown how many restoration projects are completed outside of CDFGs program, therefore the effects of these projects cannot be predicted. We also anticipate the amount of upslope restoration projects to increase. These projects often focus on identifying source problems in an area (i.e. roads) and apply corrective measures to eliminate or minimize the adverse effects to aquatic resources.

Agricultural activities

Agricultural activities including grazing, dairy farming, and the cultivation of crops.
The recent upward trend in value of dairy-related agricultural products (e.g., milk, cows and calves, pasture, hay, and silage) in Del Norte County, for example, is expected to continue as human populations continue to increase (U. S. Department of Agriculture 1998; G. Markegard, pers.

comm., January 29, 1999). As a result, the dairy industry near the project area is expected to persist. Impacts on water quality would be expected to be regulated under applicable laws. The impacts of this use on aquatic species is anticipated to be locally intense, but the longevity of the impact depends on the degree of grazing pressure on riparian vegetation, both from dairy and beef-cattle. Grasses, willows, and other woody species can recover quickly once grazing pressure is reduced or eliminated (Platts 1991) through fencing, seasonal rotations, and other measures. Assuming that appropriate measures are not taken to reduce grazing pressure, impacts to aquatic species are expected to increase with the predicted continuation or increase in grazing. Anticipated impacts include decreased bank stability, loss of shade- and cover-providing riparian vegetation, increased sediment inputs, and elevated coliform levels.

Residential development and operation of existing residential infrastructure

The current rate of human population growth in Del Norte County is expected to continue. Impacts on water quality related to residential infrastructure would be expected to be regulated under applicable laws.

Once development and associated infrastructure (roads, drainage, etc) are established, the impacts to aquatic species are expected to be permanent. Anticipated impacts to aquatic resources includes loss of riparian vegetation, changes to channel morphology and dynamics, altered watershed hydrology (increased storm runoff), increased sediment loading, and elevated water temperatures where shade-providing canopy is removed. The presence of structures and/or roads near waters may lead to the removal of LWD in order to protect those structures from flood impacts. The anticipated impacts to aquatic covered species from continued residential development are expected to be sustained and locally intense, but, given the predicted slow growth rate development within the action area, impacts are not expected to increase substantially over current levels.

Recreation, including hiking, camping, fishing, and hunting

Expected recreation impacts to salmonids include increased turbidity, impacts to water quality, barriers to movement, and changes to habitat structures. Streambanks, riparian vegetation, and spawning redds can be disturbed wherever human use is concentrated. Campgrounds can impair water quality by elevating coliform bacteria and nutrients in streams. Construction of summer dams to create swimming holes causes turbidity, destroys and degrades habitat, and blocks migration of juveniles between summer habitats. Impacts to salmonid habitat are expected to be localized, mild to moderate, and temporary. Fishing within the Action Area is expected to continue subject to the California Fish and Game Code. The level of take of coho salmon within the action area from angling is expected to remain at current levels.

Water withdrawals

An unknown number of permanent and temporary water withdrawal facilities exist within the action area. These include diversions for urban, agricultural, commercial, and residential use, along with temporary diversions, such as drafting for dust abatement. Due to the anticipated slow urban/residential growth, the number of diversions and amount of water diverted is expected to increase gradually within the action area. Impacts to salmonids are expected to include entrapment

and impingement of younger salmonid life stages, localized dewatering of reaches, and depleted flows necessary for migration, spawning, rearing, flushing of sediment from the spawning gravels, gravel recruitment, and transport of large woody debris. Water diversions are expected to be conducted under applicable laws, including the Act, California Fish and Game Code, and Clean Water Act.

Chemical use

It is anticipated that chemicals such as pesticides, herbicides, fertilizers, and fire retardants will continue to be used within the action area. Chemical application is under the jurisdiction of several Federal, state, and local agencies and their use is expected to be conducted under applicable laws.

VIII. INTEGRATION AND SYNTHESIS OF THE EFFECTS ON COHO SALMON AND CRITICAL HABITAT

The previous analyses focused on both the direct effects and indirect effects on coho salmon and their habitat in the action area for each river reach. This portion of the effects analysis summarizes this information and considers the overall effects on the population in the context of other activities occurring within the action area or influencing conditions within the action area (*Environmental Baseline and Cumulative Effects* sections).

Effects on SONCC coho salmon

The proposed actions will primarily influence juvenile coho salmon rearing in the action area. Our analysis suggests that rearing habitat along the Smith River will continue to be degraded as a result of the proposed actions. Coho salmon juveniles that rear in the lower Smith River will do so in simplified habitat where competitive pressures could be increased. Habitat partitioning between coho salmon and steelhead is especially important and could be decreased under the proposed actions. This will increase interspecific competition in habitats that favor steelhead over coho salmon because of morphological, behavioral, and ecological differences between these species. We think that tributaries support most of the coho salmon spawning population in the Smith River, but juvenile rearing capacity is limited in some cases, primarily because of habitat degradation as a result of past logging and road construction (e.g., Rowdy Creek). However, many of the other Smith River tributaries that support coho salmon are in relatively good condition with respect to properly functioning habitat conditions. We think that, without adequate rearing areas in the Smith River, populations in some tributaries with degraded habitat are unlikely to recover. Additional direct effects will incrementally increase the effects in intensively mined reaches. We expect juvenile coho salmon mortality to occur as the population adjusts to the limited resources available. Surviving smolts will likely enter the ocean at a smaller size due to these conditions and size-dependent mortality will occur as a result of this decreased fitness.

Since coho salmon utilize freshwater habitat for more than one year, they are especially susceptible to changes in habitat conditions. The Smith River coho salmon population is especially important to the survival and recovery of the ESU because it represents a significant portion of the ESU in terms of watershed area, species diversity, and population numbers. However, tributary populations are not expected to decline as a result of the proposed actions. Although some

degraded tributary populations are unlikely to recover without additional rearing habitat in the lower Smith River, most tributary populations are unlikely to be adversely affected by the proposed actions. Therefore, while the action is lkely to reduce the numbers of fish in the Smith River population, this reduction is not likely to reduce the local population's likelihood of survival or recovery. Our effects analysis suggests that the primary source of habitat decline due to the proposed actions stems from decreases in pool quantity and quality from skimming. Although we have limited reliable information regarding sustainable extraction volumes, we are concerned with the potential effects of extraction in excess of sediment recruitment under Granite's proposed action. Although incremental benefits could be achieved through more protective site-specific measures such as higher skim floors and avoiding skimming at already degraded sites, we conclude that extraction rates along a given reach are the dominant control on habitat quality.

Effects on SONCC coho salmon Critical Habitat

Designated critical habitat for SONCC coho salmon overlaps the action area of the proposed actions (May 5, 1999; 64 FR 24049). In designating critical habitat, NOAA Fisheries focuses on the known physical and biological features within the designated area that are essential to the conservation of the species. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation. Within the essential habitat types (spawning, rearing, migration corridors), essential features of coho salmon critical habitat include adequate: (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 (May 5, 1999; 64 FR 24049).

Critical habitat is further defined as the specific areas within the geographical areas occupied by the species, at the time it is listed, on which are found those physical and biological features essential to the conservation of the species and which may require special management considerations or protection, or specific areas outside the geographical area occupied by the species at the time it is listed when the Secretary determines that such areas are essential for the conservation of listed species. The ESA further defines conservation as "to use all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary." As a result, NOAA Fisheries approaches its "destruction and adverse modification determinations" by examining the effects of actions on the *conservation value* of the designated critical habitat; that is, the value of the critical habitat for the conservation of threatened or endangered species.

Implementation of the proposed actions will result in adverse effects to coho salmon rearing habitat, especially in the Smith River. Implementation of a similar proposed action during the 1997-2002 period similarly affected coho salmon habitat. The specific river reaches in the action areas that support coho salmon are especially important because much of the habitat outside these areas is degraded and less ecologically functional. The mainstem Smith River upstream of the action area is less viable for coho salmon, mainly because of a higher stream gradient. Additionally, all juvenile and adult coho salmon must spend at least some portion of their lives in the action area. Coho salmon population increase in the Smith River watershed is unlikely to be affected by the mining activities, except in degraded tributaries (e.g., Rowdy Creek). Given the adequate habitat conditions in many of the other Smith River tributaries that support coho salmon,

we do not expect that recovery of the Smith River portion of the SONCC coho salmon ESU to be impeded under the proposed actions. If habitat conditions in Smith River tributaries that support coho salmon were to decline further, than the importance of the lower mainstem Smith River would increase with respect to supporting the survival and recovery of the Smith River portion of the SONCC coho salmon ESU. Therefore, NOAA Fisheries has determined that the SONCC coho salmon critical habitat is not likely to be adversely modified.

IX. Conclusion

After reviewing the best available scientific and commercially available information, the current status of SONCC coho salmon and its designated critical habitat the environmental baseline for the action area, the effects of the proposed actions, and the cumulative effects, it is NOAA Fisheries biological opinion that gravel mining under LOP 2003-2 and Granite Construction's individual permit application for the next five years, as proposed, is not likely to jeopardize the continued existence of threatened SONCC coho salmon, and is not likely to adversely modify SONCC coho salmon designated critical habitat.

X. INCIDENTAL TAKE STATEMENT FOR THE LOP 2003-2 PROCEDURE

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. NOAA Fisheries further defines "harm" as an act that 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 defined as take that is incidental to, but is not the purpose of, the 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

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 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 the LOP 2003-2 procedure, 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 the LOP 2003-2 procedure 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. NOAA Fisheries expects that physical habitat impacts will be consistent with the areas described as lower Sultan, Simpco, Saxton, Woodruff, Crockett, Tedsen, and Reservation Ranch bars on the Smith River, Lower Rowdy Creek and Maris pits on Rowdy Creek, and Blake's Bar on the Klamath River (Table 7); compliant with the terms and conditions of LOP 2003-2 and this incidental take statement, and; within the expected effects of gravel mining operations as described in this opinion, including upstream and downstream effects.

Table 7. Gravel bar sites are listed from the most upstream site to the most downstream site, and are not necessarily contiguous.

Stream	Gravel Bar Site Name
Smith River	Lower Sultan Bar
	Simpco Bar
	Saxton Bar
	Woodruff Bar
	Crockett Bar
	Tedsen Bar
	Reservation Ranch Bar
Rowdy Creek	Maris Pit
	Lower Rowdy Creek
Klamath River	Blake's Bar

Anticipated incidental take will be exceeded if gravel mining operations extend beyond the areas described in the action area, are not in compliance with the applicable project design features of LOP 2003-2, 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 Opinion.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to SONCC coho salmon.

C. Reasonable and Prudent Measures

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon.

The Corps shall:

1. Ensure that the pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.
2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 2003-2 procedure.
3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps, and its permittees, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting requirements. These terms and conditions are non-discretionary.

RPM 1. Ensure that the annual pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.

a. All projects authorized under LOP 2003-2 must undergo annual hydrologic and geomorphic review, with associated recommendations, provided by CDFG, NOAA Fisheries, and the Del Norte County hydrologist. Copies of all pre- and post-extraction information, including cross sections, aerial photos, and other information shall be provided to NOAA Fisheries. In addition, mutually agreeable dates shall be scheduled between the Corps and NOAA Fisheries for site reviews.

b. Vertical rather than oblique air photos shall be provided to NOAA Fisheries for the spring pre-extraction planning process for our review.

RPM 2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of the LOP 2003-2 procedure.

a. No extraction shall exceed annual replenishment, unless agreed to by NOAA Fisheries. Annual replenishment shall be determined by cross-section analysis.

b. "Redline" standards shall be established to minimize potential for channel degradation as a result of over-extraction. These redlines should coincide with the riffle crest elevation(s) adjacent to and downstream of the bar as measured during the 2003 summer. Any decrease in elevation of six inches or more will result in a cessation of mining at the site until such time that the alluvial structure is recovered, as determined by the Corps, in consultation with NOAA Fisheries. Mining may be allowed if NOAA Fisheries and the Corps determine that riffle crest degradation resulted from factors other than gravel extraction.

c. The minimum skim floor elevation for the Smith River shall be approximately equivalent to the historic average annual daily flow of 3500 CFS. This flow, on average, occurs approximately five times per year. The 35% exceedence flow is slightly less at 2900 CFS. This requirement may be phased-in during 2003, the first year of implementation. The top of the silt band, where available, may be used to set the minimum skim floor elevation as a surrogate for the elevation of the average flow in 2003. Further, the top of the silt band, if available, shall be surveyed at each site as part of the monitoring and extraction cross-sections in order to assess its applicability. Where the top of the silt band is unavailable, a two-foot vertical offset from the summer low flow may be used to set the minimum skim floor elevation. The top of the silt band shall be measured at the Highway 101 gauge, as it forms, with both flow and stage height recorded during formation of the silt band. This will assist NOAA Fisheries in its assessment of using the top of the silt band as a surrogate for the water surface elevation that corresponds to the annual average flow.

d. In order to minimize the impacts to juvenile salmonids from wetland pits, cover must be provided at the edges of the wetland pit by vegetation, and by placing woody debris within the pit. The vegetative cover at the edges of the wetland pit may be natural and/or planted. The pre-extraction mining plan shall describe the cover that is, or will be, associated with the excavated wetland pit. In addition, the calculated flow inundation frequency of the surface that the wetland pit is located on shall be provided as part of the pre-extraction mining plan.

e. In order to minimize the impacts to salmonids from trenches, vegetative cover must be provided within the trench in the form of placing woody debris within the excavated trench. The pre-extraction mining plan shall describe the cover that will be associated with the trench.

f. Minimize the amount of time heavy equipment is in the wetted low-flow channel by limiting the number of heavy equipment crossings per each temporary channel crossing installation and removal. A maximum of two crossings per installation or removal shall be allowed, although one crossing where possible is preferred.

g. In order to minimize the turbidity associated with temporary channel crossing use, all wet excavated sediment must be stockpiled on the gravel bar away from the low flow channel and allowed to drain prior to hauling across the temporary channel crossing.

h. The ITS shall be attached to all Letters of Modification issued under LOP 2003-2 procedure to aid in compliance with terms and conditions by the applicants.

i. Prior approval must be granted by NOAA Fisheries for extensions to the June 1-October 15 season for gravel extraction operations.

j. Culvert requests and information describing the need for culverts must be provided to NOAA Fisheries for review and approval of salmonid impact minimization measures, and that culverts allow upstream and downstream fish passage for all life history stages.

k. NOAA Fisheries shall review and approve requests for potential fisheries enhancement projects before being authorized by the Corps.

l. Educational signing regarding the importance of LWD for salmonids shall 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 shall be gated and locked to reduce access.

