

Appendix A

Section 404(b)(1) Evaluation

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Lower Yuba River Pilot Gravel Injection Project Yuba and Nevada Counties, California

I. Project Description

The U.S. Army Corps of Engineers (Corps) is proposing to implement a pilot gravel injection project with the placement of approximately 500 tons of a heterogeneous mix of gravel and cobble (0.25 – 5.0 inches in diameter) injected directly into the lower Yuba River channel. This project is being conducted in cooperation with the Watershed Hydrology and Geomorphology lab at University of California, Davis (UCD), and with the Anadromous Fish Restoration Program Core Group under authority of the Central Valley Project Improvement Act. The proposed gravel injection site is located approximately 25 feet downstream of the Yuba County Water Agency (YCWA) Narrows II hydroelectric power facility. The proposed action would occur in late September of 2007.

Approximately 360 uniquely identified tracer cobbles will be added to the gravel mix before injection of the gravel into the river channel. The fate of the injected gravel would be tracked for an improved understanding of the lower Yuba River geomorphic processes. Injected material would be monitored by UCD during fall and winter of 2007 with the aid of group surveys and low aerial digital photography using a tethered 8-foot blimp system. Knowledge gained from the study of this proposed action would allow the Corps to develop and implement a long-term gravel augmentation program.

a. Location

The Project area is located on the lower Yuba River starting at Englebright (Yuba River mile 23.9) downstream to Daguerre Point Dam (Yuba River mile 11.4), Yuba and Nevada Counties, California. The proposed gravel injection site is less than one acre and confined to the river channel located in the steep Narrows canyon off Highway 20, about 23 miles east of Marysville, California.

b. General Description

A telescopic belt conveyor with a horizontal reach of at least 105 feet and feed capacity of at least 2.5 cubic yards per minute will inject 500 tons of specified gravel directly into the water within the lower Yuba River channel. The belt conveyor will be parked on a road bench identified downstream of and level with the top of the YCWA Narrows II powerhouse facility. The telescopic conveyor will be extended at least 80 feet horizontally over the river. A gravel-fed hopper will feed the telescopic belt conveyor and drop gravel 40 feet down directly into the lower Yuba River.

Gravel transport dump trucks will deliver gravel to the hopper from a local aggregate producer within the local watershed via paved public and private roads. Dump trucks will unhitch trailers at a pre-designated transfer area and deliver and stockpile gravel adjacent to the

belt conveyor hopper. A front-end loader will be used to feed the gravel into the belt conveyor. The empty dump trucks will return to the trailers, re-hitch, and deliver and dump the second load. Empty dump trucks and trailers will then be driven back to the aggregate producer and the process repeated until 500 tons of gravel are delivered and injected into the Lower Yuba River. Outflow release from Narrows II will aid in transporting the gravel downstream to various sections of the lower Yuba River that have been designated as critical habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead.

c. Background

Englebright Dam has effectively cut off the supply of gravel delivered to the lower Yuba River from upstream sources and has greatly altered geomorphic processes and aquatic habitat conditions in the Lower Yuba River channel downstream of the dam. Without additional gravel delivery to the channel, the existing gravel supply in the bed and usable gravel stored in bars will decrease as it is gradually transported downstream, leading to a reduction of quality spawning gravel for the federally-listed Central Valley steelhead and spring-run Chinook salmon.

d. Authority and Purpose

The proposed action would satisfy the Terms and Conditions of the incidental take statement included in the April 27, 2007, Biological Opinion prepared by National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. Specifically, the BO states: “the Corps, in cooperation with the UCD and the Anadromous Fish Restoration Program, shall implement the proposed pilot gravel injection project below Englebright Dam within 1 year of the issuance of this BO.” Knowledge gained from the study of this pilot gravel injection would allow the Corps to develop and implement a long-term gravel augmentation program. The long-term program would serve to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River.

e. General Description and Quantity of Dredged or Fill Material

(1) General Characteristics of Material. Gravel and cobble specifications would include 500 tons of uncrushed “natural river rock” from local aggregate producers within the local watershed that meet the gradations as follows:

Gravel Size (inches)	Percent Retained	Target % of Total Mix
4 to 5	0 - 5	2.5
2 to 4	15 - 30	20
1 to 2	50 - 60	35
¾ to 1	60 - 75	15
½ to ¾	85 - 90	15
¼ to ½	95 - 100	10
< ¼	100	2.5

To ensure that the specifications meet cleanliness values as required under the Clean Water Act, all gravel would be washed before arriving at the injection site. Mixing of earth material with stockpiled or delivered gravel would not be allowed.

