APPENDIX A

Notice of Preparation

To: Responsible, Federal and Trustee Agencies
(Agency)

(Address)

From: California Department of Fish and Game

601 Locust Street

Redding, CA 96001

Subject: **Notice of Preparation of a Draft Subsequent Environmental Impact Report**

The California Department of Fish and Game (CDFG) is the lead agency and is preparing a subsequent environmental impact report (EIR) for the project identified below. CDFG would like input from your agency and interested members of the public regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the subsequent EIR prepared by CDFG when considering any permit or other approval related to the proposed project.

The project description, location, and potential environmental effects are contained in the attached materials. A copy of the initial study ☒ ***is*** ☐ ***is not*** attached.

Because of the time limits mandated by state law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice.

Please send your response to Mark Stopher at the address above. Please include your name or the name of a contact person in your agency.

Project Title: Suction Dredge Permitting Program

Project Applicant, if any: n/a

Date: 10/26/09

Signature: [signature]

Title: Chief Deputy Director

Telephone: 916.653.7667

Email: dfgsuctiondredge@dfg.ca.gov

Reference: Cal. Code Regs., tit. 14, (CEQA Guidelines) Sections 15082, subd. (a), 15103, 15375.

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Initial Study
Suction Dredge Permitting Program
Subsequent Environmental Impact Report

Prepared for:

California Department of Fish and Game
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Redding, CA 96001
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November 2009

Horizon Water and Environment. 2009.
Initial Study, Suction Dredge Permitting Program SEIR. November.
Prepared for the California Department of Fish and Game. Redding, CA.

PROGRAM DESCRIPTION

1. Introduction

Small-scale suction dredge mining activity in California began in the 1960's and peaked in the late 1970's and early 1980's, when gold prices were high. The California Department of Fish and Game (Department or CDFG) administers a permitting program governing the use of vacuum and suction dredge equipment pursuant to Fish and Game Code section 5653 et seq. Existing regulations promulgated by CDFG governing suction dredge mining are found in Title 14 of the California Code of Regulations, commencing with section 228. The existing regulatory regime governing the activity as administered by the Department is rooted in statutory amendments to the Fish and Game Code that took effect in the late 1980's. The Department promulgated the existing regulations governing suction dredge mining in California consistent with this statutory authority in 1994. Under the statute and regulations, any California resident or non-resident may obtain a suction dredge mining permit from the Department upon payment of a fee required by statute. The permits issued by the Department authorize suction dredge mining throughout California subject to the terms and conditions set forth in the regulations. On average, the Department has issued approximately 3,200 suction dredge mining permits to California residents every year for the last 15 years. The comparable figure for non-resident suction dredge mining permits issued by the Department is 447.

The Department promulgated the existing regulations governing suction dredge mining in 1994 after preparing and certifying an environmental impact report (State Clearinghouse Number 93102046) under the California Environmental Quality Act (CEQA) (hereafter, the 1994 EIR). The Department considered proposed amendments to the existing regulations governing suction dredge mining in 1997, releasing a draft subsequent EIR for public review that same year (hereafter, the 1997 Draft SEIR). However, the 1997 Draft SEIR was never completed or certified.

This Initial Study and the Department's current effort under CEQA stems from a legal challenge to the existing permitting program initiated in Alameda County Superior Court in May 2005 (*Karuk Tribe of California et al. v. California Department of Fish and Game* [Super. Ct. of Alameda County, 2005, No. RG05211597]). The *Karuk* lawsuit focused on the Klamath, Scott and Salmon River watersheds in northern California, and included allegations regarding impacts to various fish species, such as coho salmon (*Oncorhynchus kisutch*), and contended that the Department's administration of the suction dredging program violated CEQA and various provisions of the Fish and Game Code. In February 2006, various mining interests and a number of individuals joined the lawsuit by court order as party interveners. In December 2006, the Alameda County Superior Court issued an order with the consent of all parties, directing the Department to "conduct further environmental review pursuant to CEQA of its suction dredge mining regulations and to implement, if necessary, via rulemaking, mitigation measures to protect coho salmon and/or other special status fish species in the watershed of the Klamath, Scott, and Salmon rivers, listed as threatened or endangered after the 1994 EIR" (hereafter, the December 2006 Court Order). For purposes of CEQA, the December 2006 Court Order describes the Department's legal obligations in terms of Public Resources Code section 21166 and related provisions in the CEQA Guidelines found in sections 15162 through 15164.[1]

As part of its effort to comply with the December 2006 Court Order, the Department issued a public notice in October 2007, soliciting information regarding the environmental impacts that may occur in California as a result of suction dredge mining under the Department's existing permitting program (Cal. Reg. Notice Register 2007, No. 42-Z, p. 1783, October 19, 2007) (hereafter, the October 2007 Public Notice). In so doing, the Department sought information from interested members of the public and various public agencies relevant to the following issues:

- Whether suction dredge mining results in adverse impacts to the environment;
- Whether suction dredge mining under the Department's current regulations governing such activities results in deleterious effects to fish;
- Whether there are changed circumstances or new information available since 1994 regarding suction dredge mining and the environment generally; and
- Whether changed circumstances or new information available since 1994 indicates that suction dredge mining under the Department's existing regulations is resulting in new significant or substantially more severe environmental impacts than previously considered by the Department in the 1994 EIR.

In response to the October 2007 Public Notice, the Department received comments from approximately 70 federal, state, and local agencies; various tribal, environmental, and mining interests; representatives of the academic and consulting community; and members of the public. Based on this information, the Department informed the Alameda County Superior Court on January 7, 2008, that it had determined it could not proceed with the court-ordered environmental review in reliance on an addendum prepared pursuant to CEQA (see generally CEQA Guidelines, § 15164). The Department indicated to the court at the same time that more than minor additions or changes to the 1994 EIR would be necessary and that statewide issues would need to be addressed in a subsequent environmental document in order to fulfill the Department's obligations under CEQA. On February 26, 2008, the Department informed the Alameda County Superior Court that it intended to prepare a subsequent environmental impact report (SEIR) that would be statewide in scope in order to comply with the December 2006 Court Order.

The SEIR and related review under CEQA will analyze new significant and substantially more severe environmental impacts that may be occurring under the existing permitting program that were not addressed by the Department during prior environmental review completed in 1994. The proposed project, for the purposes of the SEIR, will consist of continued implementation of the permitting program, and, if necessary, proposed amendments to the Department's existing regulations governing suction dredge mining throughout California. (See generally Cal. Code Regs., tit. 14, § 228 et seq.) This proposed project is referred to as the "Proposed Program" or simply the "Program" throughout this Initial Study.