RPM 3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

a. The Corps, the applicants, and NOAA Fisheries will develop an extraction reach-specific monitoring plan by September 15, 2003, which will replace the anadromous fish monitoring requirements of the LOP 2003-2 procedure. Final approval of the monitoring plan will be granted by NOAA Fisheries prior to implementation.

b. The Corps, the applicants, and NOAA Fisheries will develop a data form for applicants to consistently report cross-sectional and other survey information by September 15, 2003. Final approval of the data form will be granted by NOAA Fisheries prior to implementation. Additionally, NOAA Fisheries shall receive copies of all electronic cross sections.

c. Ensure that all required monitoring is completed and that monitoring reports are provided to NOAA Fisheries each year prior to December 31. Reports shall be submitted to:

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

XI. CONSERVATION RECOMMENDATION FOR LOP 2003-2

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.

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

1. Coordination should occur between the Corps, the Del Norte County hydrologist, other regulatory agencies, and NOAA Fisheries. The Corps should establish a procedure for reviewing pre-and post-extraction information, monitoring reports, and mining plans by all of the parties responsible for regulating gravel mining.

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

XII. INCIDENTAL TAKE STATEMENT FOR GRANITE CONSTRUCTION

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. NOAA Fisheries further defines "harm" as an act that 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 defined as take that is incidental to, but is not the purpose of, the 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

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 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 Granite Construction's Smith River gravel mining operations at Huffman and upper Sultan bars 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 Granite's proposed action 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. NOAA Fisheries expects that physical habitat impacts will be consistent with

the areas described as Huffman and upper Sultan bars on the Smith River, compliant with the terms and conditions of Granite's individual permit application and this incidental take statement, and within the expected effects of gravel mining operations as described in this opinion, including upstream and downstream effects..

Anticipated incidental take will be exceeded if gravel mining operations extend beyond the areas described in the action area, are not in compliance with the applicable project design features of Granite's individual permit application and this incidental take statement, and within the expected effects described in the Opinion.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to SONCC coho salmon.

C. Reasonable and Prudent Measures

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon.

The Corps shall:

1. Ensure that the pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.
2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of Granite Construction's permit.
3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps and Granite Construction must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting requirements. These terms and conditions are non-discretionary.

RPM 1. Ensure that the annual pre-extraction planning process minimizes adverse effects to listed species and designated critical habitat.

a. Granite's annual projects must undergo annual hydrologic and geomorphic review, with associated recommendations, provided by CDFG, NOAA Fisheries, and the Del Norte County hydrologist.

b. Copies of all pre- and post-extraction information, including cross sections, aerial photos, and other information shall be provided to NOAA Fisheries. In addition, a mutually agreeable date shall be scheduled between the Corps and NOAA Fisheries for site reviews.

c. Vertical rather than oblique air photos shall be provided to NOAA Fisheries for the spring pre-extraction planning process for our review.

RPM 2. Ensure that measures that minimize adverse effects to listed species and designated critical habitat are implemented as part of Granite Construction's permit.

a. "Redline" standards shall be established to minimize potential for channel degradation as a result of over-extraction. These redlines should coincide with the riffle crest elevation(s) adjacent to and downstream of the bar as measured during the 2003 summer. Any decrease in elevation of six inches or more will result in a cessation of mining at the site until such time that the alluvial structure is recovered, as determined by the Corps, in consultation with NOAA Fisheries. Mining may be allowed if NOAA Fisheries and the Corps determine that riffle crest degradation resulted from factors other than gravel extraction.

b. The minimum skim floor elevation for Huffman and upper Sultan bars shall be approximately equivalent to the historic average annual daily flow of 3500 CFS. This flow, on average, occurs approximately five times per year. This requirement may be phased-in during 2003, the first year of implementation. The top of the silt band, where available, may be used to set the minimum skim floor elevation as a surrogate for the elevation of the average flow in 2003. Further, the top of the silt band, if available, shall be surveyed at each site as part of the monitoring and extraction cross-sections in order to assess its applicability. Where the top of the silt band is unavailable, a two-foot vertical offset from the summer low flow may be used to set the minimum skim floor elevation.

c. In order to minimize the impacts to salmonids from trenches, vegetative cover must be provided within the trench in the form of placing woody debris within the excavated trench. The pre-extraction mining plan shall describe the cover that will be associated with the trench.

d. The vegetation management project for Huffman Bar, as proposed, shall be modified in consultation with NOAA Fisheries.

e. In order to minimize the turbidity associated with temporary channel crossing use, all wet excavated sediment must be stockpiled on the gravel bar away from the low flow channel and allowed to drain prior to hauling across the temporary channel crossing.

f. The mining season for Granite construction shall be limited to the June 1 through October 15 period. Prior approval must be granted by NOAA Fisheries for extensions to the June 1-October 15 season for gravel extraction operations.

g. Culvert requests and information describing the need for culverts must be provided to NOAA Fisheries for review and approval of salmonid impact minimization measures, and that culverts allow upstream and downstream fish passage for all life history stages.

h. NOAA Fisheries shall review and approve requests for potential fisheries enhancement projects before being authorized by the Corps.

i. In order to protect LWD deposited on mined gravel bars, all access roads owned or controlled by Granite Construiction shall be gated and locked to reduce vehicle access.

j. A minimum slope of 2% towards the low-flow channel shall be used as final grade for skimming operations on Huffman and Sultan bars.

k. No extraction shall take place on the head-of-bar buffer defined as that portion of the upstream extent of the bar that comprises 1/3rd of the total length of the bar.

RPM 3. Ensure that the monitoring necessary to track changes to salmonid habitat quality and quantity in the vicinity of gravel extraction sites is implemented.

a. The Corps, Granite Construction, and NOAA Fisheries will develop an extraction reach-specific monitoring plan by September 15, 2003, which will replace the anadromous fish monitoring requirements proposed by Granite. Final approval of the monitoring plan will be granted by NOAA Fisheries prior to implementation.

b. The Corps, the applicants, and NOAA Fisheries will develop a data form for Granite Construction to consistently report cross-sectional and other survey information by September 15, 2003. Final approval of the data form will be granted by NOAA Fisheries prior to implementation. Additionally, NOAA Fisheries shall receive copies of all electronic cross sections.

c. The top of the silt band shall be measured at the Highway 101 gauge, as it forms, with both flow and stage height recorded during formation of the silt band. This will assist NOAA Fisheries in its assessment of using the top of the silt band as a surrogate for the water surface elevation that corresponds to the annual average flow.

d. Ensure that all required monitoring is completed and that monitoring reports are provided to NOAA Fisheries each year prior to December 31. Reports shall be submitted to:

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

XII. CONSERVATION RECOMMENDATION FOR GRANITE CONSTRUCTION

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.

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

1. Coordination should occur between the Corps, the Del Norte County hydrologist, other regulatory agencies, and NOAA Fisheries. The Corps should establish a procedure for reviewing Granite's pre-and post-extraction information, monitoring reports, and mining plans by all of the parties responsible for regulating gravel mining.

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

XIII. REINITITATION OF CONSULTATION FOR LOP 2003-2

This concludes formal consultation on the actions and processes described in the LOP 2003-2 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.

XIV. REINITIATION OF CONSULTATION FOR GRANITE CONSTRUCTION

This concludes formal consultation on the actions and processes described in Granite Construction's individual permit. 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.

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Enclosure 2

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set forth new mandates for the National Marine Fisheries Service (NOAA Fisheries), regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NOAA Fisheries, are required to delineate Aessential fish habitat@ (EFH) in fishery management plans (FMPs) or FMP amendments for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NOAA Fisheries regarding potential adverse effects of their actions on EFH, and respond in writing to NOAA Fisheries= conservation recommendations. In addition, NOAA Fisheries is required to comment on any state agency activities that would impact EFH. Although the concept of EFH is similar to that of ACritical Habitat@ under the Endangered Species Act, measures recommended to protect EFH are advisory, not proscriptive.

The Pacific Fisheries Management Council has delineated EFH for Pacific Coast Salmon (PFMC 1999). Species from the above Fisheries Management Plan (FMP) occur within the action area of the preceding biological opinion and require EFH consultation.

Identification of Essential Fish Habitat

Essential fish habitat (EFH) is defined in the MSFCMA as A...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity...@. NOAA Fisheries regulations further define Awaters@ to 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; Asubstrate@ to include sediment, hard bottom, structures underlying the waters, and associated biological communities; Anecessary@ to mean the habitat required to support a sustainable fishery and the managed species= contribution to a healthy ecosystem; and Aspawning, breeding, feeding, or growth to maturity@ to cover a species= full life cycle.

Proposed Actions

The Proposed Actions are detailed in the *Description of the Proposed Action* section of the biological opinion (Attachment 1). One of the Proposed Actions involves the authorization of gravel mining in Del Norte County through a Letter of Permission Procedure (LOP). As described in the proposed LOP 2003-2, the purpose of the LOP procedure is to streamline Section 404 of the Clean Water Act (33 U.S.C. ' 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. ' 403) authorization of gravel excavation and related work in waters of

the United States within Del Norte County, California, that would not pose substantial individual or cumulative adverse impacts to the aquatic environment. In addition, we have batched the LOP consultation with a consultation on an individual permit application for Granite Construction's gravel mining on two bars on the Smith River. The waters of Del Norte County covered under this consultation include the Smith River, Rowdy Creek, and the Klamath River which are part of the designated EFH for Chinook *(Oncorhynchus tshawytscha)* and coho *(Oncorhynchus kisutch)* salmon.

Effects of the Proposed Action

As described above in the *Effects of the Action* section of the accompanying biological opinion, the Proposed Action is likely to adversely affect designated critical habitat for SONCC coho, and will similarly affect Chinook salmon habitat. Therefore, the Proposed Action will also result in impacts to EFH for coho and Chinook salmon. Impacts to habitat for Chinook salmon are expected to occur in the same manner, and from the same project elements, as determined above in the *Effects of the Action* section of the biological opinion. However, some short-term impacts such as elevated turbidity could have greater effects on adult Chinook salmon than on adult coho salmon due to the expected arrival of Chinook salmon in the action area as early as August (i.e., during the work period). In addition, Chinook salmon spawning occurs in the action area, primarily in Rowdy Creek and the Smith River, which may result in more effects to Chinook salmon from redd scour caused by gravel mining changes to the sediment deposition/scour regime. We believe some of the terms and conditions required to minimize effects to coho salmon will protect Chinook salmon spawning. However, instream trenching has the potential to increase scour of Chinook salmon redds.

Conclusion

NOAA Fisheries believes that the Proposed Action may adversely affect designated EFH for Chinook and coho salmon.

EFH Conservation Recommendations

NOAA Fisheries recommends that the Terms and Conditions of the Incidental Take Statement of the biological opinion, be adopted. In addition, instream trenching in the Smith River should be restricted to areas downstream of the Simpco Bar.

Should these EFH conservation recommendations be adopted, potential adverse impacts to EFH would be minimized.

Statutory Requirements

The Magnuson-Stevens Act and Federal regulations (50 CFR Section 600.920) to implement the EFH provisions require Federal action agencies to provide a written response to EFH Conservation Recommendations within 30 days of receipt. The final response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity.

If the response is inconsistent with the EFH Conservation Recommendations, an explanation of the reasons for not implementing them must be included.

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State of California
The Resources Agency
Department of Fish and Game

RECOVERY STRATEGY FOR CALIFORNIA COHO SALMON

Report to the California Fish and Game Commission

Prepared by
The California Department of Fish and Game

Species Recovery Plan Report 2003-1

August 2003

EXHIBIT NO. 7
APPLICATION NO.
1-03-039
EXCERPT, *RECOVERY STRATEGY* FOR CALIFORNIA COHO SALMON *– REPORT TO THE CALIFORNIA FISH & GAME COMMISSION*, CAL. DEPT. OF FISH & GAME, AUGUST, 2003 (1 of 18)

Executive Summary

On August 30, 2002, the California Fish and Game Commission (Commission) found that coho salmon (*Oncorhynchus kisutch*) warranted listing as an endangered species under the California Endangered Species Act (CESA) from San Francisco north to Punta Gorda and as a threatened species from Punta Gorda to the California-Oregon border. The division of coho salmon in California follows the federal designation of Evolutionary Significant Units (ESU); the California Central Coast (CCC) Coho ESU and the Southern Oregon-Northern Coastal California (SONCC) Coho ESU. Rather than proceeding immediately with regulatory action, the Commission, pursuant to Fish and Game Code (FGC) section 2114, directed the Department of Fish and Game (Department) to prepare a recovery strategy for coho salmon within 12 months (pursuant to FGC §2105 et seq.)

The Department issued a report to the Commission describing the status of coho salmon north of San Francisco Bay. Available information indicates that coho salmon from San Francisco Bay to the Oregon border have experienced a significant decline in the past 40 to 50 years. Coho salmon abundance, including hatchery stocks, is currently 6 to 15% of their abundance during the 1940s. Coho salmon harvest decreased considerably in the late 1970s, despite a fairly stable rate of hatchery production. Recent abundance-trend information for several stream systems along the central and north coasts indicate an overall declining trend throughout California.

In accordance with the Comimission's direction, the Department established a 21-member California Statewide Coho Salmon Recovery Team (CRT) and a 12-member local coho salmon recovery team (SSRT) focusing on agricultural water and land uses in the Shasta and Scott river valleys. Both teams brought together people with various concerns and perspectives. The two teams aided the Department in development of a single strategy to recover coho salmon throughout its range in California.

The fundamental and statutorily required goal of this recovery strategy is to return coho salmon to level of sustained viability while protecting the genetic integrity of both ESUs, such that regulations or other protections under the California Endangered Species Act (FGC §2050 et seq.) are not necessary. The Department defines sustained viability as a future condition when naturally producing coho salmon are sufficient in abundance and in sufficient range and distribution to ensure

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against extinction due to environmental fluctuation, stochastic events, and human land use impacts while allowing for incidental mortality of coho salmon and coho salmon by-catch associated with well-regulated ocean and recreation fisheries for other species of anadromous salmonids.

The recovery strategy has an additional goal to achieve harvestable populations of coho for tribal, recreational, and commercial fisheries.

GEOGRAPHIC SETTING

Coho salmon occur naturally in the northern Pacific Ocean and tributary drainages. It ranges in freshwater drainages from Hokkaido, Japan, and eastern Russia, around the Bering Sea and Aleutian Islands to mainland Alaska, and south along the North American coast to Monterey Bay, California. Within California, coho salmon historically ranged from the Oregon-California border, including the Winchuck and Illinois River watersheds, south to the streams of northern Monterey Bay, including small tributaries to San Francisco Bay.

Two coho salmon ESUs occur partially or entirely within California. The California portion of the SONCC ESU occurs in twelve California watersheds from Punta Gorda north to the Oregon border. The CCC ESU occurs entirely in six watersheds from Santa Cruz north to Punta Gorda.