(2) Source of Material. Gravel and cobble would be sourced from local aggregate producers within the local watershed. Following is a list of potential sources for materials that meet the described specifications:

Silica Resources
6130 State Highway 20
Browns Valley, CA
(530) 742-2890

Silica Resources, Inc.
4553 Hammonton Rd
Marysville, CA
(530) 741-0290

f. Description of the Proposed Discharge Site(s)

(1) Location. The YCWA Narrows II powerhouse is located off Highway 20 about 23 miles east of Marysville, Yuba County, CA. Take Peoria Road off Highway 20 (2 miles downstream of Parks Bar Bridge). Peoria Road merges into Scott Forbes Road to Narrows II powerhouse. Total distance from Highway 20 to Narrows II powerhouse: 8 miles.

(2) Size. The proposed gravel injection site is less than one acre

(3) Type of Site. The gravel would be injected directly into the lower Yuba River channel from an existing unpaved road bench.

(4) Type(s) of Habitat. The lower Yuba River channel at the project injection site is mostly devoid of vegetation. Small isolated clumps of shining willow, mulefat, and other riparian species are widely scattered along the otherwise barren rocky banks for approximately 2 miles downstream.

(5) Timing and Duration of Discharge. The gravel injection must be completed no later than 30 September 2007. 1-2 days is estimated to complete the work.

g. Description of Disposal Method (hydraulic, drag line, etc.)

A telescopic belt conveyor with a horizontal reach of at least 80 feet and feed capacity of at least 2.5 cubic yards per minute will inject specified gravel directly into the water within the lower Yuba River channel.

II. Factual Determinations (Section 230.11)

a. Physical Substrate Determinations (consider items in Section 230.11(a# and 230.20 Substrate)

(1) Substrate Elevation and Slope. The project injection site is 305 feet above sea level with a channel slope of 14 to 15 feet per mile.

(2) Sediment Type. Soils of the site are river deposits which include silts, sands, gravel, and bedrock.

(3) Dredged/ Fill Material Movement. The project injection site is within a hydraulically efficient stretch of lower Yuba River. The gravel would likely eventually be flushed from the area under high flows into the Narrows Pool – a deep in-channel pool downstream of the proposed injection site.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.). Higher invertebrate density and biomass are expected after the proposed gravel injection as compared to the existing site conditions. These benefits may only be temporary because of the transient nature of injected gravels within the hydraulically efficient stream channel.

(5) Other Effects. The project would increase the amount of suspended sediment and thus turbidity within the project area. However, the increase would be temporary and localized.

(6) Actions Taken to Minimize Impacts. To ensure that the specifications meet cleanliness values as required under the Clean Water Act, all gravel would be washed before arriving at the injection site. Mixing of earth material with stockpiled or delivered gravel would not be allowed.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Consider effects on:

(a) *Salinity*. Not applicable.

(b) *Water Chemistry (pH, etc.)*. No significant effect.

(c) *Clarity*. Temporary and localized increases in turbidity would be likely at the gravel injection site and immediately downstream. No significant long-term effects.

(d) *Color*. Temporary and localized changes in color would be likely at the gravel injection site and immediately downstream. No significant long-term effects.

(e) *Odor*. No significant effect.

(f) *Taste*. No significant effect.

(g) *Dissolved Gas Level*. No significant effect.

(h) *Nutrients*. No significant effect.

(i) *Eutrophication*. No significant effect.

(j) *Others as Appropriate*. No significant effect.