[1] The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

With respect to proposed amendments to the existing regulations, the Department is charged by the Fish and Game Code to issue suction dredge permits where the Department determines, consistent with the regulations, that the operation will not be deleterious to fish (Fish & G. Code, § 5653, subd. (b).). Any proposed amendments to the Department's existing regulations governing suction dredge mining must be promulgated in compliance with the Administrative Procedure Act (APA) (Gov. Code, § 11340 et seq.). The Department anticipates that "formal rulemaking" under the APA to promulgate amendments to the existing suction dredge mining regulations will run concurrently with the related environmental review of the SEIR required by CEQA. The scope of the proposed amendments to the existing regulations is discussed below in more detail.

The use of vacuum or suction dredge equipment for instream mining is currently prohibited in California by state law (Fish & G. Code, § 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins)). As signed into law by Governor Schwarzenegger and effective August 6, 2009, SB 670 (Wiggins) establishes a temporary moratorium on instream suction dredge mining in California, even with an existing permit issued by the Department. The new law also prohibits the Department from issuing any new permits under the existing regulations. The statewide moratorium on instream suction dredge mining and the related prohibition on the issuance of new permits will remain in place until the Department completes the environmental review required by the December 2006 Court Order; the Department adopts, as necessary, updates to the existing regulations; and any such updates become effective. (Fish & G. Code, § 5653.1, subd. (b).)

The Department is also subject to a separate court order prohibiting the issuance of any new suction dredge permits under the existing regulations. Issued by the Alameda County Superior Court as a preliminary injunction on July 9, 2009, the order specifically prohibits the Department from expending any money from the California General Fund in connection with the suction dredge permitting program. The court clarified on July 27, 2009, that the order and preliminary injunction prohibits the Department from issuing any new permits under the existing regulations. The order and preliminary injunction will remain in place pending further court order or other direction from the Alameda County Superior Court. (*Hillman et al. v. California Dept. of Fish and Game*, Super. Ct. Alameda County, 2009, No. RG09434444, order filed July 10, 2009.)

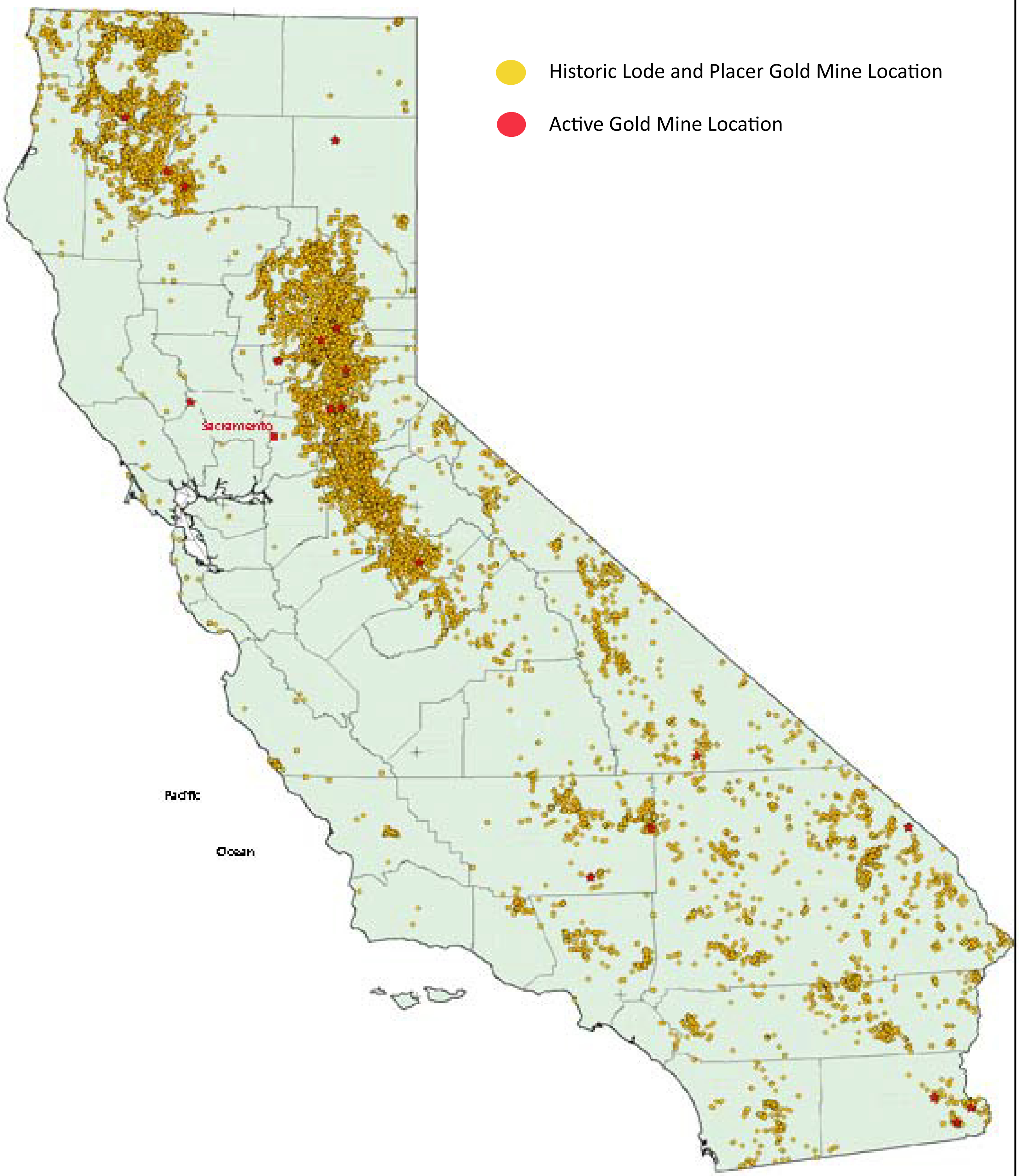
2. Program Area

Suction dredging occurs in rivers and streams throughout the state where gold is present, and the Department's existing suction dredge regulations identify areas throughout the state that are currently open or closed to suction dredging. Most dredging takes place in streams draining the Sierra Nevada, Klamath Mountains, and within the Mojave Desert (see Figure 1). Suction dredging may also occur to a lesser extent within the Peninsular Ranges, Transverse Ranges, northern Great Valley, and Coast Ranges.