RECOVERY GOALS

To achieve the fundamental and statutorily required goal of the recovery strategy, coho salmon must first reach the point where the regulations or other protections for coho salmon listed under CESA are not necessary, and the species may be delisted. The CRT requested, and the Department agreed, to an additional goal of restoring tribal, recreational, and commercial coho salmon fisheries in California (restoring fisheries). Improving coho salmon populations and habitat is the means to achieve these two objectives.

Five criteria have been identified to achieve delisting:

I. Maintain and protect the number and size of key populations of coho salmon.

II. Maintain and increase the number of spawning adults and maximize freshwater and estuary survival of juveniles in basins to a level that reduces the probability of extinction to an insignificant level.

III. Maintain and increase the range and distribution of coho salmon to a level that reduces the probability of extinction of an ESU to an insignificant level.

IV. Maintain and protect habitat essential for coho salmon.

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V. Maintain, improve, and restore coho salmon habitat to a level that reduces the probability of extinction to an insignificant level.

An additional criterion has been identified for the second objective:

VI. Reach and maintain coho salmon population levels to allow for the resumption of tribal recreational, and commercial fisheries for coho salmon in California.

RECOVERY IMPLEMENTATION

The causes for the decline of coho salmon are many and complex. On the whole, the strategy for recovery of coho salmon involves:

a. Interim and long-term actions;

b. Equitable apportionment of both public and private support and action;

c. Equitable apportionment of regulatory and nonregulatory obligations;

d. Scientifically, technologically, and economically reasonable means;

e. Best available scientific data;

f. Financial investments; and

g. Long-term commitment and efforts of all involved in coho watersheds.

With the aid of the CRT, the Department developed a recovery strategy that will be implemented at two geographic levels. The first level is a larger, range-wide resolution. The recovery strategy identifies recommendations for range-wide issues. The second level is within each watershed. The recovery strategy identifies recommendations that apply to specific watersheds. These two levels allow for acting on recommendations that are more universal in their application and for taking specific actions intended for issues specific to a watershed. In line with this second course, the Department established the Shasta-Scott Pilot Program (SSP), a unique endeavor within the Shasta and Scott watersheds were coho salmon occur. The SSP contains a detailed analysis of agricultural water and land use issues in the Shasta and Scott valleys and a detailed set of recommendations in reference to such uses for recovery. Non-agricultural water and land use issues are addressed in the statewide recommendations and/or watershed-specific recommendations for the Shasta and Scott watersheds.

Several central elements underlie all levels of implementation. Those elements include: coho salmon population and habitat protection and restoration; cooperation and collaboration between public and private entities; education and outreach; implementation and enforcement of existing laws; and improved land management.

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TABLE 3-5: Major dams within the Central California Coast Coho ESU that block coho salmon from accessing historical spawning and rearing habitat

NAME OF DAM	LOCATION	UPSTREAM HABITAT BLOCKED	PERCENT OF BASIN
Peters Dam	Lagunitas Creek, approximately 14 miles upstream from the Pacific Ocean, forming Kent Lake in Marin County	8 miles	6%
Nicasio Dam	Nicasio Creek, (tributary to Lagunitas Creek), approximately 8 miles upstream from the Pacific Ocean, forming Nicasio Reservoir in Marin County	5 miles	10%
Warm Springs Dam	Dry Creek (tributary to the Russian River), approximately 45 miles upstream from the Pacific Ocean, forming Sonoma Lake in Sonoma County	50 miles	9%
Coyote Dam	Russian River, approximately 95 miles upstream from the Pacific Ocean, forming Lake Mendocino in Mendocino County	36 miles	7%

3.6.5 GRAVEL EXTRACTION

Instream mining (the removal of sediment from the active channel) has various impacts on salmonid habitat by interrupting sediment transport and often causing channel incision and degradation (Kondolf 1993). The impacts that can result from instream mining include: direct mortality; loss of spawning habitat; noise disturbance; disruption of adult and juvenile migration and holding patterns; stranding of adults and juveniles; increases in water temperature and turbidity; degradation of juvenile rearing habitat; destruction or sedimentation of redds; increased channel instability and loss of natural channel geometry; bed coarsening; lowering of local groundwater level; and loss of LWD and riparian vegetation (Humboldt County Public Works 1992; Kondolf 1993; Jager 1994; Halligan 1997). Terrace mining (the removal of aggregate from pits isolated from the active channel) may have similar impacts on salmonids if a flood causes the channel to move into the gravel pits.

While instream gravel extraction has had direct, indirect, and cumulative impacts on salmonids in the recent past, no direct impacts to coho salmon have been documented under the current (post-1995) mining monitoring and reporting standards developed by the Department and the mining industry which were incorporated into: County Conditional Use Permits; State Mining and Reclamation Act (SMARA) required Reclamation Plans; and U.S. Army Corps of Engineer (USACE) Letters of Permission. Many rivers continue to suffer the effects of years of channel degradation from the millions of tons of aggregate removed from the systems over time (Collins and Dune 1990).

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FIGURE 7-3: Winchuck River and Smith River Hydrologic Units

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7.2.1.1 Illinois River HSA (Priority Map Values: 5-3-4-5)

A very small portion of the Illinois River HSA is located in eastern Del Norte County, California. The main drainages of the Illinois River HSA in California are Elk Creek, the East Fork Illinois River, and Dunn Creek. Portions of these drainages are in the Siskiyou National Forest, and the rest is in private ownership. Timber production is among the main land use activities. Coho salmon have been found in the above-listed drainages as well as a few of their main tributaries in recent Department surveys. Problems for coho salmon recovery in these drainages include inadequate pool structure due to insufficient existing and recruitable conifer LWD and excessive fine sediment.

Recommendations for the Illinois River HSA are:

RO-IR-01 Develop a long-term plan to promote retention of LWD.

RO-IR-02 Support continued control of sediment.

RO-IR-03 Monitor impacts of suction dredge activities.

RO-IR-04 Develop a cooperative management strategy with Oregon Dept. Fish and Wildlife to improve downstream habitat conditions.

7.2.1.2 Winchuck River Hydrologic Unit / Winchuck River HSA (Priority Map Values: 5-5-5-5)

The South Fork Winchuck River is the only portion of the Winchuck River HSA located in California. The primary land use in the South Fork drainage is industrial timber production. Coho salmon have been found in the South Fork in recent Department surveys. Potential problems for coho salmon recovery in this river include inadequate pool structure due to insufficient existing and recruitable conifer LWD and excessive fine sediment.

Recommendations for the South Fork Winchuck River are:

WR-SF-01 Develop a short-term plan to increase LWD until natural recruitment can be restored.

WR-SF-02 Develop a long-term plan to restore a mature coniferous riparian zone to South Fork Winchuck River.

WR-SF-03 Support the assessment, prioritization, and treatment of sources of sediment.

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7.2.2 SMITH RIVER HYDROLOGIC UNIT

The Smith River (Figure 7-3) is California's fourth largest coastal river, with a watershed of approximately 390,400 acres (610 mi^2) in California, and 73,600 acres (115 mi^2) in Oregon. At its terminus, the Smith River flows through an agriculturally developed coastal plain, and enters the Pacific Ocean four miles south of the Oregon border. The mainstem Smith River is fed by three forks, the North, South, and Middle. The Smith River estuary is an important rearing habitat for juvenile salmonids. The precipitous upper canyon areas are forested in fir, spruce, cedar, and pine with groves of tall redwoods in Redwood National and State Parks. Second and third growth trees, most often planted after harvest, inhabit the majority of merchantable timberlands in the basin. A large portion of the Smith River watershed supports a unique flora, which exists on unusual soils derived from ultramafic parent materials.

The main industries in the basin today are timber production, agriculture, sport fishing, gravel extraction, tourism, and other recreational activities. Agricultural industries within the basin include lily and flower production, beef and dairy ranching and some hay production. The majority of agricultural activities in the Smith River basin occur on the Smith River Plain along the lower seven miles of the river. Aggregate extraction in the Smith River basin occurs near the mouth of Sultan Creek downriver to the Reservation Ranch Bar.

Historically, salmon were very abundant in the rivers and streams of the Pacific Northwest and the Smith River was no exception. In the late 19th and early years of the 20th century, runs of salmon in the Smith River sustained the operation of a cannery near its mouth. Some cannery records dating from the 1890's documented the processing of 50 tons of salmon per year (Bartson 1997). Coho salmon are currently found throughout the HU, although their numbers are typically small. Preliminary Smith River results from the 2002 Department presence/absence surveys of streams historically inhabited by coho salmon (Brown and Moyle 1991) shows a percentage increase in coho salmon presence over the previous year's data (79%-82%).

Problems facing anadromous salmonids in the Smith River include amount of available habitat, degraded condition of riparian vegetation, poor LWD recruitment, altered estuarine environment, excess sediment, compacted stream gravels, and fish passage.

7.2.2.1 Recommendations for the Smith River HU

SM-HU-01 Develop and implement a program to control exotic vegetation, particularly canary grass, which impedes access to and use of tributaries by coho salmon.

10 Implementation

Several hundred statewide and watershed-specific recommendations for recovering coho salmon in California are listed in Chapter 6 (Range-wide Recommendations), Chapter 7 (Watershed Recommendations), and Chapter 8 (Shasta-Scott Pilot Program). To successfully implement these recommendations, watersheds within the coho salmon range should be prioritized. In addition, several elements must be identified for each task: a) level of priority; b) responsible party(ies) or organization(s); c) estimated initiation and duration of implementation; and d) estimated cost. These topics are covered in this chapter, to the extent that the information is available.

As described in Chapter 7, this recovery strategy mainly uses two watershed designations from the CALWATER 2.2a system (Appendix E), the *hydrologic unit* (HU), which generally corresponds to major watersheds or sub-regions, and within each HU by *hydrologic subarea* (HSA), which generally corresponds to major tributary watersheds. In a few cases, the *hydrologic area* (HA), a unit intermdiate in scale between the HU and the HAS, is used. For purposes of implementation priorities, rankings were only developed at the HSA level.

10.1 PRIORITIZATION OF WATERSHEDS

The recovery strategy incorporates a three-tiered process to prioritize watersheds for coho salmon recovery. This approach: 1) identifies for maintenance and recovery those watersheds supporting the best coho salmon populations in California and identifies those coho salmon populations that are currently at risk of extinction; 2) provides a ranking system for guiding recovery planning actions among watersheds; and 3) identifies those watersheds having barriers to migration that could be corrected with ease, relative to other solutions. This process was developed from a review of data available for coho salmon and their watersheds throughout California, as well as discussions with the CRT. The maps below are intended to guide recovery-planning actions. Appendix F describes how the maps were developed and defines terms used in the following discussion. *The maps, and criteria used to develop them,*

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should be considered general guidelines for watershed recovery planning and restoration actions rather than absolute.[1]

10.1.1 GENERAL PRINCIPLES

In HSAs considered refugia for coho salmon, the recovery strategy will include actions that preserve, protect, and enhance these best remaining populations and their habitats. These HSAs, identified on Figure 10-1 (Consistent presence of coho salmon in the SONCC ESU) and Figure 10-2 (Consistent presence of coho salmon in the CCC ESU), are top priorities for Department resources and other resources available for habitat restoration.

Each population of coho salmon potentially represents unique genetic and life history attributes. Some populations of coho salmon are at greater risk of extinction than others, particularly those in the central coast of California. Identifying these populations will enable resource managers and others to guide actions to avoid extinction and begin recovery. HSAs in which populations of coho salmon are at risk of extinction, identified in Figure 10-3 (SONCC ESU) and Figure 10-4 (CCC ESU), will receive special consideration for maintenance and recovery actions.

Ranking of HSAs relative to their potential for coho salmon recovery is intended to guide recovery strategy actions that may improve habitat within these watersheds. This ranking incorporated information on coho salmon populations, HSA condition, and risks to salmon within these HSAs. HSAs scoring higher in this ranking should be given priority in the expenditure resources or resources available for restoration, other considerations being equal. HSA rankings for maintenance and recovery actions are presented for the SONCC ESU (Figure 10-5) and the CCC ESU (10-6).

Recovery strategy actions in HSAs with barriers to migration will include providing passage for both juvenile and adult coho salmon. The distribution of barriers is illustrated in Figure 10-7 (Disconnected habitats in the SONCC ESU) and Figure10-8 (Disconnected habitats in the CCC ESU). These HSAs should be viewed as cost-effective opportunities to provide increased habitat, relative to other recovery strategy actions.

The databases used to generate the maps and support this prioritization should be updated periodically, perhaps at 3- to 5-year intervals. This would allow review and modification, if warranted, of the HSA rankings.

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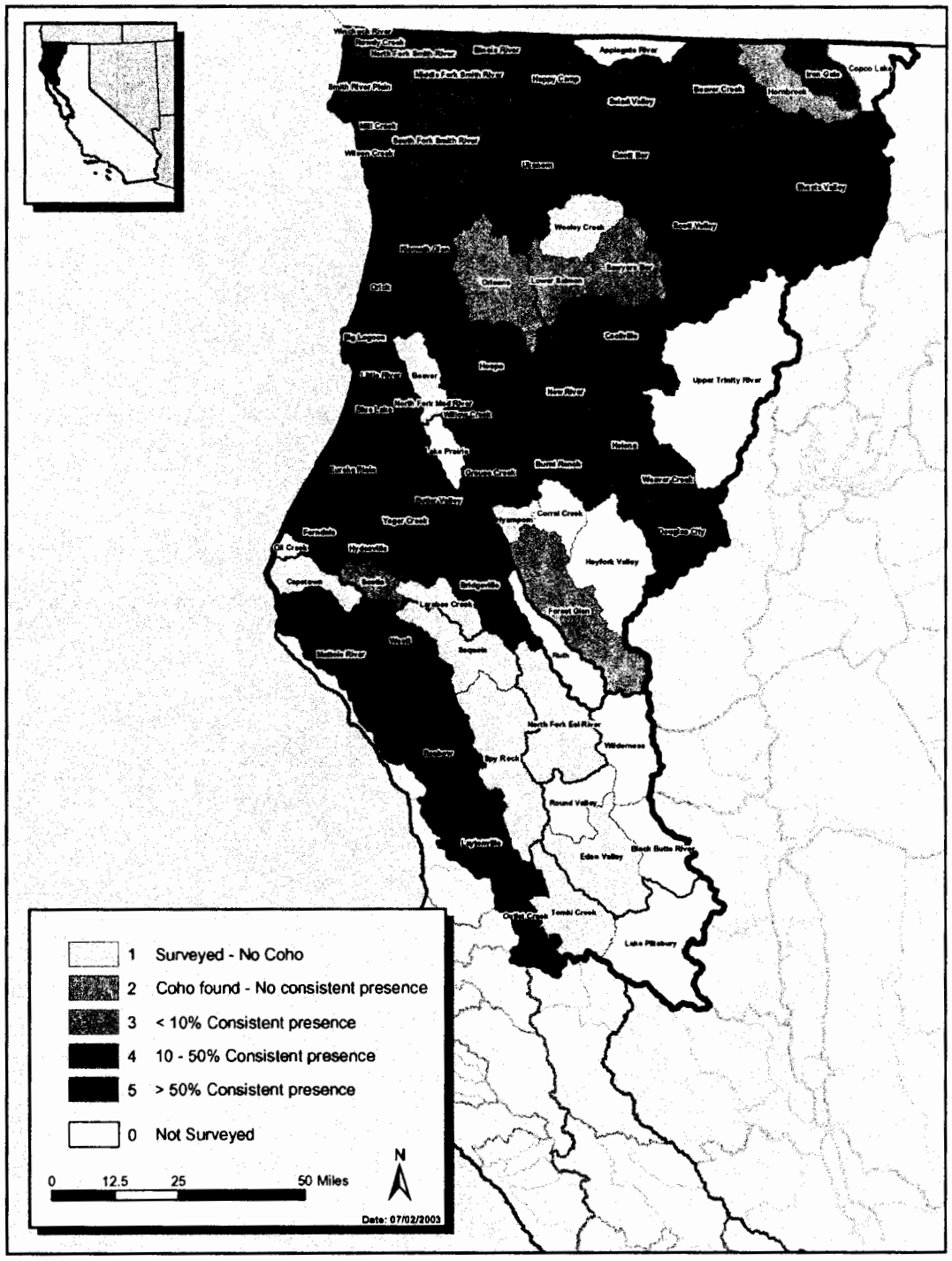
[1] Some situations may over-ride or alter recommended priorities. Examples include, but are not limited to, willing landowners, high cost-shares, unique funding opportunities or partnerships, multi-species projects, etc. Cost effectiveness must be considered regardless of priorities.