(2) Current Patterns and Circulation. No significant effect.

(3) Normal Water level Fluctuations. No significant effect.

(4) Salinity Gradients. Not applicable

(5) Actions That Will Be Taken to Minimize Impacts. Gravel would arrive pre-washed from a commercial source and would be injected directly into the river. No mechanized equipment will be entering the channel. The gravel injection site is minimized to less than one acre.

c. Suspended Particulate/ Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site. Increases in turbidity would be localized where gravel is injected into the lower Yuba River channel. Increases in turbidity would be short-term and considered less than significant.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column.

(a) *Light Penetration*. No significant effect.

(b) *Dissolved Oxygen*. No significant effect.

(c) *Toxic Metals and Organics*. Gravel would arrive pre-washed from a commercial aggregate source to remove sediments that may contain mercury. Any mercury levels remaining in residual gravel sediments would be considered low and its release would not be expected to pose any environmental or health risk

(d) *Pathogens*. Not applicable.

(e) *Esthetics*. Turbidity would be localized and temporary. No significant change is anticipated.

(f) *Others as Appropriate*. There would be no other significant adverse effects to the chemical and physical properties of the water column.

(3) Effects on Biota

(a) *Primary Production, Photosynthesis*. Gravel injection activities would result in localized and temporary increases in turbidity. Increases in turbidity would be minimal and would not inhibit photosynthesis in the channel.

(b) *Suspension/ Filter Feeders*. The project may temporarily affect suspension and filter feeders on a localized scale. However, the effect would be temporary and less than significant for the area.

(c) *Sight Feeders*. The project would temporarily affect sight feeders on a localized scale. However, the effect would be temporary and less than significant for the area.

(4) Actions Taken to Minimize Impacts. Effects to the aquatic biota would be temporary and not significant in the area downstream of the gravel injection site. Therefore, no additional measures to minimize effects are necessary.

d. Contaminant Determinations

The proposed project would not add contaminants to any nearby body of water. Best management practices to reduce the potential of accidental spills during gravel injection would follow all regulatory requirements in conjunction with the National Pollution Discharge Elimination System permitting process.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton. Effects to plankton would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(2) Effects on Benthos. Effects to the benthos would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(3) Effects on Nekton. Effects to nekton would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(4) Effects on aquatic Food Web. There would be no adverse effects to the aquatic food web, or the plankton, benthic and nekton communities with the proposed project

(5) Effects on Special Aquatic Sites (discuss only those found in project area or disposal site)

(a) *Sanctuaries and Refuges*. None exist in project area.

(b) *Wetlands*. None exist in project area.

(c) *Mud Flats*. None exist in project area.

(d) *Vegetated Shallows*. None exist in project area.

(e) *Coral Reefs*. None exist in project area.

(f) *Riffle and Pool Complexes*. A potential short-term localized effect to the geomorphologic process would be expected in response to the gravel injection. The geomorphic stability of the river would reach dynamic equilibrium with the redistribution of injected gravel into hydraulically shielded areas that allow coarse sediment deposition to occur. Because the proposed injection site is within a hydraulically efficient stretch of lower Yuba River, the gravel would likely eventually be flushed from the area under high flows into the Narrows Pool – a deep in-channel pool downstream of the proposed injection site. Some beneficial effects (for anadromous fish) on geomorphic conditions are expected to result from the gravel injection.

(6) *Threatened and Endangered Species*. The proposed project may affect, but not likely adversely affect, the following Federally listed and candidate species: Central Valley fall/late fall-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and green sturgeon. The proposed action will also not adversely affect designated critical habitat of the spring-run Chinook salmon and steelhead.

The proposed project short-term effects may include localized and temporary disturbance, displacement, or impairment of feeding, migration, or other essential behaviors by adult and juvenile salmon and steelhead from noise, suspended sediment, turbidity, and sediment deposition generated during gravel injection activities. Gravel injected into the river would cause short-term increases in turbidity and temporarily disturb salmonids within the stream channel. Short-term increases in turbidity and suspended sediment may disrupt feeding activities of salmonids or result in temporary displacement from preferred habitats. Gravel injected into the river bed can also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for salmonids. Consequently, growth rates of salmonids could be reduced if suspended sediment and turbidity levels substantially exceeded ambient levels for prolonged periods.