3. Program Objectives

The objectives of the Program are as follows:

- Comply with the December 2006 Court Order;



Modified from California Department of Conservation, Division of Mines and Geology. 1998 Map of California Historic Gold Mines.

Horizon WATER and ENVIRONMENT

Figure 1
Program Area

- Promulgate regulations as necessary that effectively implement Fish and Game Code section 5653 and 5653.9 and other applicable legal authorities;
- Fulfill the Department's mission of managing California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public; and
- Ensure that the development of the regulations consider economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation.

4. Program Description

4.1 Applicability

The Department's regulatory authority governing suction dredge mining is based specifically on Fish and Game Code section 5653 et seq. In general, these provisions of the Fish and Game Code prohibit the use of any vacuum or suction dredge equipment by any person in any river, stream, or lake in California, except as authorized by a Department permit issued in compliance with regulations adopted pursuant to Fish and Game Code section 5653.9. (See Fish & G. Code, § 5653, subd. (a).) The Department's existing regulations governing the issuance of vacuum and suction dredge permits are found in Title 14 of the California Code of Regulations in sections 228 and 228.5.

For purposes of the Department's existing regulations, "suction dredging (also called vacuum dredging) is defined as the use of a suction system to remove and return materials at the bottom of a stream, river, or lake for the extraction of minerals." (Cal. Code Regs., tit. 14, § 228.) The Department's regulatory authority pursuant to Fish and Game Code section 5653 et seq. pertains, in this respect, to the use of vacuum and suction dredge equipment in California for instream mining. Related provisions of the Fish and Game Code underscore the same point. Recently enacted Fish and Game Code section 5653.1 refers to the use of vacuum and suction dredge equipment for instream mining, prohibiting the use of the equipment for this purpose pending, among other things, completion of the environmental review that includes this Initial Study. (Fish & G. Code, § 5653.1, subds. (a)-(b), added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins); see also *id.*, § 2 (referring to "suction or vacuum dredge mining").) The same provision of the Fish and Game Code also clarifies that the related temporary moratorium on the use of vacuum and suction dredge equipment is limited to instream mining, and that the section does not expand or provide new authority for the Department to regulate suction dredging for other purposes governed by other state or federal law. (Fish & G. Code, § 5653.1, subd. (c).)

That the Department's regulatory authority under Fish and Game Code section 5653 et seq. is limited to instream suction dredge mining is also underscored by legislative history. Fish and Game Code section 5653, for example, derives from former Fish and Game Code section 5653. (See former Fish & G. Code, § 5653, added by Stats. 1961, ch. 1816, § 1 (SB 1459 (Arnold).) Legislative history materials related to this former section specifically casts the Department's related regulatory authority in terms of instream mining. (See, e.g., Analysis of Senate Bill No. 1459 (Arnold), as amended in the Senate May 26, 1961, Legislative Analyst (referring to the use of "vacuum or suction devices … to carry out gold dredging operations … in rivers and streams"); Letter to Honorable Edmund G. Brown, Governor, from Senator

Stanley Arnold (June 16, 1961) (urging the Governor's favorable consideration of the SB 1459 as passed unanimously by the Legislature; "intent of this bill" is to regulate and control the use of "small portable dredging equipment used for gold recovery by skin divers in streams"); State of California Interdepartmental Communication to the Honorable Edmund G. Brown, Governor, from the Director, Department of Fish and Game, Subject: Senate Bill No. 1459 (June 28, 1961) (recommending approval of the bill, indicating it is "designed to control the activities of the 'weekend gold miners' who are using portable suction dredges … in the stream beds of northern and central part of the state").)

Against this backdrop, for purposes of this Initial Study and the SEIR, key constitituent parts of a suction dredge include the following:

(1) A vacuum hose operating through the Venturi effect which removes sediment from the bottom of the stream;

(2) A motor-driven pump; and

(3) A sluice box.

The following, in turn, is an incomplete list of activities that are not considered suction dredging for purposes of the Proposed Program, as they are not subject to the Department's permitting authority under Fish and Game Code section 5653, subdivision (b). However, other permits or authorizations from the Department may be required, including in some instances a Lake or Streambed Alteration Agreement pursuant to Fish and Game Code section 1600 et seq. (See also Cal. Code Regs., tit. 14, § 228, subd. (f).)

- Use of non-motorized (e.g., hand-powered) suction dredging equipment;
- High-banking outside of the existing water line;
- Sluicing or panning for gold;
- Use of a suction dredge with its intake pipe removed but still using a pump to move water through the sluice box;
- Power sluicing for gold; and
- Use a suction dredge (e.g., cutterhead dredge) for the purposes of infrastructure maintenance, flood control, or navigational purposes.

There may be other methods of placer mining not captured by the above list.

4.2 Summary of Existing Regulations

The current regulations governing suction dredging under the Fish and Game Code are found in Title 14 of the California Code of Regulations, in sections 228 and 228.5. The Department adopted these regulations on May 27, 1994, with the latest subsequent revisions made in April 2008. Under the existing regulations, every person operating a suction dredge in the state of California for instream mining must be in possession of a suction dredge permit issued by the Department. Permits can be obtained from Department offices or by mail following the submission of an application and payment of the statutorily prescribed fee ($47.00 for California residents, $185.25 for non-residents as of June 2009). (See also Fish &

G. Code, §5653, subd. (c).) Permits are valid for a single calendar year (January-December), regardless of the date of issuance by the Department.

The regulations identify equipment requirements, seasonal and permanent closures for locations throughout the state, restrictions on the methods of operation, and permit revocation and suspension rules (see summary below).

The Department reserves the right to revoke or suspend permits for any violation of the terms and conditions set forth in the governing regulations. Repeat offenders may be subject to revocation of current permits or prohibited from permit renewal based on past citations or convictions. Furthermore, all waters are subject to closure from suction dredging following emergency regulatory action by the Department pursuant to Government Code section 11346.1. (Cal. Code Regs., tit. 14, § 228, subd. (h); see also Fish & G. Code, § 5653.7.)

4.2.1 Equipment Restrictions

The Department regulates the allowable intake nozzle and hose diameter of suction dredges. A 6-inch diameter nozzle intake is generally the largest allowed size, however a larger nozzle is allowed under the following conditions:

- A larger intake is permitted with the use of a constricting ring (<6 inch diameter) attachment
- An 8-inch nozzle size is permitted on the following ten rivers: American, Consumnes, Feather, Klamath, Merced, Mokelumne, New, Scott, Trinity, and Yuba.