FIGURE 10-1: Consistent presence of coho salmon in the SONCC ESU



Note: Refugia watersheds have consistent presence >50%.

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FIGURE 10-3: Risk of extinction in watersheds of the SONCC ESU

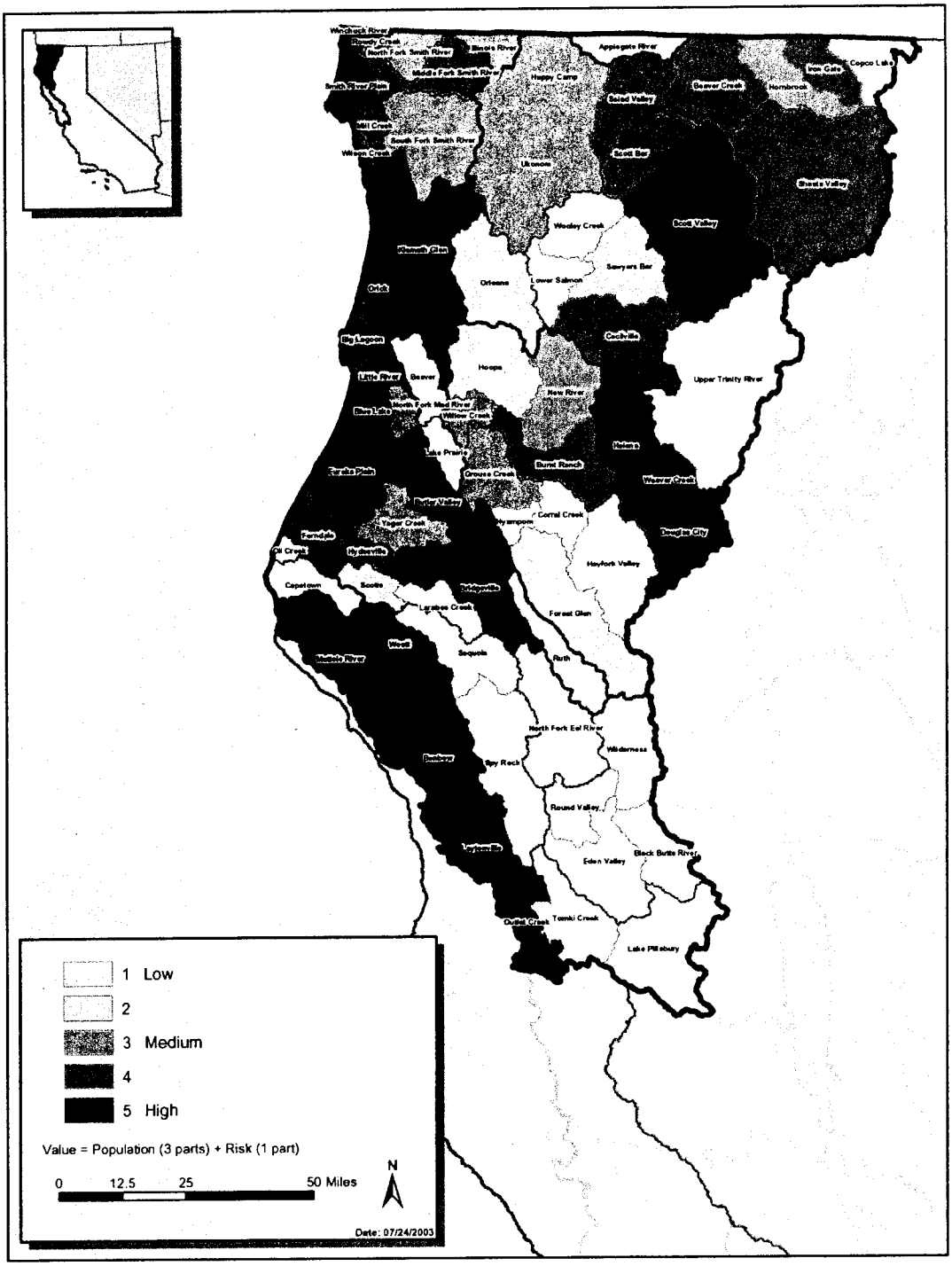

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FIGURE 10-5: Restoration and management potential in the SONCC ESU

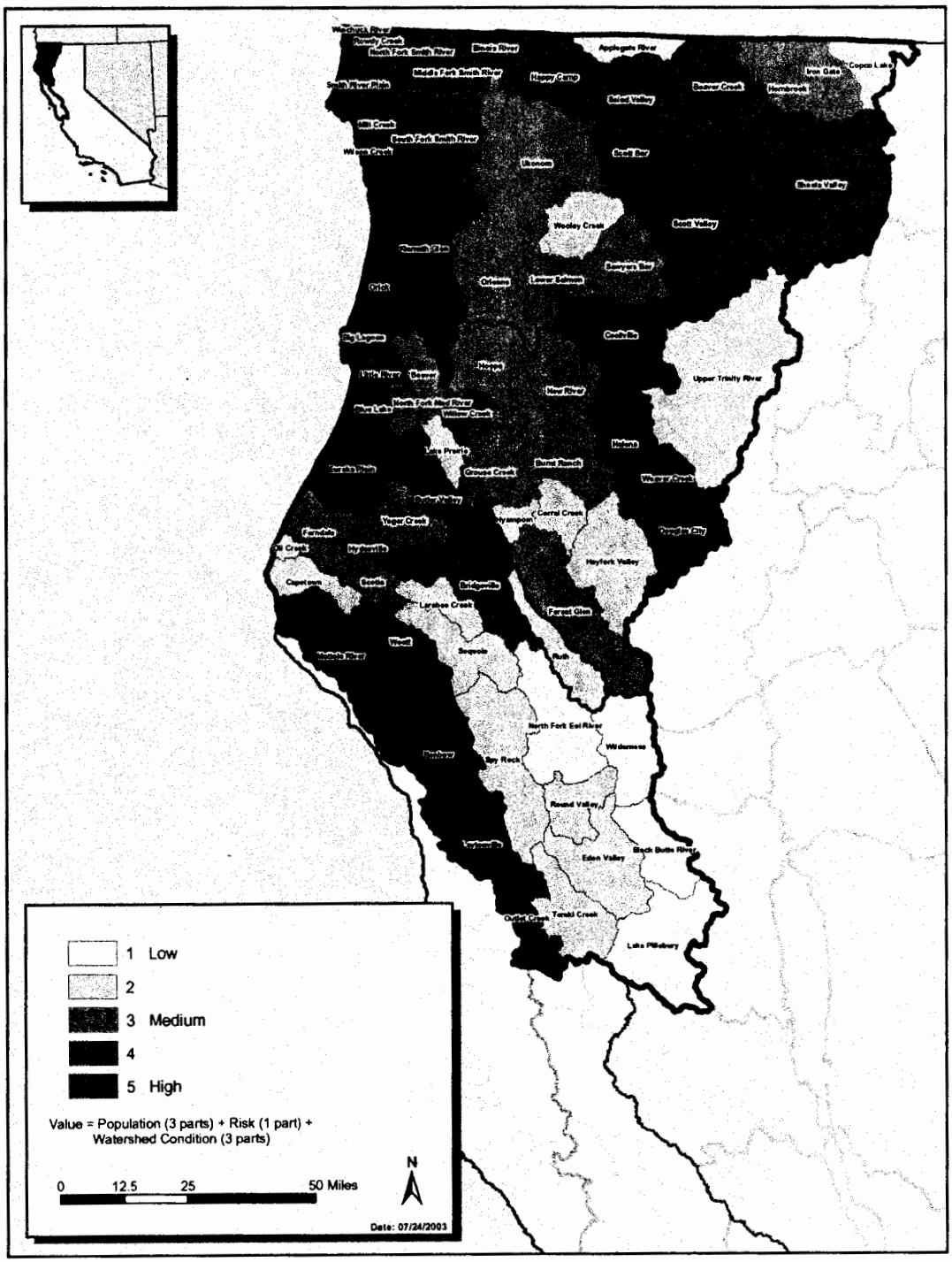

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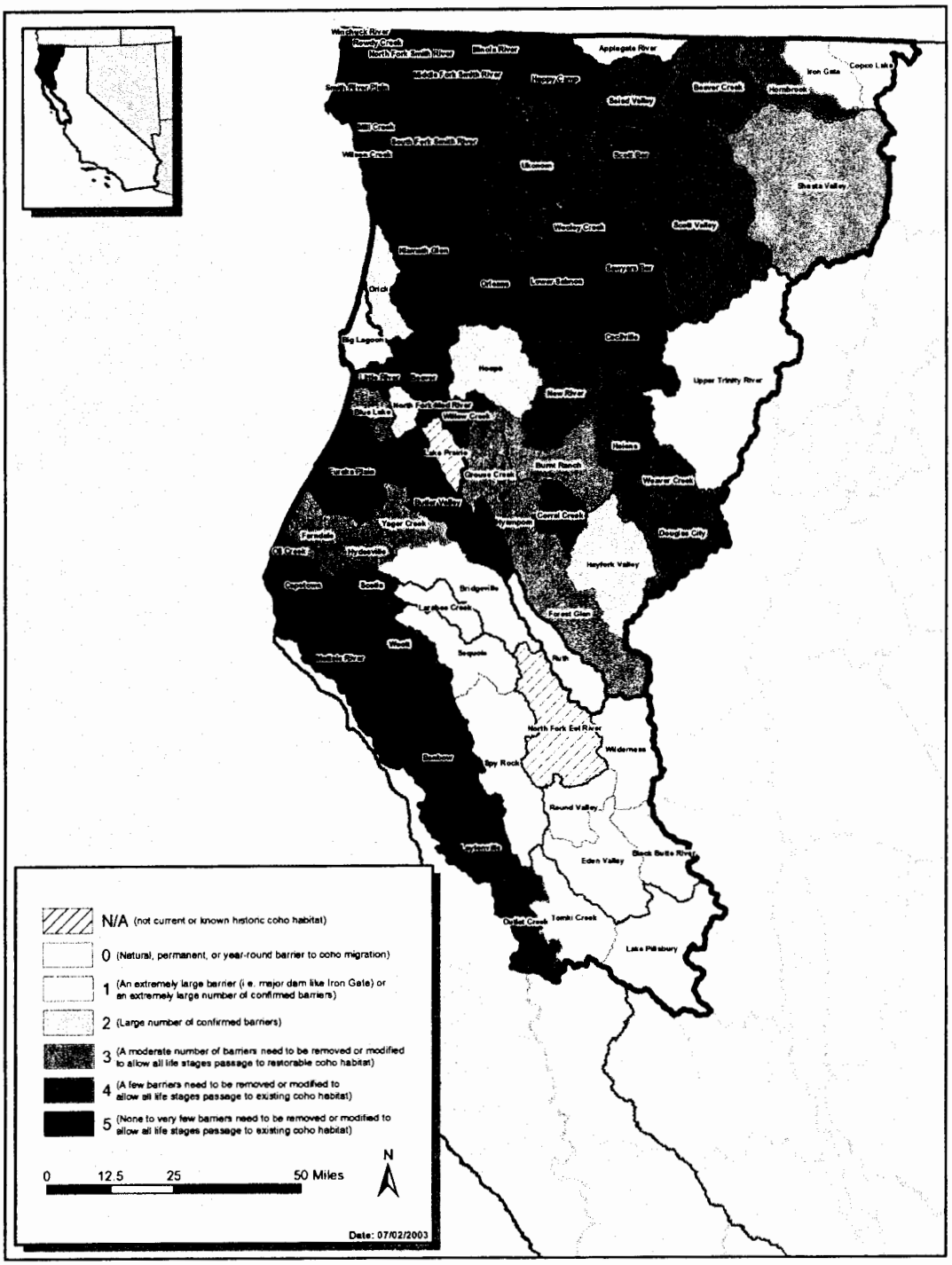
FIGURE 10-7: Disconnected habitat in the SONCC ESU



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Finally, the prioritization criteria proposed is for recovery of coho salmon, as per CESA and FGC, and may or may not apply to other salmonid species such as Chinook salmon, steelhead, and coastal cutthroat trout.

10.1.2 PRIORITIZATION PROCESS

The three steps followed to prioritize the watersheds are described in this section.

10.1.2.1 Identify Refugia Watersheds (Figures 10-1 and 10-2) and Risk of Extinction (Figures 10-3 and 10-4)

Rationale: Those HSAs in the SONC ESU with consistent presence of > 50% should be considered refugia watersheds. HSAs in the Central California Coast ESU having consistent presence of > 10% should also be considered refugia watersheds. However, even these watersheds have problems that could reduce productivity and these problems should be addressed.

Risk of extinction to coho salmon is ranked on watershed risks and coho population parameters, since coho salmon population abundance and genetic data are not available statewide. The ranking combines risk (human density, water diversions, road density) and population parameters (consistent presence of coho salmon, isolation index for coho salmon populations, and run length of coho salmon populations). Those HSAs in which risk of extinction is high should be given equal priority as refugia watersheds.

Anticipated Actions:

i. On public lands, consider full maintenance and recovery of instream and riparian areas.

ii. On private lands, provide incentives for riparian maintenance and recovery strategy activities that maintain and enhance coho salmon habitat.

iii. Identify any problems within these watersheds and recommend actions (for example; restoring estuarine habitats in Eureka Plain, Redwood Creek and Smith River).

iv. Prioritize biological refugia watersheds in the application of California coho statewide recommendations.