Long-term effects of the proposed pilot gravel injection on the critical habitat of salmonids include alteration of river hydraulics and substrate conditions within the river channel. The total aquatic volume of the Narrows II pool may be initially decreased by deposition of injected gravel. However, it is expected that a substantial

portion of the introduced substrate would eventually be transported downstream to hydraulically shielded areas during periods of greater discharge.

Whether the modified channel offers more favorable habitat for spawning and rearing, and whether more favorable fish habitat translates to increased biological production remains uncertain. The proposed gravel injection site within the Narrows reach may have primarily served as a pathway for fish traveling to and from spawning habitat farther upstream in the drainage network. With upstream migration blocked by Englebright, this mainstream channel becomes the upstream-most available location to create alluvial habitat.

The key challenge is to balance the need for reduced gravel mobility with the biological requirement of preferred substrate, depth, and flow velocity for spawning and redd survival. Achieving this balance is particularly difficult because of the wide range of flow magnitudes that must be accounted for. Implementation of the proposed gravel injection project would improve the understanding of how gravel resources (spawning habitat) respond to changes in flow, and allow better identification of channel reaches where a long-term gravel augmentation program might be most beneficial.

(7) Other Wildlife. The proposed project action would have no significant adverse effect on wildlife because of the limited scope and duration of the action. Gravel will be injected directly into the river channel for one to two days. Any displaced wildlife would be expected to return to the area after the action is completed.

(8) Actions to Minimize Impacts. There would be no significant adverse effects to wildlife due to proposed project action. Therefore, there would be no minimization measures needed.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination. Not applicable.

(2) Determination of Compliance with Applicable Water Quality Standards. No water quality or effluent standards would be violated during proposed project action.

(3) Potential Effects on Human Use Characteristics. The proposed project would not have any significant adverse effects to municipal and private water supply, recreational and commercial fisheries, or water-related recreation. There would be no national and historic monuments, parks, seashores, wilderness areas, research sites or similar preserves affected by the proposed project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

The proposed project would not have any significant cumulative effects on the aquatic ecosystem. The results of the proposed project would be used to develop a long-term gravel injection program that would serve to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River. As a result, the proposed project would benefit, rather than adversely impact, the fluvial geomorphologic characteristics of the lower Yuba River by providing a better understanding of the geomorphic and ecological context of the system before development of strategies for a long-term program. Restoration efforts (e.g., gravel augmentation) immediately downstream from Englebright Dam, where there is a net deficit of spawning caliber sediment, may provide disproportionately important spawning habitat which will result in a benefit to production of the system.

h. Determination of Secondary Effects on the Aquatic Ecosystem

Local physical habitat changes, such as improved availability and quality of spawning gravel, are to be expected. Behavioral and biological benefits for salmonids can also be expected downstream of the proposed gravel injection site, including reduced redd superimposition, improved spawner distribution, and improved invertebrate production.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Impact on the Aquatic Ecosystem

There were no alternatives identified that would have significantly less adverse effects on the aquatic ecosystem than the proposed alternative.

c. Compliance with Applicable State Water Quality Standards, and;

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act

State water quality standards would not be violated. The proposed project would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act (ESA) of 1973

The Corps has initiated consultation with USFWS and NOAA Fisheries under Section 7 of the Endangered Species Act for potential effects to listed species.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

Not applicable.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

- a. *Municipal and Private Water Supplies*. No significant effect.
- b. *Recreation and Commercial Fisheries*. No significant effect.
- c. *Plankton*. No significant effect.
- d. *Fish*. No significant effect.
- e. *Shellfish*. No significant effect.
- f. *Wildlife*. No significant effect.
- g. *Special Aquatic Sites*. No significant effect.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems. None.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity, and Stability. None.

(4) Significant Adverse Effects on Recreational, Esthetic, and Economic Values. None.