In all cases, the inside diameter of the intake hose may not be greater than 4 inches larger than the permitted intake nozzle size. (See generally Cal. Code Regs., tit. 14, § 228, subd. (e).)

4.2.2 Method of Operation

Under the existing regulations in effect until August 6, 2009, a permittee operating with only a suction dredge permit, was not allowed to do the following:

- Move boulders outside the existing water line;
- Winch materials embedded in banks of streams or rivers;
- Cause water to be deflected or diverted into the bank;
- Use power-winch activated shovels, buckets or rakes in the stream course;
- Damage or remove woody riparian vegetation;
- Suction dredge into the bank;
- Remove or relocate anchored or exposed woody debris;
- Create or obstruct a stream such that fish passage is impeded; or
- Import earthen material into the waterway.

(See generally *Id.*, § 228, subd. (f).)

4.2.3 Area Restrictions

Prior to the temporary moratorium established in August 2009 with the enactment of SB 670 (Wiggins), the Department's existing suction dredge regulations identified seasonal or year-round closures in the various counties within the state, along with additional seasonal/permanent closures for particular waterbodies. The existing regulations make clear that the regulations do not authorize trespass or otherwise affect the permittee's responsibility to comply with other applicable laws and ordinances. (Cal. Code Regs., tit. 14, § 228, subd. (g).) Permits issued pursuant to the Department's existing regulations also do not allow suction dredging in lakes or reservoirs without special approval and site review by the Department. (Cal. Code Regs., tit. 14, § 228, subd. (d).)

Current permit language also stipulates that suction dredging may be restricted in waters designated under the state and federal Wild and Scenic Rivers Acts. Waters designated under these Acts include portions of the following rivers: American (North Fork American and Lower American rivers), Big Sur, Eel, Feather, Kern, Kings, Klamath, Merced, Sespe Creek, Sisquoc, Smith, Trinity, and the Tuolumne. In addition, the Auburn State Recreation Area imposes special restrictions on suction dredging.

Areas previously closed to suction dredging also include some waters in the San Gabriel Mountains, and portions of the Sequoia and Sierra National Forests (designated as the Kings River Special Management Area), as well as waters in National Parks, National Monuments, State Parks, and designated wilderness areas.

4.3 Description of Updated Regulations

For purposes of this Initial Study, the Department has not yet developed and does not have specific proposed amendments to the existing regulations. Updating the existing regulations, however, is part of the Proposed Program contemplated by the analysis set forth below and any specific updates to the existing regulations proposed by the Department will be identified specifically in the draft SEIR. Any such updates will be consistent with and proposed as necessary to comply with the Department's statutory obligations set forth in Fish and Game section 5653, subdivision (b). That obligation requires the Department to issue suction dredge permits, but only where the Department determines pursuant to its adopted regulations that the operation will not be deleterious to fish. (Fish & G. Code, §§ 5653, subd. (b), 5653.9.) Likewise, importantly, any proposed updates to the existing regulations must and will be implemented within the fee structure currently prescribed by statute for the permitting program. (*Id.*, § 5653, subd. (c).) Updates to the existing regulations are also likely to be statewide in scope, as well as location-specific depending on various factors, including the water body at issue, the presence of biological resources, and related environmental effects.

In developing any proposed updates to the existing regulations the Department is guided by, among other things, the definition of "fish" set forth in the Fish and Game Code. Section 45 of the Code defines fish to mean wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn, or ova thereof. Similarly, the Department is guided by the common sense plain meaning of the word deleterious such that deleterious effect generally means a wide-ranging or long-lasting consequence for a fish population that extends beyond the temporal or spatial context of a specific direct impact. Such deleterious effects could include the following:

(1) Catch, capture, kill, or injure a species listed as candidate, threatened or endangered under the state or federal Endangered Species Act;

(2) A substantial reduction in the range of any species, and/or extirpation of a population;

(3) A fundamental change to the structure of a community or stream ecosystem, including substantial reductions in biodiversity or resiliency to disturbance, resulting in the reasonably foreseeable consequence of (1) or (2) above.

Within this framework, the Department envisions that the following types of regulatory updates are possible:

- Specifying stream reaches where suction dredging is permitted.
- Specifying periods of time when suction dredging is permitted in particular stream reaches.
- Specifications regarding the types of equipment that may be used.
- Requirements such as nozzle or hose size, horsepower and other methods of operation.
- Density restrictions or quotas for the number of suction dredges permitted to operate on a particular stream reach.

5. Activity Description

5.1 Overview

Suction dredges used to recover gold from California's waterways are engine-powered machines that are easy to operate, portable, and are capable of excavating and processing substantially more sediment than human-powered methods such as panning. Due to their portability and lightweight design, single operators can access remote locations and mine a greater area than would otherwise be possible. Suction dredgers regulated under the Program are often small-scale, recreational gold dredging operators conducting suction dredging for a limited time each year.

5.2 History

Although gold had been discovered in California as early as 1775, California's famous Gold Rush began with the discovery of gold at Sutter's Mill on January 24, 1848. At first, individual dredgers could "strike it rich" by panning, and using simple equipment such as rocker boxes and sluices. However, by the mid-1850's, the easily recoverable gold had been mined out and gold mining began to be dominated by well capitalized companies (California Divisions of Mines and Geology 1970).

Hydraulic mining emerged in several locations simultaneously in the early 1850's. After extensive water conveyance systems were completed, it became an important segment of the gold mining industry and thrived from about 1860 to 1884 when the Sawyer Decision (which addressed environmental and commerce damage caused by hydraulic mining debris) led to the decline of hydraulic mining in California.

Underground "hardrock" gold became a major gold producing industry as milling technology improved after hydraulic mining began to wane. However, hardrock mining for gold was suspended during World War Two and never fully recovered after the war.

In the late 1890's, large, mechanical dredges (e.g., bucket and dragline dredges) were developed to mine low grade gold deposits in rivers or on their outwash fans. These dredges floated in rivers or in their own ponds and mined ahead by scooping up gold-bearing gravel in huge steel buckets, extracting the gold, and dumping the waste cobbles into great mounds behind them. The gold dredging industry grew steadily and reached its peak during the Great Depression. However, because of low gold prices and increased operating expenses, the business declined. By the 1950's very few large gold operations remained.