10.1.2.2 Identify Restoration Potential (Figures 10-5 and 10-6)

Rationale: HSAs with high scores for recovery strategy actions are known to support populations of coho salmon and have potential habitat that has been compromised. Coho salmon populations in HSAs ranking high (4-5) in the combined population, risk and habitat potential categories should have potential to respond when restoration actions are taken.

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Anticipated Action:

i. Determine if near-term (< 9 years) actions are adequate to maintain these populations at their current level.

ii. Determine if near-term and long-term actions will allow for expansion of these populations in all brood-years.

iii. If identified recovery strategy actions satisfy categories (b,i) and (b,ii) above, use the prioritize scheme to guide watershed restoration and other identified recovery strategy actions. If identified recovery strategy actions do not satisfy categories (b,i) and (b,ii) above, then recommendations *must* be upgraded.

iv. Develop recommendations specific enough to direct restoration actions.

v. Work with existing watershed groups in priority HSAs and landowners who are willing to work on watershed assessments to develop specific actions to restore coho habitat.

10.1.2.3 Identify Disconnected Habitats (Figures 10-7 and 10-8)

Rationale: Eliminating barriers to migration is among the most effective restoration actions that can be taken. Barriers to migration limit the distribution of coho salmon and limit recovery potential. Removing barriers, including but not limited to those created by federal, state, county or private road culverts, rail crossings, tide gates and small impoundments are high priorities. Addressing levees for flood control, access over larger impoundments, or other hydraulic or thermal barriers may present greater challenges, but must also be considered important components of disconnected habitats.

Anticipated Actions:

i. Identify and map the specific locations of barriers and score barriers using two criteria: 1) the amount of coho salmon habitat made accessible by their removal and 2) the relative ease or cost of their removal (culverts, tide gates and small impoundments = 3, levees and large impoundments = 2, thermal and hydraulic barriers, and other barriers requiring sites-specific evaluation = 1).

ii. Where appropriate, implement existing recommendations that are specific enough to direct barrier elimination.

iii. Develop additional, needed recommendations for barrier elimination.

10.2 IMPLEMENTATION SCHEDULE AND COSTS

The timing and duration required for recovery was given in Chapter 9 (Timeframe and Economics of Recovery). This chapter identifies estimated time for each recovery recommendation. Some recovery actions are already occurring (*ongoing*). But most actions are yet to be initiated. Some of those actions can commence immediately or within the first five years of the strategy (*interim*), while others require other actions to occur before they, themselves, can be undertaken (*long-term*).

Some actions will be immediate and temporary *(short-term)*, while others will continue indefinitely and at constant intervals (*continual*).

TABLE 10-1: Implementation Schedule

PRIORITY	TASK #	TASK DESCRIPTION	RESPONSIBLE PARTY	ESTIMATED TIME	ESTIMATED COST

10.3 FEASIBILITY

The recovery strategy and implementation schedule must be capable of being carried out in a scientifically, technolocially, and economically reasonable and legal manner. Therefore, all of the processes and activities within this strategy are subject to these considerations.

10.4 AVAILABILITY OF FUNDS

Implementation of the recovery strategy by the Department is subject to the availability of adequate funding and staffing resources. It is also subject to the availability of adequate funds of other responsible parties and participants to support and implement recovery strategy actions.

10.5 RESPONSIBLE PARTIES

Many parties and organizations are either responsible for recovery actions or will be instrumental in recovery of coho salmon in California. These include, but are not limited to:

Federal agencies:
- National Marine Fisheries Service (NOAA Fisheries)
- United States Forest Service (USFS)
- National Park Service (NPS)
- Bureau of Reclamation (BOR)
- United States Fish and Wildlife Service (USFWS)

State agencies:
- California Department of Fish and Game (DFG)
- California Departmentof Forestry and Fire Protection (CDF)
- California Department of Parks and Recreation (DPR)
- State Water Quality Control Board (SWQCB)
- California Department of Transportation (CalTrans)
- Board of Forestry and Fire Protection (BOF)

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County governments

City governments

Tribal governments

Private industry (including forestry, agriculture, livestock, mining)

Private landowners

Conservation organization

Watershed councils and groups

Academic institutions

for copies of any
: addressed to the
ified in this notice.
en comments on the
's after the date on
ole to the public.

TITLE 14. FISH AND GAME COMMISSION

NOTICE OF PROPOSED CHANGES IN REGULATIONS

NOTICE IS HEREBY GIVEN that the Fish and Game Commission (Commission), pursuant to the authority vested by sections 2070 and 2075.5 of the Fish and Game Code and to implement, interpret or make specific sections 1755, 2055, 2062, 2067, 2070, 2072.7, 2075.5 and 2077 of said Code, proposes to amend Section 670.5, Title 14, California Code of Regulations, relating to animals of California declared to be endangered or threatened.

INFORMATIVE DIGEST/POLICY STATEMENT OVERVIEW

At its August 30, 2002 meeting in Oakland, California, the Fish and Game Commission (Commission) made a finding that coho salmon north of San Francisco warrants listing pursuant to the California Endangered Species Act (CESA). Specifically, the Commission determined that the coho salmon populations between San Francisco and Punta Gorda should be listed as an Endangered Species and the populations between Punta Gorda and the northern border of California should be listed as a Threatened Species.

The Commission therefore proposes to amend Section 670.5 of Title 14, CCR, to add the coho salmon populations between San Francisco and Punta Gorda to the list of Endangered Species and the coho salmon populations between Punta Gorda and the northern border of California to the list of Threatened Species.

This proposal is based upon the documentation of population declines and threats to the habitat of this species to the point that it meets the criteria for listing by the Commission as set forth in CESA. The Commission is fulfilling its statutory obligation in making this proposal which, if adopted, would afford coho salmon north of San Francisco with the recognition and protection available under CESA.

NOTICE IS ALSO GIVEN that any person interested may present statements, orally or in writing, relevant to this action at a hearing to be held the Elk Valley Rancheria, 2500 Howland Hill Road, in Crescent City, California, on Friday, June 25, 2004, at 8:30 a.m., or as soon thereafter as the matter may be heard. It is requested, but not required, that written comments be submitted on or before June 18, 2004 at the address given below, or by fax at (916) 653-5040, or by e-mail to FGC@dfg.ca.gov, but must be received no later than June 25, 2004 at the hearing in Crescent City, CA. All written comments must include the true name and mailing address of the commentor.

The regulations as proposed in strikeout-underline format, as well as an initial statement of reasons, including environmental considerations and all information upon which the proposal is based (rulemaking file), are on file and available for public review from the agency representative, Robert R. Treanor, Executive Director, Fish and Game Commission, 1416 Ninth Street, Box 944209, Sacramento, California 94244-2090, phone (916) 653-4899. Please direct requests for the above mentioned documents and inquiries concerning the regulatory process to Robert R. Treanor or Sherrie Koell at the preceding address or phone number. **Gail Newton, Department of Fish and Game, phone (916) 327-8841, has been designated to respond to questions on the substance of the proposed regulations**. Copies of the Initial Statement of Reasons, including the regulatory language, may be obtained from the address above. Notice of the proposed action shall be posted on the Fish and Game Commission website at http://www.dfg.ca.gov/fg_comm/.

AVAILABILITY OF MODIFIED TEXT

If the regulations adopted by the Commission differ from but are sufficiently related to the action proposed, they will be available to the public for at least 15 days prior to the date of adoption. Any person interested may obtain a copy of said regulations prior to the date of adoption by contacting the agency representative named herein.

If the regulatory proposal is adopted, the final statement of reasons may be obtained from the address above when it has been received from the agency program staff.

IMPACT OF REGULATORY ACTION

The Administrative Procedure Act (APA) requires state agencies to assess the potential for adverse economic impacts whenever they propose to adopt, amend, or repeal any administrative regulation (see generally Gov. Code, §§ 11346.3, 11346.5). The APA also requires state agencies to adhere to the economic assessment requirements to the extent such requirements do not conflict with other provisions of state or federal law (*Id.*, § 11346.3, subd. (a)).

CESA does not specifically prohibit consideration by the Commission of potential economic impacts that may result from a decision to list a species as threatened or endangered under state law. Yet, the information and criteria by which the Commission is required to determine whether a species should

be listed under CESA as threatened or endangered are limited to biological considerations (see, *e.g.*, Fish & G. Code, §§ 2062, 2067, 2074.6). The Office of the Attorney General, as a result, has consistently advised the Commission that it should not consider economic impacts in making findings in the CESA listing context. This recommendation is also based on the fact that CESA is modeled after its federal counterpart and the federal Endangered Species Act specifically prohibits consideration of economic impacts during the listing process. The recommendation is also informed by state case law indicating that economic considerations may not be considered by the Commission when designating a species as a candidate for listing under CESA (*Natural Resources Defense Council* v. *California Fish and Game Comm.* (1994) 28 Cal.App.4th 1104, 1117, fn. 11).

Therefore, the Commission does not believe it is authorized to take economic impacts into account when considering listings under CESA. However, despite this belief, an analysis of potential economic impacts that may result from the proposed regulatory action on businesses and private individuals is provided below. The analysis is intended to provide disclosure, which is one of the basic premises of the APA.

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the following statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Business, including the Ability of California Businesses to Compete with Businesses in Other States:

The proposed regulatory action to designate coho salmon between San Francisco and Punta Gorda as endangered and between Punta Gorda and the northern border of California as threatened will afford the species the protections of CESA, which prohibit take, possession, purchase, and sale (herein collectively referred to as "take") of threatened and endangered species, except as authorized by the Department. To the extent businesses are engaged in activities that will take coho salmon, the proposed regulatory action may result in adverse economic impacts directly affecting businesses, including the ability of California businesses to compete with businesses in other states. However, the majority of such activities are already subject to federal take prohibitions under the federal ESA, and therefore, have incurred economic consequences as a result since the federal listings (1996 and 1997).

Where the Department authorizes take of coho salmon that is incidental to an otherwise lawful activity, impacts of the taking must be minimized and fully mitigated, and any such mitigation must be monitored for effectiveness under CESA. Permitting under CESA for incidental take of coho salmon would result in some increased costs when compared to the status quo, which includes the federal take prohibition under the federal ESA.

Potential costs of recovery of coho salmon were identified in the Response to Comments on the Draft Recovery Strategy for California Coho Salmon (*Onchorhynchus kisutch*), Report to the California Fish and Game Commission (January 2004). A currently unquantifiable fraction of these potential costs can be attributed to the listing of the species, as opposed to recovery, if practices result in take of coho salmon under CESA. (Existing practices that result in take under the federal ESA may have already incurred economic impacts.) With regard to potential impacts to timber businesses, costs of proposed policies to guide the issuance of incidental take authorizations were estimated to be $151–373 million, or stated another way, a reduction in timberland values by an estimated 2.8 to 6.9 percent; a reduction in timberland values, which are valued at $1,400 per acre on average, by between $39 and $97 per acre. However, these estimates assume that all of the recommended timberland management provisions would be applied to every timber harvesting plan. The Department does not anticipate this will be the case because the proposed policies would be recommended as necessary on a site-specific basis when take of the species would occur or if the California Department of Forestry and Fire Protection were to require them in order to mitigate significant adverse effects on the environment pursuant to the California Environmental Quality Act. Therefore, the Commission estimates that although economic impacts to timber businesses may be significant, they will likely be only a fraction of the estimates described above.

With regard to other businesses engaged in activities such as agriculture, in-stream sand and gravel extraction, construction of roads and bridges, suction dredging, and municipal and domestic water use, there may be some economic impacts if these activities would result in the take of coho salmon under CESA; however, again, a portion of these impacts may have already occurred as a result of the federal ESA listing of coho salmon.

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Presently, California ocean and inland non-Indian fisheries are closed by federal and state regulators to the direct harvest of coho salmon. Therefore, there would be no adverse effect from the proposed listing on sectors associated with coho salmon fisheries.

(b) Impact on the Creation or Elimination of Jobs within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California:

Given the potential for additional economic impacts as identified above, there may be the potential for adverse impacts on new or existing jobs; however, these impacts are unlikely to cause the elimination of existing businesses in California. Whether these potential impacts actually occur depends upon the extent to which commercial activities result in take of coho salmon under CESA, the level of compliance with the federal ESA, and the costs, if any, of minimizing and mitigating for take under CESA. Therefore, these impacts are difficult to estimate at this time.

In addition, there is the potential for creation of jobs and businesses, or expansion of businesses in California. The public sector may create new jobs as a result of mitigations such as road treatment, culvert replacement, and habitat enhancement. These jobs would likely be created largely in rural counties with high levels of unemployment. Increased public education could result in increased contributions to the State's Rare and Endangered Species Tax Check-off program, which would in turn provide further funding for management and recovery activities for all listed species.

Private tour operators could also potentially benefit economically from increased tourism, interpretation, and educational activities.

Additionally, private environmental consulting firms could benefit economically from assisting in the development and implementation of mitigation measures.

(c) Cost Impacts on a Representative Private Person or Business:

A representative private person or business may experience economic impacts as described in section (a) above.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal funding to the State:

As a project applicant, a state agency may realize costs associated with projects involving the incidental take of coho salmon as described in section (a) above.

The proposed regulatory action is not expected to affect federal funding to the state.

(e) Nondiscretionary Costs/Savings to Local Agencies:

As a project applicant, a local agency may realize costs associated with projects involving the incidental take of coho salmon as described in section (a) above.

(f) Programs Mandated on Local Agencies or School Districts: None.

(g) Costs Imposed on any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4: None.

(h) Effect on Housing Costs: None.

EFFECT ON SMALL BUSINESS

It has been determined that the adoption of these regulations may affect small business.

CONSIDERATION OF ALTERNATIVES

The Commission must determine that no reasonable alternative considered by the Commission, or that has otherwise been identified and brought to the attention of the Commission, would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

TITLE 16. BUREAU OF ELECTRONIC AND APPLIANCE REPAIR

NOTICE IS HEREBY GIVEN that the Bureau of Electronic and Appliance Repair ("Bureau") is proposing to take the action described in the Informative Digest. Any person interested may present statements or arguments orally or in writing relevant to the action proposed at two hearings to be held on:

SOUTHERN CALIFORNIA
April 27, 2004
10:00 a.m.
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, California 91765

NORTHERN CALIFORNIA
April 29, 2004
10:00 a.m.
Department of Consumer Affairs
400 R Street, Hearing Room, Ste 1030
Sacramento, California 95814

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Geomorphology and Hydrology
Wetherell – Upper Woodruff Bar
Salmon Habitat Restoration

August 30, 2003

Prepared by

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EXHIBIT NO. **9**

APPLICATION NO.
1-03-039

EXCERPT, *GEOMORPHOLOGY AND HYDROLOGY WETHERELL - UPPER WOODRUFF BAR* SALMON HABITAT RESTORATION, EGR & ASSOCIATES, INC., AUGUST 30, 2003 (1 of 18)

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Geomorphology and Hydrology
Wetherell – Upper Woodruff Bar
Salmon Habitat Restoration

August 30, 2003

On Monday, August 18, 2003 Ralph Christensen of EGR and Associates, Inc., California Geologist License #4973, inspected the Upper Woodruff Bar on the Smith River next to the Rich Wetherell Dairy Farm. Accompanying him were Frank Galea of Galea Wildlife Consulting, and Rich Wetherell of the Wetherell Dairy. Mr. Christensen has been involved with a number of gravel and rock extraction facilities which are adjacent to and impinge upon riverine systems. Commonly, these facilities are precluded from "in river" removal of rock, but we have still been called upon to examine the influence of the excavation on the adjacent river. Usually the major concern is the potential for avulsion into the excavation and the capture of the stream and its bed load of sand and gravel. We commonly perform geomorphic analysis of the river to determine its meander constraints, rate of change and estimate the impact to the river system if such capture were to occur.

INTRODUCTION

Much recent study in river systems has focused on the interaction between river water and groundwater. When water leaks from the river into the sediments around, under, or in the river channel, and then that water discharges back into the river it is termed hyporheic water. Commonly, this specific type of groundwater comes from the river water entering the sand and gravel bars in the river, or across oxbow loops. This water is distinct from phreatic groundwater which comes from precipitation within the basin. Hyporheic water is wholly or partially derived from the river itself and returns to the river. Much of the research regarding hyporheic water centers on its importance for temperature and water quality control in rivers, and as a source for may aquatic insects which are important portions of the lower food chain.

One of the major directions in river management today is to use rock extraction to restore and improve degraded river habitat. For example, the Willamette River is similar to the Smith River in being a gravel (sediment) choked river. Historically the river was braided and highly meandering. For instance, from Eugene to Corvallis, a distance of about 40 air miles, the Willamette River used to be about 190 river miles long. Today the river is but 100 river miles long in this reach. Where did the river go? It was diked a little piece at a time (just to keep it from eroding the good farm ground) until enough diking constraints had encroached upon the river from both sides to reduce its meanders by 90 miles, converting those miles to more good farm ground. Continuous diking was not necessary, if fact only a small percentage of the river's banks are diked, but enough dikes occur to effectively pin the river within a much narrower meander zone..

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Who now can afford to purchase 90 miles of farm ground and restore the river meanders? Our tax dollars are hard pressed, and it would be politically untenable to simply try to legislate the farmers into giving it up without compensation (and likely not legal given "takings" laws). Only gravel operators, who extract and sell the rock, have the ready means to act as river restorers, while also paying most of the cost of restoration. The key will be to have the gravel operators not confined to small areas while digging deeply, but encourage the gravel operators to mine in long shallow reaches alongside the river. This has already been done in cooperation with the Oregon Department of Fish and Wildlife near Corvallis, where a riverine restoration of off channel rearing areas was constructed by a gravel company (using some State funding) while the gravel company extracted and used the rock for beneficial purposes. Some state funding was required because the economics currently tends to benefit digging deep, rather than shallow and long.

Besides the walkover, and the pictures I took while there, I also received the following documents which I have reviewed:

- Cross sections at various stations from LaRue Hydrology dated June, 2003
- Salmonid Habitat Restoration and Bar Stabilization Project – Protect Description and Impacts Analysis, Galea Wildlife Consulting
- Letter from Galea Wildlife Consulting to Dan Free NMFS, dated July 21,2003
- An undated Response to Dan Free of NMFS
- An undated response from Dan Free of NMFS (not on letterhead)
- An undated response to Rich (presumably Rich Wetherell) by Gerald LaRue regarding the "Letter to Frank Galea dated July 3, 2003"
- Hydrologist Report for Westbrook-Wetherell Gravel Bar Smith River System, Gerald LaRue, undated with a hand written "2001"

The above materials are found in Appendix A

After my return from the walkover I received the additional 6 aerial photographs dating from June 8, 1945?; February 28, 2001; May 22, 2001; 2002(?); June 20, 2003; and one undated photograph (probably in the 1990s). I researched and reviewed the following articles regarding temperature control by subsurface water discharges within river systems, the importance of intragravel flow (hyporheic flow), associated aquatic food production, and the areas in streams favored by salmonids. Following is listed of the articles included with this report: Thermally Stratified Pools and their Use by Steelhead in Northern California Streams by Vicki Ozaki, Transactions of American Fisheries Society, 123:613-626, 1994; A Landscape Perspective of Surface-Subsurface Hydrologic Exchanges in River Corridors, Freshwater Biology (2002) 47, 621-640 by Florian Malard (et al); Pathways of Human Influence on Water Temperature Dynamics in Stream Channels by Geoffrey C. Poole and Cara H. Berman, USEPA Region 10; and the presentation outline of Groundwater/Surface Water Interactions as present by Sam Fernald at the New Mexico Water Resources Research Institute, November 2001. Finally, a couple of internet articles were reviewed called: "Cold Spots" [http://members.tripod.com/~Len_Rich/webdoc2.htm]; and "Trout & Salmon Habitat"

[http://www.thecontentwell.com/Fish_Game/Trout/Trout_Habitat.html]. All of these articles are found in Appendix B.

PURPOSE

The purpose of this review has been to:

- provide a geomorphologic evaluation of the bar;
- establish a reasonable estimated volume of rock necessary to "restore" the secondary channel bisecting the gravel bar to a "no flow" condition during summer flows;
- comment on bar configuration and rock replacement relative to the restoration of the gravel bar and creating a "no flow" condition on the new channel;
- make recommendations as to any extraction of rock to re-create a deep water refuge
- comment on the desirable characteristics regarding size, shape, depth, and location of such a refuge;
- comment on the potential for destabilization of the river bar system by rock extraction off of the bar, within the channel, or some combination these;
- comment on long term and short term impacts relative to migration of sand and gravel through this particular river reach; and
- comment on importance of gravel bars and constructed deep pool refuges once the river has been constrained by diking.

Geomorphologic Evaluation

Geologic History

After reviewing topographic maps, historic aerial photographs of the area, examining personally the site and surrounding geologic exposures, and reading the geologic literature for the area I have come to several conclusions regarding the geomorphology of this site and more particularly with regard to the proposed extraction of rock to form a deep pool as a salmon refuge at this particular location.

In quick summary, the Smith River above the Highway 101 Bridge is a high gradient gravel choked stream in a narrow steep sided erosional canyon system. Numerous landslides provide abundant materials and periodic high winter runoff provides motive power to transport the rock downstream. Once this stream reaches the alluvial coastal plain the river widens and loses gradient, both of which causes the river to lose energy. With less energy the river cannot carry as heavy a load of gravel and it therefore begins to deposit gravels. From this process much of the coastal plain from Crescent City to the Smith River Rancheria is underlain by sand and gravel deposits of variable thickness.

In addition to this river process of gravel transport is the changing sea level brought about by glacial periods (and interglacials), and the coastal uplift (with some interspersed

subsidence) brought about the tectonic forces of sea floor subduction. Thus, locally the gravel deposits can be seen to be fairly deep or only a shallow layer (St. George Formation), while elsewhere one can find gravel deposits at substantial elevations above the present river elevation.

Upstream gravels are supplied to the river by normal erosional forces (including what humans would term abnormal flood events), landslides (natural and human aided), and debris from hydraulic mining. It is clear from the amount of gravel that has been delivered to the fan over geologic time, and the configuration of the canyons that this a very active erosional stream system, and even without human interference substantial amounts of gravel were, will, and will continue to be supplied down the river.

Current Configuration at the Woodruff Bar

The Woodruff Bar is a long lived, in human terms, feature of the coastal plain portion of the Smith River. The immediate question is why is this feature so long lived in this one location? Gravel bars commonly migrate in gravel choked portions of river systems like the lower Smith River. The answer is seen immediately upriver. On the north side of the river is a visible outcrop of resistant bedrock which partially constrains the river and flood flows. The river has been impinging upon this outcrop for an extended period to time.

The outcrop acts as a constrictor in the river flow, causing flow velocities to increase and the flow direction to be focused as the river races through this pinch point. Aerial photographs, such as the USGS photographs from the spring of 1994 (see in Appendix C Aerial Photographs), when winter and spring rains and snow melt caused higher flows, one can see the effects on the river velocity quite clearly as the water rushed past the outcrop area. These increased flows tend to scour gravels out from the area surrounding the outcrop, and to move gravels through the scour zone (i.e. there is very little deposition in the area around the outcrop). Gravels scoured through this zone soon reach a lower energy portion of the river and are deposited, thus the origin of the Upper Woodruff Bar. This system will create a "permanent" hole at the outcrop and immediately downstream a "permanent" bar.

The position of the Woodruff Bar, and its configuration (a very deep "V" pointing down river, all align with the expected flow out of the constriction or pinch point caused by the outcrop. This direct link beaten flow velocity, the direction of the flow (where it "points"), and location of the Woodruff Bar can also be clearly seen in the aerial photograph from the spring of 1994 river flows (not a spectacular flood but normal spring high water).

What this most importantly tells us is that the Woodruff Bar will be a very long term fixture in the river in its present location because the conditions that form the bar are generally permanent as well. Only if the river moves away from the outcrop, or erodes it away, will the Woodruff Bar become like many other bars on the lower coastal floodplain section of the river and migrate over time.

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Historic Configuration of the Woodruff Bar and Lower Smith River

The Woodruff Bar has doubtlessly been at its present location and configuration since white settlers first arrived here. The rock outcrop is a very stable site location for the river, and the outcrop controls the location of the Upper Woodruff Bar. Gravel movement on the Smith River is directly related to flood events. When there are not flooding events then sand is moved and not gravel. This can be seen in the last excavations into the river bed at the Upper Woodruff Bar. These excavations have been filled with medium to fine sand and not gravel, clearly indicating that no gravel has been transported down the river since they were dug (see Appendix D, where labeled photographs of the previous excavations and the river appear).

Naturally occurring deep holes in a gravel bottomed river such as the Smith River, generally occur either below pinch points (such as the bedrock outcrop upstream of the Upper Woodruff Bar), or at meander loops where the river changes direction. When a river makes a significant turn the water does not just move around the corner, instead it flows straight at the far bank of the turn, hits the far bank and curls down under and twists under the itself in a helical pattern and flows out of the turn in a new direction. This downward flow and turn causes the water to accelerate (increased energy) and allows the stream to erode a deep hole at the turn.

When people begin to experience loss of their real estate due to river erosion at meander bends, they naturally begin to protect their land by preventing the river from eroding any farther. Over time, land owners on both sides of the river continue to protect their land and to dike their lands from floods and other river nuisances. The final result is a river which is constrained to a straighter path and with fewer meanders. With few meanders there are fewer opportunities for the erosion of deep holes. Further, without big meanders there are fewer oxbows, river bars, and opportunities for hyporheic water.

Since it is unlikely that anytime soon the Smith River will be allowed to form many big meanders again, then a substitute mechanism for creating such holes as historically existed on the Smith River (as long as it was not environmentally damaging itself) would very likely be beneficial.

VOLUME OF RESTORATION ROCK NECESSARY

The Woodruff Bar has an open breach in the middle of the bar. This breach could temporarily become the main channel if left unattended, and is likely a result of too much gravel removal from the bar itself. The bar should only very cautiously have any gravel removed from it, with the preferential location for gravel removal from the stream bed itself, where the removal can actually provide some benefit to the fish. For many reasons this breach is likely harmful to the overall desire to restore habitat in the lower Smith River near this bar. Because the gradient across this breach is greater than the current main channel flow at the upper end of the bar, the breach threatens to cut

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through the bar and take over as the main channel. Though if left alone this configuration would not likely remain stable (eventually a flood event would fill the breach and cause the main flow to return to the inherently more stable upper bar overflow) there is no way of knowing whether that would take 2 years, 20 years or 200 years.

Given the appropriate configuration of the bar for the most stable configuration (see below), I estimate from cross sections and my visual inspection of the breach area, at least 700 cubic yards of gravel to minimally restore the breach to a "low flow, no flow" condition. It may take as much as 1,800 cubic yards of material to restore the breach in a more uniform condition comparable to pre-beach configuration. The more minimal breach repair will be less stable.

APPROPRIATE BAR CONFIGURATION FOR BAR RESTORATION

The Woodruff Bar is built primarily by the high flow events and flood episodes of a straight ahead blast of water coming out of the upstream bedrock restriction. The restriction caused by the bedrock outcrop is some 1,200 feet upstream of the bar. This straight ahead flow of water would tend to build a deep V shaped bar (point of V pointing downstream, see labeled aerial photographs below (and other aerials in Appendix C) with moderate sediment (gravel) slopes on the inside of the V, rising to where the water breaks over the top of the legs of the V (see Ground Level Photographs of the bar in Appendix D, note the shape of upstream slope).

During high flow events, gravel tends to be moved up the moderate upstream (inside) slope of the bar, up over and across the top of the bar, and finally to be deposited on the downstream side of the V legs, usually in a steep angle of repose slope (see cartoon below). This profile across a leg of bar can also be seen in the measured profiles from 1998 at stations 5+00 and 7+50, in Appendices E & F of this report. Note the scale difference from horizontal to vertical (10X exaggeration) in these cross sections. The profile configuration is a result of the river having lost much of its energy in getting up over the top of the of the V legs of the gravel bar, and the quieter (deeper) water downstream of the bar leg.

As water levels fall after a high flow event, moderate and lower flows will locally modify the shape of the gravel bar. Particularly, where the overflow or bypass channel, and the main channel, cross the gravel bar. In these locations the bar will be eroded to a gentler slope, with most of the gravel deposited immediately below the cross over point. This is now happening at the breach with a delta of gravel being deposited immediately downstream of the breach channel.