In the early 1960's, a new inexpensive and portable dredge emerged – the suction dredge. Self Contained Underwater Breathing Apparatus (SCUBA) and Hookah Air systems allowed individuals to use suction dredges underwater like vacuum cleaners to excavate sediment from a river or stream. Anecdotal reports hold that the individuals first using these new machines in northern rivers recovered impressive amounts of gold. Although suction dredges began as self-crafted devices, there are now a number of manufacturers who produce suction dredges of various sizes and prices, including companies such as Keene and Proline. The commercial availability of suction dredges makes it possible to excavate tons of sediment per hour from a river or stream in a quest for gold.

5.3 Number of Suction Dredgers

The number of general suction dredge permits issued annually by the Department increased dramatically from 3,981 in 1976 to a peak of 12,763 in 1980, echoing the steep rise in gold prices in the late 1970s. However, the number of issued permits subsequently declined to around 3,000 in most recent years. On average, the Department has issued approximately 3,200 suction dredge permits to California residents every year for the last 15 years (Figure 2).

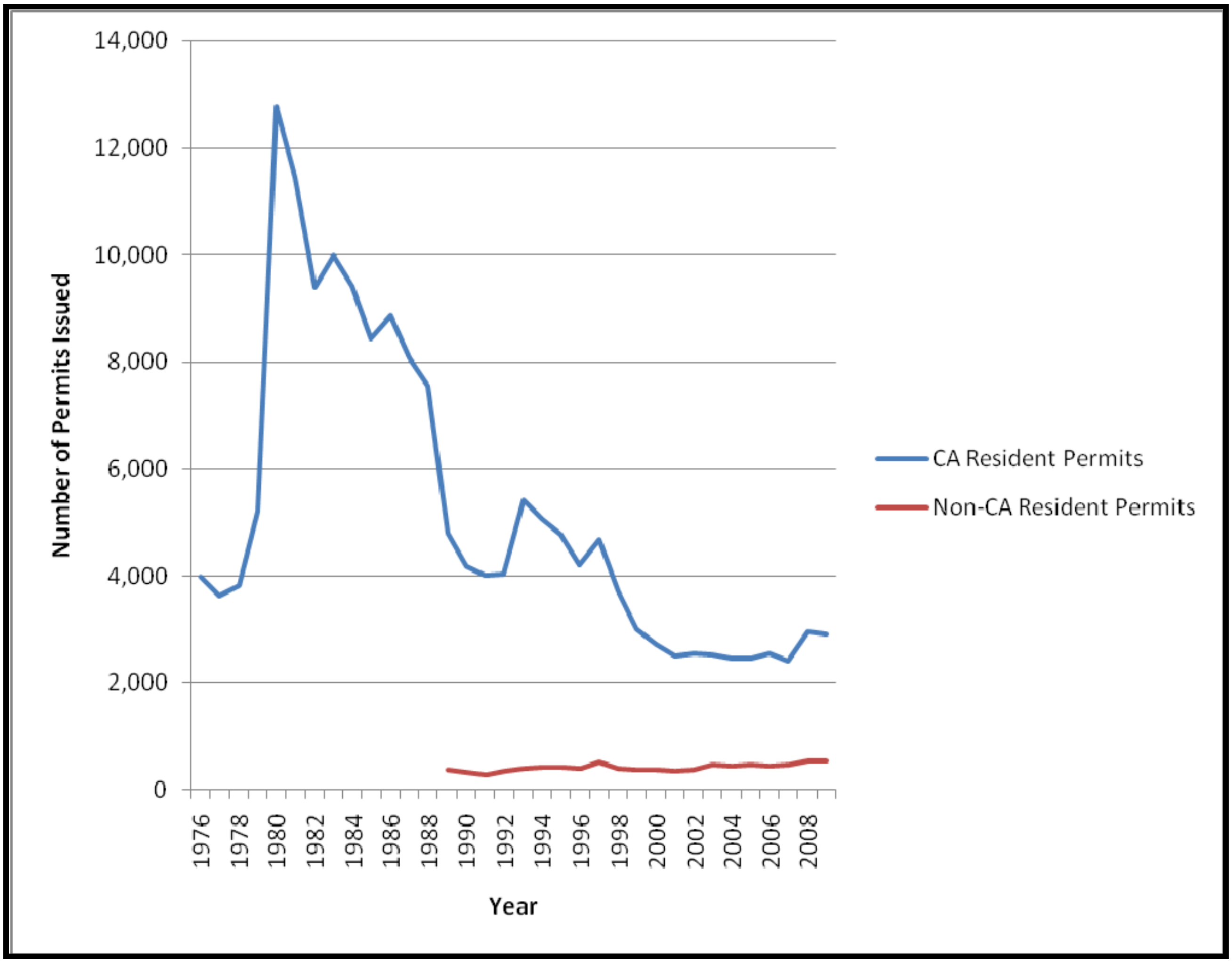
5.4 Equipment

5.4.1 General

Although suction dredges vary in size and power, their basic configuration is comprised of a floating gold recovery system (known as a sluice box) attached to a suction hose (see Figure 3). These machines are operated by one or two individuals who control the hose underwater using a supplied air system as necessary.

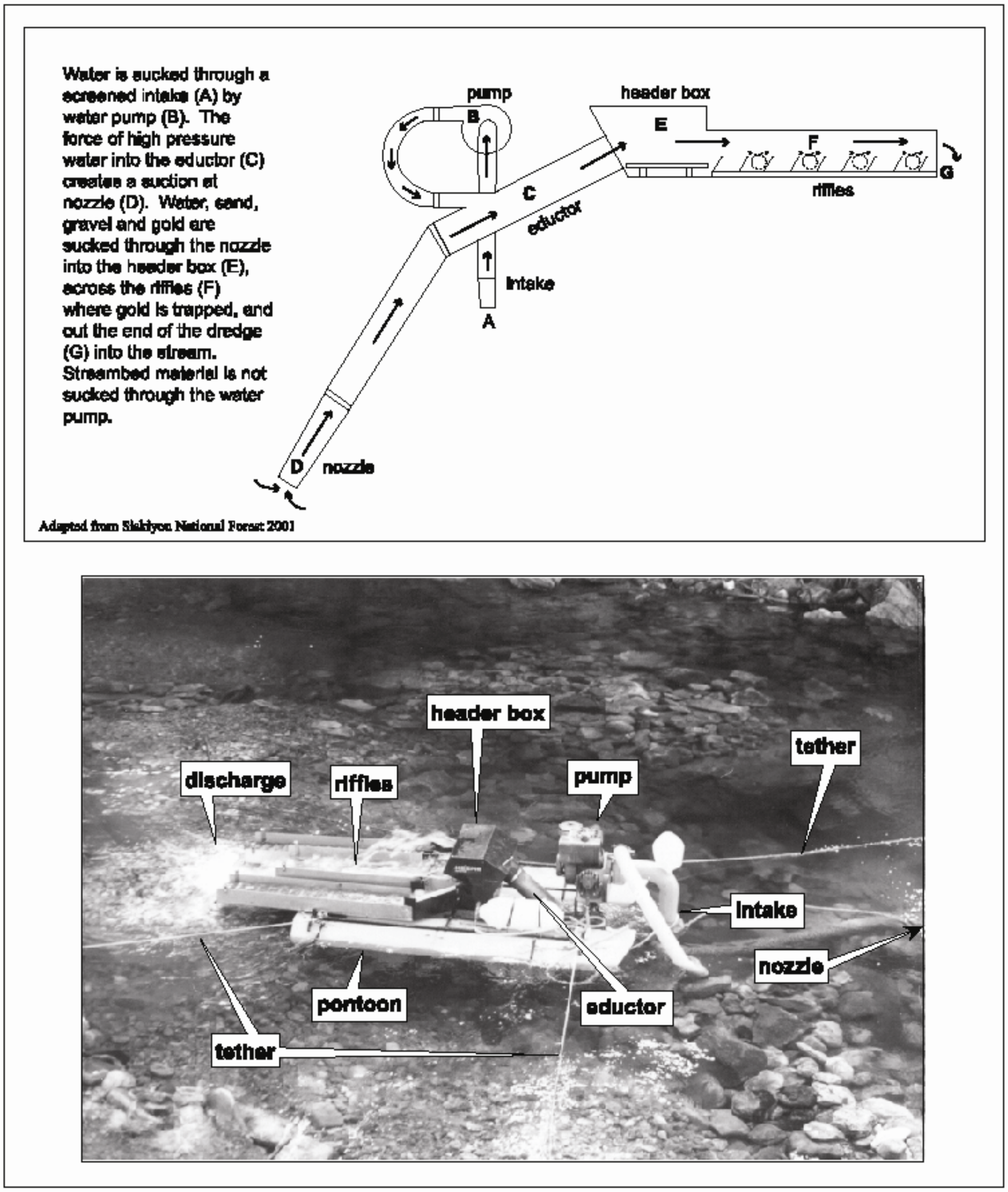
Suction dredges are generally driven by either a gasoline or diesel engine that runs a centrifugal pump. The pump draws in river water and forces it through a series of hoses and tubes to create a Venturi effect, or a strong suction. Sediment from a river or stream is drawn up the suction hose and discharged into one or more sluice boxes. In general, dredge performance or capacity (reported as cubic yards per hour by manufactures) is a function of the diameter of the intake nozzle and the horsepower of the engine(s) used, with the power of dredges to move sediment increasing by approximately the square of the increase in nozzle diameter. Further description of the relationship between dredge performance and nozzle/engine size is provided below in Section 5.4.3.

Figure 2. Historical Trends in Suction Dredge Permit Issuance between 1976 and 2009



Source: California Department of Fish and Game Historical Licensing Statistics – Special Licenses and Permits

Figure 3. Typical Small-Scale Suction Dredge



Source: U.S. Forest Service 2006.

Sluice boxes are metal boxes equipped with steel riffles and are used to recover gold and other high density solids (e.g., black sand, lead weights and shot, mercury amalgam, mercury) from bulk sediment. Gold-bearing sediment is washed through a sluice box and gold and other high density solids settle behind the riffles. Materials discharged from the sluice (e.g., low density sediment, small gold particles, etc.) are called tailings. Gold and other dense solids are collected when the sluice is cleaned. Sluice boxes have become increasingly complex as manufacturers attempt to increase their gold-trapping efficiency (e.g., systems employing several sluice boxes, sediment classifiers, and jet flare technology). However, because manufacturers do not provide test data for different designs, it is not possible to state how much better or worse different designs fare at trapping gold.

Almost all dredges are supported in the water by floats made of plastic, foam, or tire tubes. Some dredges are designed with twin pressure systems—they have two engines, two pumps, and two pressure hoses which attach to a special jet. The main advantage of this type of system is that it allows a dredge operator to move material faster by combining portability with capacity.

Larger dredges—those with a nozzle size larger than 6 inches—generally require at least two operators. In addition, the larger dredge systems are almost always equipped with Hookah air compressors, which can supply air to one or more divers.

5.4.2 Types of Dredges

Surface Dredge

Surface dredges are dredges that have their engines and sluice boxes mounted above the water's surface (see Figure 3). It is by far the most common type of suction dredge. They are most effective in shallow water and thus, are easily operated without diving equipment. Surface dredges range in size from small backpack models to large models up to ten meters in length.

Subsurface Dredge

Subsurface dredges differ from surface dredges in that their gold recovery systems are suspended underwater beneath the dredge’s floats. Since the sluice box can be raised or lowered, it can be maintained close to the stream bottom. Therefore, the sand and gravel need not be pumped all the way to the water's surface. This minimizes the amount of power required to operate the dredge and decreases the overall weight of the device. For example, a 5-inch subsurface pump can use the same pump from a 3-inch surface dredge yet move 2-3 times more material than the surface unit (Herschbach 1999). However, the recovery rate of gold for the subsurface dredge is less effective. The recovery system utilizes a long, enclosed chamber with removable riffle trays that are attached along the bottom. And since the riffle trays are relatively small and provide less surface area in which gold may be trapped, it is less efficient at fine gold recovery than the surface dredge. Despite lower recovery rates, the benefit of decreased weight makes these types of dredges popular with suction dredgers who favor portability.

Underwater Dredge

Underwater dredges employ an enclosed gold recovery system that rests on the river or stream bottom underneath the float-supported engine(s). Like the subsurface dredge, the underwater dredge is an enclosed chamber with riffle trays that are suspended under water. However, unlike the subsurface systems, there are no chains attaching the underwater sluice to the floats. Instead, the sluice box rests on the bottom, supported in an upright position by the diver; the pressure hose is its only link with the water surface. The underwater dredge has no suction hose; the intake nozzle and jet are built as one recovery system, generally a metal or plastic tube with an attached metal elbow. Instead of manipulating just a flexible suction hose, as with the subsurface dredge, a diver using an underwater dredge must maneuver the whole unit around the bottom, keeping it always in an upright position and completely submerged. If it falls over, any gold in the small riffle tray may be lost. The reported main advantage of underwater dredges is portability. The components of an underwater dredge, for instance, are approximately half the weight of a subsurface dredge, and they are more compact and easier to carry. As a result, these underwater dredges are primarily used for reconnaissance of sites; when a gold streak is found a more efficient dredge type is employed.