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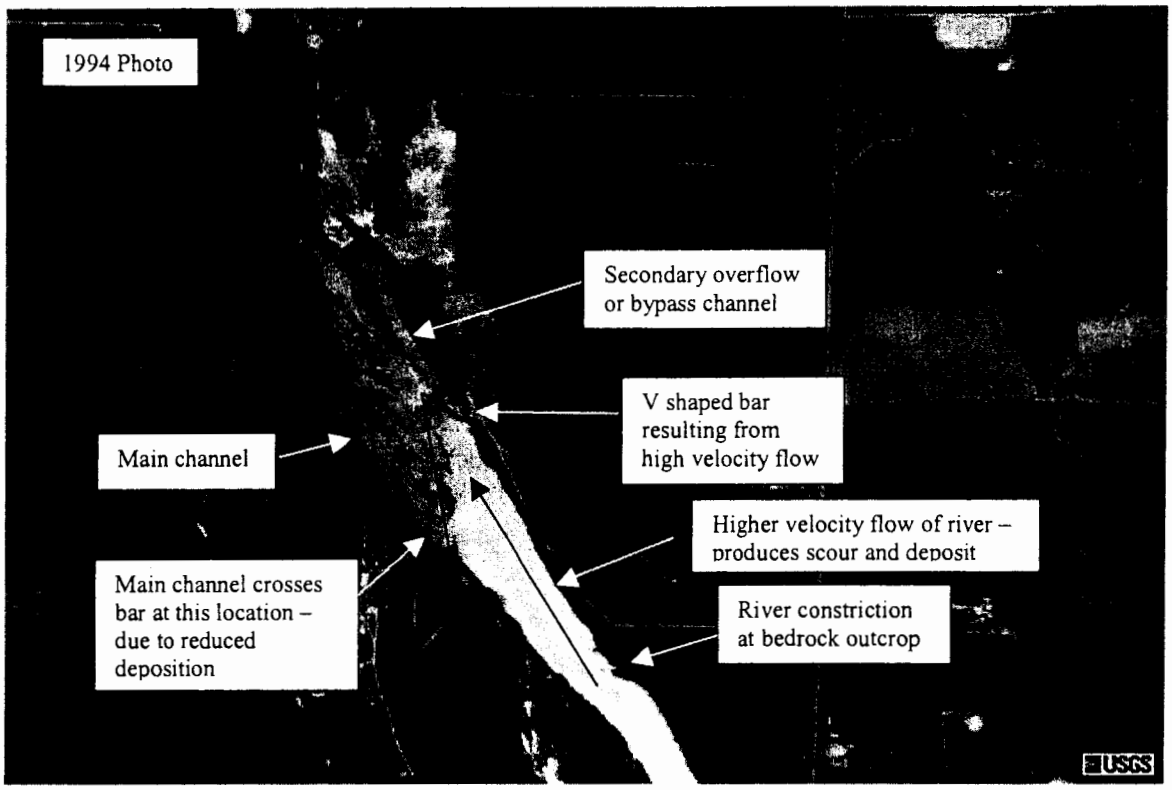

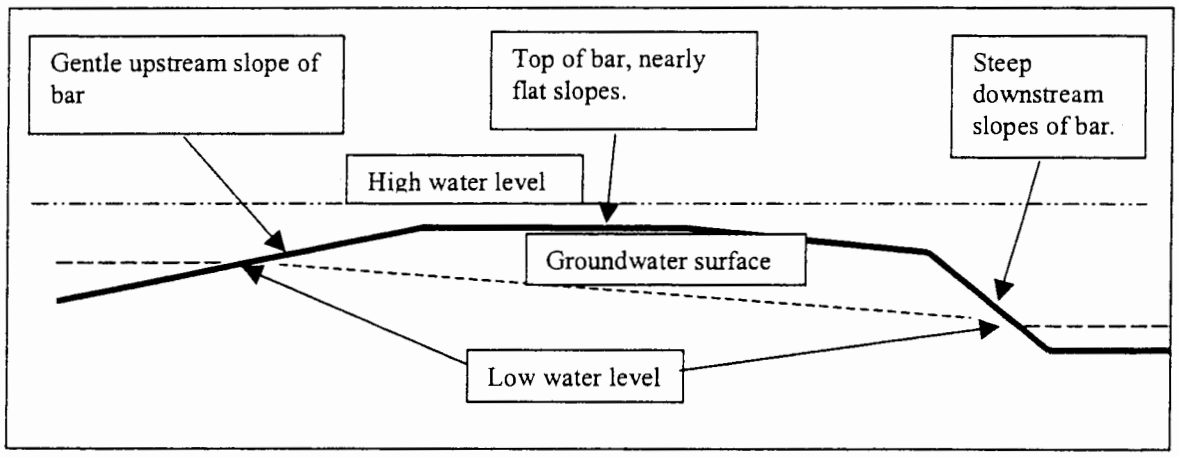

Specifically, the Upper Woodruff Bar is mostly seen as only one leg of the V, while the north bank of the river is the other leg. The bottom of the V is open and is the "side channel" which a smaller portion of the river runs through. The main portion of the river overflows at the top of the V leg near the south bank of the river. This overflow of the main channel takes place at the upstream, upper end of the Woodruff Bar V leg, because the bar will tend to be lower there, where flow velocity and flow direction tends to reduce gravel deposition there relative to the bottom of the V.

Thus. the most natural, and therefore most stable, configuration of a reconstructed bar would be moderately slope the fill on the upstream (inside the V) portion of the bar, rising to the top level of the bar. The top of the bar should have a flat section of 10 to 20 foot width (the outwash level), with a relatively steep downstream section where gravel normally deposits. This cross section configuration is common across gravel bars in rivers (see profiles of Section lines 5+00 and 7+50 for 1998 in Appendix E & F, Cross Section Profiles by year or by Section).

Note: There are apparent errors in the profiles and the cross section locations as they were presented in some of the reports produced in the past. These have been tentatively corrected in this report to produce the cross sections reproduced here. The probable correct cross section locations are found on the undated aerial photograph as seen in Appendix C. The cross section locations noted on the February 28, 2001 aerial photograph are in error both in sequence (station 0.00 is at the wrong end) and distance between stations. Other ambiguities and cross section presentation have been modified to reflect actual observed ground conditions.

DEEP WATER REFUGE, SIZE, SHAPE, DEPTH, AND LOCATION

The recent literature on stream restoration and habitat needs of salmonids clearly indicates that both adult returning fish and young of the year utilize cool refuge pools. Further, these pools are often the result of intragravel flows (hyporheic water) which after passing through the gravel bars is enriched in aquatic insects on which juveniles will feed. Such pools are the result of upstream water entering gravels, flowing through the gravels and exiting in a lower stream section. Returning adults will use deeper portions of the pool, while fry may be using shallow water sections (which are still being fed by cooler hyporheic water).

At the Upper Woodruff Bar the water above the bar is approximately 2.0 to 2.6 feet higher in head than the water immediately below the bar during non-flood flow conditions. This head difference drives river water through the bar. Using a midrange estimate for groundwater flow through the gravels, yields an expected flow rate of about 6 gallons per minute per square foot of gravel bar (measured as a vertical cross section down the length of the bar, and perpendicular to the expected groundwater flow across the bar). Thus, if a 5 foot deep pool were created at the lower (downstream) edge of the bar for 800 feet about 33 cubic feet per second of water would be passing through the bar as hyporheic flow and discharging cool water into the deep pool. The water would also have increased numbers of insects and other small aquatic life that take advantage of the flow through the gravel. Even in locations where the pool was not created, outflows of hyporheic water into shallows will occur where fry and other small fish would feed on the insects and other aquatic life. In fact, such shallow water zones along the lower edge of the bar are very important and must be created or preserved when excavation occurs.

Size

Up to a point, the size of the pool is not necessarily critical to the fish or the stability of the stream, as long as the functions of a deep pool can occur and the excavation does not remove portions of the bar itself. The pool must be able to receive water that has either come from the groundwater (phreatic water from the floodplain) or hyporheic flow (river water that has passed through the gravel bar). However, a larger pool provides additional variability within the pool itself, and thus providing fish with different water quality characteristics within the pool which will be attractive at different times, life stages, and seasons. One long pool would be preferred to the three (3) smaller pools as constructed in the past.

The project proposes a pool which is wide (175 feet) and deep (20 feet) at the downstream end, and becomes narrower (100 and 50 feet wide for the mid and upper portions of the hole respectively), and shallower (15 feet and 10 feet respectively) as it is excavated upstream. This configuration does not present a hydraulic issue with the river system as long as recommended slopes of the excavation are maintained.

Shape

The pool needs its long axis oriented up and down stream. The actual shape is not critical though some irregularity would probably be beneficial. Large woody debris could be added to the pool to increase diverse habitats, but its longevity in the pool will be suspect. The pool should be out into the river far enough so that the bank next to the bar has a shallow zone to create a shallow water hyporheic flow zone for small fish to use as a refuge from aquatic predators that would use deeper water.

The proposed excavation is a sort of tear drop shape, narrower in the up river direction, becoming wider and deep in the downstream direction. This variability in width and depth is very likely beneficial in providing diversity in the channel environments. The length of the excavation is 800 feet with the following dimensions: upper end of excavation 50 feet wide by 300 feet long; mid-portion of the excavation 100 feet wide by 200 feet long and downstream end of the excavated pool 175 feet wide by 300 feet long. This shape is acceptable hydraulically for the river system.

Depth

The pool should be more than 6 feet deep to allow for stratification of the water and cool water accumulation in the pool. The proposed depths of 10, 15, and 20 for the upper, mid, and lower pool excavations meets this criteria. Depth is important in maintaining the cool zone in light of the main channel flows occurring over the pool which can tend to cause mixing. Slopes into the pool should be at the angle of repose or less (30 degrees or so). Some variability in slope and edge orientation may be helpful for fish, but it is not necessary hydraulically.

Also a deeper pool makes a broader area from which hyporheic flows can discharge along the edge of the pool. This outflow of cool, food rich water may only be effective

for fish habitat right along the edge of the bar (within a foot or two or even less), and perhaps non-existent over much of the rest of the pool. Therefore the existence of an extensive edge along the toe of the bar is important. A larger pool is preferred so that fish can spread out throughout the pool. When a flood comes that will move gravel, then likely much of the pool will be filled. Restoring the pool again will be important to fish habitat preservation. This may be necessary every few years or so.

Location

With the importance of hyporheic water flow to creating good resting habitat, the best possible location for the deep pool creation would be just offshore of the present bar (as seen at low flow). This would allow for a shallow water habitat with cool enriched water flowing from the bar during summer months. Cool shallow water is important for small fish to protect them from fish predation, and for their proper growth. The shallow zone should be 3 to 5 feet wide. There also is an enriched aquatic insect population that also uses the hyporheic water flow. Then farther out from shore, would be a deep pool where older fish and returning adults could find cool water refuge. Though on the Smith River the temperature may not be as critical as in other rivers, it still provides preferred habitat for adults, and likely for small fish as well. Deep water will provide some additional protection for adult fish over that of the broad shallow river channel now present.

By no means should excavation occur on the surface bar itself.

POTENTIAL FOR DESTABILIZATION OF THE RIVER BAR SYSTEM BY ROCK EXTRACTION

Always of concern with excavations in or near a river channel is the potential for the excavation to destabilize the river system and cause upstream erosion, block load transport of gravel, or cause some unforeseen consequence. Given that the Upper Woodruff Bar is a semi-permanent fixture in the river there is little one could do to the bar, or the area around it, that would permanently destabilize the bar, geologically speaking. Over time, and a few floods (or one good flood), the Upper Woodruff Bar will always re-establish itself, as long as the river flows past the upstream rock outcrop and gravel recruitment occurs from upstream sources.

Over shorter time spans, however, the bar can be made less stable. For instance, gravel removal off the bar itself de-stabilized the bar and has acerbated if not caused the breach at the midpoint of the bar. A good flood will replace this gravel on the bar though, see the cross sections from Stations 5+00 and 7+50 for the years 1997 and 1998 (Appendices E & F). These cross sections show how much gravel can be deposited on the bar in a one year period or less. Recall that gravel is deposited on the bar from the top and then across. An excavated pool on the downstream side of the bar will not tend to fill with material from the bar, until the bar has been "filled". Instead, the bar itself will fill to a semi-stable configuration, then gravel will be transported into the excavation. This configuration will continue until the gravel bar reaches equilibrium with the main and

overflow (bypass) channels whose flow modify the gravel bar where they respectively cross the bar. In these locations the channels transport gravel off the bar into the river runs below them, and will, during intermediate flows, move gravel along these stream reaches. The excavation can potentially be filled with gravel from these lower flows along the main and overflow channels, and the growth of the bar itself will be limited by the flows down these channels which remove excess gravel.

An example of this can be seen from the photographs taken in the river where the excavation that took place early in the 1990s was made. That excavation filled in over a few years period with gravel (not sand as the more recent triple excavations did). The photograph shows a subtle difference in the gravel that filled the excavation (lighter color, slightly smaller gravel), relative to the gravel that was not removed during the excavation (darker color and slightly larger gravel). What is interesting is that the older gravel has not been moved or re-worked, and the newer gravel refilled the stream bed to nearly the exact same level as the original gravel.

Generally, unless excavated in an inherently unstable fashion, the pool will not fill with gravel from the bar, at the expense of the bar itself. Instead the river will tend to deposit and erode to a stable configuration, particularly here where local rive configuration favors a semi-permanent configuration.

Flood Conditions

During flood events the water surface of the river will rise across the bar until the whole river channel from bank to bank will be at very nearly the same water surface elevation. It is during this period that gravel is transported voluminously. The gravel is moved from (through) the deep hole upstream at the bedrock outcrop, down to the bar where the stream pushes the gravel up the gentler slope on the upstream side of the bar. The current will continue to transport gravel over the top of the bar. Water depths have continued to shallow as they approached the bar crest, tending to increase velocity, while the water is spread of a much broader flow area which tends to decrease energy and gravel carrying capacity. It is these two competing conditions that creates the V shaped bar, with the crest of the bar located where the energy from shallowing water is overcome by the loss of energy from the widening of the stream flow.

As soon as the water begins to get deeper on the downstream side of the bar crest (remember during a flood the water surface elevation is nearly uniform with only the bottom changing elevation), the deeper water for the same flow allows flows to slow rapidly, and therefore, the river loses a lot of energy and it begins to deposit rapidly gravel. Thus we see a shallow to moderate slope up to the upstream side of a bar to the crest, a flat top across the bar, and a much steeper (often angle of repose) slope on the downstream side of the bar, because the gravel is dropped very quickly.

Given this mechanism for gravel transport and deposition it is highly unlikely that the bar will erode into a pool excavated below it. A pool, as proposed, of 10 to 20 feet depth with a slope of 20 degrees to 30 degrees on the sides will be conditionally stable.

The primary caveat is that streams can have very unpredictable responses to even transient events. For example, a snag can fall into the river, lodge on the bar and in a few hours cause erosion and/or deposition that after the flood will cause local changes to flows and channels. A stable excavation in the river, such as proposed by Mr. Galea and Mr. Wetherell, can be destabilized by a transient event, as described above, with unexpected results. Further, a major flood could in a matter of hours fill the bar and the excavation and go on to erode a new hole beneath the dike on the Wetherell farm, independent of the excavation. This should note be confused with the excavation being a precipitating cause of the erosion event.

The second caveat is, the breach in the middle of the bar. Because the breach flows in low summer flows as well as spring and winter flows, it can transport gravels into where the pool should be constructed. This breach should be closed so the flows only cross the bar during the higher winter flows and flood events; as proposed by Mr. Galea and Mr. Wetherell. Further, if the breach is not plugged or even enlarges, it will locally increase downstream flow velocities and reduce any potential stratification of the river temperatures in any nearby constructed pools. Ultimately the river will repair this breach, but the timing is not known, and it could cause problems for some time before a flood of sufficient size comes along to properly rebuild the Upper Woodruff Bar.

LONG AND SHORT TERM IMPACTS ON THE RIVER REACH

Geologically speaking, almost anything done at this bar will not damage the bar over a long time period (unless it is continuously impacted). The reason the Upper Woodruff Bar exists will continue for a long time, and therefore even if the bar were completely excavated away it would eventually be restored, pretty much in its present location. However, in the time between short term impacts to the bar occur, and restoration of the bar is complete, a number of undesirable consequences could occur.

Long term and short term impacts relative to fish and humans life spans are more easily quantified. The most significant impact is the actual excavation period for the pool. The river will need to be rerouted through the "overflow channel", and some turbidity will inevitably impact the river. Though the actual adverse impact is likely to be quite small, particularly compared to the potential benefit of establishing a deep pool refugia, it certainly will be noticeable visually when it occurs.

Will the pool restrict gravel from moving down river? Yes, gravel that is removed from the river will not travel down the river. The excavated pool will need to fill with gravel before gravel will pass the pool location. However, during high water and flood episodes some gravel will pass by the excavations down through the bypass channel (as it always has in the past), or over portions of the Upper Woodruff Bar (not directly up current of the excavation during the flood episode), and portions of the main channel. Not all gravel, only a portion of the gravel moving down the river during high water and floods, will flow into the pool as constructed in the location suggested. Some gravel will

bypass this location because only that gravel passing over the top of the bar immediately upcurrent will eventually be captured by the excavation during floods, while some additional gravel (but mostly sand) will pass by and or be deposited at intermediate water levels and flows of the main channel (which will be re-working local gravels off the main channel's bar crossing.

Very few other adverse impacts will occur from excavating this pool. Positive impacts will occur for the fish, both returning adults and seaward bound juveniles.

IMPORTANCE OF CONSTRUCTED DEEP REFUGIA AND GRAVEL BARS ON CONSTRAINED RIVERS

Deep water has three great features making it good for fish. Depth generally equals slower water, so it acts as a resting place for fish. Secondly, deep water tends to be cooler and offers variable river characteristics for fish to chose from. Finally, deep water provides some increased protection from predation (though it may not for all stages of a fishes life, such as rainbow predation on fry). If however, a variety of habitats, including shallow cool water are accommodated then fish habitat diversity increases, increasing the likelihood that a good safe habitat can be located by the fish using the pool and its fringes.

All of the pools discussed here, and their benefits, rely on a high permeability gravel bar with a head difference between the upstream and downstream side of the bar. This forces water through the gravel, often in substantial volumes, and provides cool water with nutrients and food for fish on the downstream side. That is why the pools should never be built on the upstream side of the bar.

Recognition of the importance of these pools is greatly increased when it is realized that the river has lost many natural deep pools. Commonly this is a result of even modest straightening of the river. There is little prospect of getting these pools back as long as the river stays semi-confined and cannot meander more freely across its flood plain. Restoring some of the deep pools on the river, even artificially would presumably yield significant positive results. Without the construction of pools it appears the river will tend to simply remain a shallow stream, with no refugia for temperature, and less diverse habitats producing cool waters, insects, and other nutrients for the aquatic life.

Finally, the gravel bar itself must be stabilized so the hyporheic river water will continue to flow through bar, and cool and feed the fish on the downstream side. Over time it is clear that the bar has had several episodes of gravel removal that have lowered its current surface by some 5 to 8 feet blow the original surface (see Cross Sections in Appendices E & F). Gravel should not be removed from the bar. Instead it should be removed from the river channel, just offshore on the downstream side of the gravel bar for optimal fish habitat improvement. Ultimately this should be done at various locations up and down the river from the Upper Woodruff Bar.

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I hope this report provides you with sufficient information to complete what will very likely be an excellent habitat enhancement program at the Upper Woodruff Bar.

Appendix A

Reviewed Materials Sent by Frank Galea

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Appendix B

Various Articles and Internet WEB Pages Reviewed for this Report

STATE OF CALIFORNIA—THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *GOVERNOR*

CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
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19 April 19, 2004

EXHIBIT NO. **10**

APPLICATION NO.
1-03-039
REVIEW MEMORANDUM, MARK, JOHNSSON PhD, CEG, CHG, CALIFORNIA COASTAL COMM. – TECHNICAL SERVICES UNIT, APRIL 19, 2004 (1 of 5)

REVIEW MEMORANDUM

To: Jim Baskin, Coastal Program Analyst
From: Mark Johnsson, Staff Geologist
Re: 1-02-026 (Westbrook-Wetherell) CDP Application

With regard to the above referenced permit application, I have reviewed the following documents:

1) EGR & Associates, Inc. 2003, "Geomorphology and hydrology Wetherell--Upper Woodruff Bar salmon habitat restoration", 13 p. report dated 30 August 2003 and signed by R. Christensen (RG 4973).

2) Galea Wildlife Consulting 2003, "Gravel extraction application, Wetherell Ranch, Upper Woodruff Bar, Smith River", 3 p. letter to Dan Free dated 21 July 2003 and signed by F. Galea.

3) Larue, Gerald W. "Letter to Frank Galea dated July 3, 2003, Fluvial-geometric analysis", 2 p. undated letter signed by G. W. LaRue.

4) Galea Wildlife Consulting 2003, "Upper Woodruff Bar, Salmonid Habitat Restoration and Bar Stabilization Project, Project Description and Impacts Analysis", 16 p. report dated 4 June 2003 and signed by F. Galea.

5) Galea Wildlife Consulting 2003, 2 p. undated letter to Dan Free signed by F. Galea.

6) Larue, Gerald W. 2001, "Hydrologist report for Westbrook-Wetherell gravel bar, Smith River system", 17 p. undated report signed by G. W. LaRue.

7) Larue, Gerald W. 1996, 1 p. letter to Dave Baldwin dated 19 August 1996 and signed by G. W. LaRue.

8) Pacific Affiliates 1992, 11 p. packet of cross sections from 11 July 1991 and 14 May 1992 surveys dated 15 May 1992 and initialed by PK.

9) Pacific Affiliates 1990, 10 p. packet of cross sections from 1 May 1989 and 6 December 1990 surveys dated 21 December 1990 and initialed by PK.

In addition, I have reviewed two emails from Dan Free, of NOAA fisheries, commenting on the proposed project. I also met with Mr. Ralph Christensen, geologic consultant for the project, and

Mr. Frank Galea, agent for the applicant, to discuss fluvial geomorphic issues associated with the proposed project. I have discussed the effects of gravel mining in general, and this project in particular, with Dr. Matthias Kondolf of the Department of Environmental Planning and Geography, University of California Berkeley. Dr. Kondolf has extensive experience in fluvial geomorphology and the effects of gravel mining in California streams. I visited the site on 10 March 2004.

In preparation for reviewing applications that involve gravel extraction from active river channels, I recently completed two short courses. The first was a two-day course entitled "Stream and river protection and restoration for the regulator and program manager," held by Ann L. Riley of the California State Water Resources Control Board in 2003. I also attended a three-day short course entitled " Sediment Transport In Gravel-Bed Rivers with Implications for Channel Change", sponsored by the University of California, Berkeley and taught by Peter Wilcock of Johns Hopkins University in February 2004.

I understand that the proposed project involves the excavation of a pool, or trench, in the active main channel of the Smith River approximately four miles upstream of its mouth. The trench would be approximately 175 feet wide and 20 feet deep at its downstream end and taper to 15 feet wide and 10 feet deep at its upper end. The trench would be approximately 800 feet long and would parallel the Woodruff gravel bar, which has been an historic feature of the Smith River at this point. Reportedly, the trench would be in the same location as an historic deep pool on the river that has not been present for several decades. A second part of the project would be to fill a cross-bar channel that developed as a result of previous gravel mining activities on the surface of the Woodruff bar. This channel would be filled with a portion of the gravel excavated from the trench; the remainder of the gravel would be sold as aggregate.

This review does not address the merits of the project as a habitat enhancement restoration project. Rather, I address here the potential for the project to alter the dynamics of the river channel. Section 30253 of the Coastal Act states, in relevant part, that new development shall "*assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area.*" The remainder of this review will analyze the extent to which the proposed project is consistent with Section 30253.

Gravel mining has the capacity to destabilize river channels in a number of ways. Perhaps the most serious effects come about as a result of deep pits or trenches in the active channel, such as is proposed here. First, whenever gravel is removed from the active bed of a river, that gravel is not available to the river channel at points downstream. Regardless of whether or not the amount of gravel extracted is less than the amount supplied from upstream sources ("recruitment") the gravel extracted is a net loss to the river system. In fact, Kondolf (1999) estimates that gravel extraction throughout California exceeds recruitment by an order of magnitude, and recommends that understanding the sediment budget for a given stretch of river is critical to understanding the potential effects of gravel extraction (Kondolf 1995). No sediment budget has been provided in support of the proposed project, and the applicant and his agent have indicated that the collection of such data, which is admittedly a very difficult undertaking, is beyond the means of any single gravel operator.

A common effect of depriving the downstream reaches of a river of its sediment load is that the flow may be capable of mobilizing additional sediment from the river bed . Such "hungry waters" commonly erode the bed of the river, resulting in incision of the channel downstream of the gravel operation (Kondolf 1997). This effect is well documented in California rivers, such as the Russian River, the upper Sacramento River, the San Benito River, and Tujunga Wash in southern California (Collins and Dunne 1990; Kondolf 1994; Florsheim et al. 1998). Deep pits in the active channel compound the effect in that they function as sediment traps. A deep pit such as that proposed will intercept essentially all of the coarse sediment being transported downstream until it fills in. Steep-walled pits in the active channel can also cause incision upstream of the pit (Kondolf 1994). This occurs through "nick-point migration," a process that also causes waterfalls on streams to migrate upstream. The steeper grade at the upstream end of an excavation in the bed of the river causes a localized increase in current velocity at that point. This current has a higher capacity to transport sediment, and so erodes the bed locally. With time, the nick point can migrate far upstream, causing incision of the river channel upstream of the gravel mining operation. Incision can even migrate up tributaries once the main channel has been incised by this process.

One result of channel incision can be a lowering of the water table in alluvial aquifers. This can affect wells or wetlands adjacent to the affected stream (Kondolf 1994).

Gravel mining also can result in a coarsening of the bed of the river. This occurs partly through the selective extraction of gravel and smaller cobble size materials, which most suitable for aggregate, leaving a lag of large cobbles and boulders (Kondolf 1994). In addition, gravel and smaller cobbles that would have remained on the bed may be entrained by the "hungry waters" described above. The result may be an armored bed—one made up principally of large cobbles and boulders that do not move except in the largest floods. Bed coarsening is environmentally significant because the process could result in a streambed lined by cobbles and boulders too large for salmonids to use for spawning.

The dynamics of sediment transport in gravel bed rivers are complex and difficult to evaluate. Numerical models can be used to make predictions, and the predictions of some such models have been validated by field observations. In order to apply these models to the Smith River, however, far more information on bed grain size, sediment budget, and flow regime than currently is available would have to be collected.

All of potential impacts of in-channel gravel mining described above have been observed in gravel bed rivers in California. However, there is anecdotal evidence from the Smith River that previous gravel operations have not resulted in impacts such as these. Reference (9) represents a pre-and post-extraction survey of 10 cross sections through a trench excavated in 1990 at the site of the proposed project. As is evident from these cross sections, a trench up to 30 feet wide and 15 feet deep and at least 1000 feet long was excavated at that time. According to the applicant and his agent, this trench resulted in no observable incision in the channel upstream or downstream. Most notably, the riffle located at the head of the bar, only about 300 feet upstream of the excavation, apparently was not affected. Further, the applicant indicates that the trench was naturally filled in only a few years, suggesting relatively high bed load transport and high

recruitment rates. Reference (8) is a set of surveyed cross sections taken in 1991 and 1992. Indeed, no evidence of the trench is apparent in these cross sections. I note, however, that these cross sections extend no more than 215 feet southwest of a baseline established on the bar itself. Comparison with reference (9) shows that the axis of the trench was from 200 to 240 feet southwest of the baseline. The cross sections, accordingly, are somewhat limited in their ability to resolve whether the trench was filled at this time or not. In any case, the trench was not evident when I visited the site, although the time of my visit was at relatively high water. However, the trench may have been filled not from gravel that coming from far upstream, but from a redistribution of gravel on the bar to the northeast of the trench. Indeed, a channel has been cut across this bar as a result of capture of high flows by an access road graded during gravel mining activities on the bar itself. Much of the gravel that was carried away as this channel was cut likely ended up in the trench.

There are several other gravel operations nearby, most notably several deep pits immediately downstream of the Woodruff bar on the Crockett Bar. These pits do not appear to have generated upstream or downstream incision. Further, there is no evidence that the Highway 101 bridge, approximately 1.5 miles upstream of the bar, has been affected by scour such as is common in rivers affected by channel incision.

These anecdotal data indicate that, despite past gravel mining activities, this reach of thee Smith River does not seem to have suffered the impacts often seen on gravel-bed rivers on which in-channel mining has occurred. Although the reasons for this are unknown, there are several reasons why this part of the Smith River may not be as susceptible to such impacts as other rivers. First, the Smith River, unlike nearly all sizable rivers in coastal California, has not been dammed. Thus, there are no impediments to trap sediment upstream of the areas of the gravel mining operations. Second, due to poor timber management practices in the past, the river and its tributaries may be receiving relatively high sediment loads. Because these practices largely have been corrected, this situation is likely to be a temporary one. Finally, the site of this and most other gravel operations on the Smith River is near the downstream end of the river. The river bed is less than 30 feet above sea level at this point. There simply is not much room for incision of the bed this close the sea level.

Currently, a high-water channel cuts across the Woodruff bar. Reportedly, this channel was formed by capture of high flow water by an access road built for gravel operations on the bar itself. Part of the proposed project is to fill this eroding channel to prevent its growth and the potential bifurcation of the bar. I can identify no adverse impacts from this portion of the project on the basis of channel stability. Indeed, this part of the project would help prevent the main channel from shifting into a new location, although there may be a natural tendency for it to do so eventually in any case.

To summarize, the effects of the proposed project are potentially complicated and difficult to predict. Well-documented effects from similar excavation operations on rivers elsewhere in the State have resulted in destabilization of the channel, channel incision, and coarsening of the bed. The limited data available do not indicate that such problems have occurred on the Smith River as a result of past activities, but without such basic information as a complete sediment budget, potential impacts of the proposed project are difficult to judge.

I hope that this analysis is helpful. Please do not hesitate to contact me if you have further questions.

Sincerely,

Mark Johnsson, Ph.D., CEG, CHG
Staff Geologist

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