5.4.3 Size of dredges

Dredge size varies greatly according to dredge type, make, and model. Table 1 summarizes characteristics of common dredge types and sizes. In general, nozzle and engine size controls the sediment excavating capacity (given as cubic yards/hour by manufacturers) of suction dredges. This study considers the effects of nozzles ranging from 2 to 10 inches in diameter.

The volume of sediment moved based on varying nozzle and engine sizes is presented in Table 1, with more specific information contained in Table 2 and Figure 4. In general, dredges equipped with small-diameter nozzles have much less sediment excavating capacity compared to those mounting larger diameter nozzles. As can be seen from the table, the sediment movement power of suction dredges generally increases by the square of the nozzle diameter increase.

Table 1. Characteristics of Various Suction Dredges

Dredge Size & Type	Nozzle Size (inches)	Engine Size (horsepower)	Capacity		Dredge Pros	Dredge Cons
			Cubic yards per hour	Tons per hour		
Backpack dredge	2	2.5	0.5 – 2	0.7 – 2.9	Light and easy to pack in and out of the location. Good for prospecting and sampling. With suction nozzle it can be used in very shallow water.	Small capacity, not good for production.
Sampling dredge	3	5	1 – 3	1.5 – 4.5	Still lighter and smaller than a 4-inch and can move much more material than the 2 inch.	Still low on production. Portability is fairly good for remote places.
Sampling/small scale production dredge	4	6.5	1 – 5	1.5 – 7.4	The smallest of the production dredges but still good at sampling for pay streaks.	Heavier and more work to put together and take apart. Fairly mobile still, good for more remote sites.
Larger scale sampling/production dredge	5	9 – 13 or 2 x 6.5	2 – 10	2.9 – 14.9	Good for larger operations. Still good for sampling, but on a larger scale. Hose is flexible and can be operated by a single dredger.	Heavier to disassemble and move around. May have multiple or larger engines.
Recreational or smaller commercial production dredge	6	13 – 32 or may have 2 engines	6 – 17	8.9 – 25.2	A useful size for someone who has found a sizable pay streak and wants to get all the gold out that is possible. Can move rocks, gravel, and sand up to about 5 inches across without a plug up of the hose or jet.	Heavier unit. Larger nozzle makes it harder to sample with, although sampling of larger rivers to locate gold in bigger areas is possible. The hose isn't as flexible as a smaller dredge, although one person can handle it. Two person teams are better because the

Dredge Size & Type	Nozzle Size (inches)	Engine Size (horsepower)	Capacity		Dredge Pros	Dredge Cons
			Cubic yards per hour	Tons per hour		
						rocks are uncovered so quickly by a 6" unit that a single dredger can be overwhelmed with the work of clearing large cobbles and small boulders that don't fit in the suction nozzle.
Commercial dredge	8	36 or 2 x 18	10 – 30	14.8 – 44.5	Good size for commercial operations	Heavy unit. Manning the hose and moving the rocks require at least two persons to make productive use. Dredges this size are legally limited in which waters they can be used.
Larger commercial dredge	10 – 12	80 or more	20 – 50	29.7 – 74.2	Good for larger commercial operations.	Heavy unit. Needs a team of underwater workers. Not legal under existing regulations.

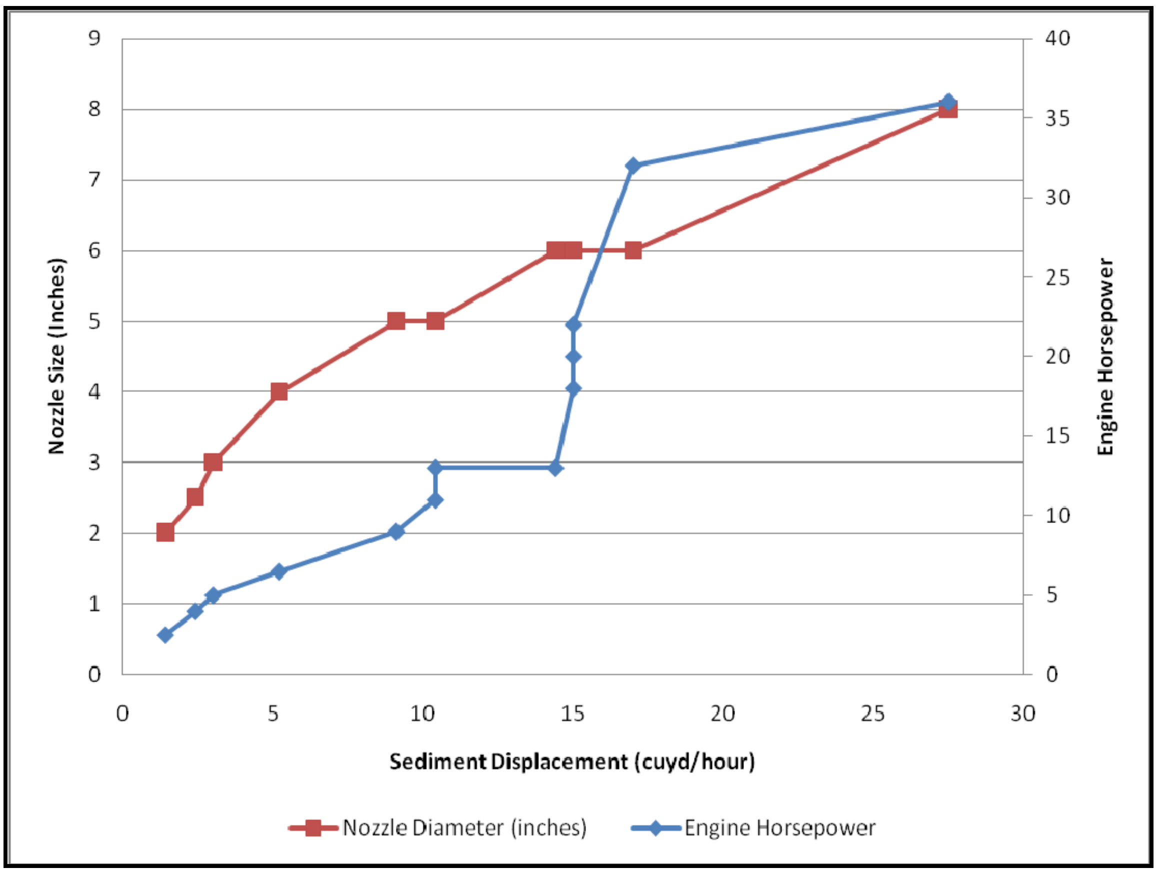
Source: DoradoVista, Inc. N.D.; Keene 2008

Table 2. Volume of Sediment Moved Based on Nozzle and Engine Size

Dredge Nozzle Diameter (inches)	Engine Horsepower	y^3/hour	y^3/day (7 hours)
2	2.5	1.4	11
2.5	2.5 to 4	~1.4 – 2.4	11 – 17
3	5	3	21
4 (4 models)	6.5	5.2	35.3
5	9	9.2	62.8
5	11	10.5	70.6
5	13(2 x 6.5)	10.5	70.6
6	13 (2 x 6.5)	14.4	98.1
6	18 (2 x 9)	15	104.6
6	20 (2 x 10)	15	104.6
6	22 (2 x 11)	15	104.6
6	32 (2 x 16)	17	119
8	36 (2 x 18)	27.5	196.2

Source: Keene 2008

Figure 4. Volume of Sediment Moved Based on Nozzle and Engine Size



5.5 Suction Dredging Activities

This section briefly describes the basic steps involved during suction dredge mining activities. Information was derived from the Modern Gold Dredging booklet (Heavy Metal Mining Company 1992), website advice from miner Dave McCracken (N.D.), the New 49ers Club Rules (Koons 2004), and dredge manufacturer Keene Engineering, Inc. (N.D.). The information provided by these sources appears to be based on personal experience and has not been verified or described in peer reviewed, scientific publications. The references were very instructive in providing an intimate and knowledgeable perspective on suction dredging, but they are not necessarily definitive or complete. Further, the Department was unable to validate this information in the field due to moratorium.

5.5.1 Selecting a Site

In seeking a good site with potential for gold, suction dredge miners consider river processes and river form in prioritizing their locations, as well as past history with sites producing gold. In California, gold found in streams, floodplains, and terraces is generally alluvial having been previously transported and deposited by streams. A placer deposit is the collection of valuable minerals (in this case gold) concentrated in a dense depositional site. In California, placer deposits are typically comprised of alluvial sand and gravel. While placer deposits are generally thought of as occurring in the active stream channels, placer gold deposits are often commonly held in the stored alluvium in the floodplains and relict terraces adjacent to stream courses. Within streams, placer gold deposits will generally be found in zones where sediments are deposited or are collected. Because the gold is typically very fine (less than .0015" in diameter) it will more likely deposit (or settle out) in slower water environments, such as in deeper pools or along point bars on the inside bend of river turns. Gold may also be found in the stillwater deposits downstream of obstructions, such as rocks, vegetation, logs, or bedrock outcrops. Backwater eddies along the stream banks or around coarse woody debris (CWD) may also help settle gold. As one of the denser materials transported by any stream, gold is among the first to drop out when a stream slows and energy diminishes. Unless the gold is re-initiated into transport, it often sifts down through coarser sediments (sand and gravel) ultimately settling on a hardpan layer or local bedrock. Deep narrow crevices and cracks, especially occurring in steeply dipping rocks whose strike or trend is perpendicular to the stream flow, are particularly favorable for the occurrence of gold. A series of parallel, deep, narrow cracks or crevices at right angles to streamflow are productive because they form natural riffles and pockets to trap gold.

Dredging is generally conducted in waters with 10 feet of depth or less. However, larger dredges equipped with Hookah Systems and hose lengths can allow for excavations in deeper waters (such as the Klamath, American, and Yuba rivers).

5.5.2 Accessing the Site

Suction dredge operators usually rely on personal transportation to access sites. These mining areas can be accessed via vehicle or boat depending on the location. Miners typically use existing trails and pathways whenever possible. It should also be noted that miners are required by law to obtain permission to enter private and public lands – the Department's permit does not allow trespassing.

5.5.3 Delivering Equipment

Suction dredge mining equipment, including the dredge engine, pump oil, fuel, and other components, are usually driven into an area where the miner will stay. The equipment may require additional secondary transport if the mining location is remote and not accessible by roads from the campsite. If the ultimate site is inaccessible by vehicle, miners will generally carry the equipment, fuel, and supplies to the desired location and assemble the suction dredge on the bank. It is a standard practice to drain oil and fuel from motors during transportation or carrying. The amount of fuel brought for the rigs to the mining location is generally limited to the day's estimated needs.

5.5.4 Securing Equipment

Any equipment not used during the dredging operation is generally secured at a campsite or along the banks of the area to be dredged.

During operation, dredges are usually secured in the waterway using rope or cable to prevent drift while the dredge is in use. This is generally done using two separate knots and a heavy or stationary object near the stream bank.

5.5.5 Conducting Dredging

Once the components have been assembled and placed at the mining site, the pump must be fully primed – full of water with all air removed – before starting the engine.

Dredging operations are generally divided into "sampling" and "production" phases. The first phase, "sampling," is the testing of areas to determine the presence or absence of gold laden areas, or "pay streaks." Pay streaks are referred to as such because of the notion that gold deposits settle out in areas with definite left and right boundaries and less definitive upstream and downstream margins. Sampling can involve several test holes and can be conducted with smaller suction dredges until a suitable production area is located. A dredge hole is the general term for the area in which the miner is dredging. These dredge holes are commonly cleared of large cobbles and rocks to allow the dredge to suck up smaller, gravel-sized sediments from the stream bed.

Experienced dredge miners recommend that one find the tail end of a streak and move upstream when in a production phase, so that the tailings fall in areas already worked. In order to fully take advantage of the suction dredger's production rate, the operator frees and moves over-sized rocks (too large to be sucked into the nozzle) from the stream bed work area. The basic movement for a suction hose is placement into the streambed at a slightly upstream angle, and then moving upstream. Cobbles are generally tossed downstream rather than to the side to prevent the need to re-excavate if the diver chooses to move laterally to locate a more promising area. Suction dredgers will often perform multiple passes over a streak, until they have reached the bottom of the gold deposit.

On occasion, to reach gold that has deposited below or around large boulders, winching or prying is performed. Crowbars, powered winches, or pull cables/chains are used to move the boulders out of place during dredging. Cables can be pulled by hand or by vehicle depending on their size and weight.

During dredging, a solid-to-water balance must be maintained to ensure suction. The solid content being dredged should generally never exceed 10%. Therefore, care is exercised to prevent dredging excess amounts of sand.

5.5.6 Refueling

Most engines will require refueling during the day, and can be replenished with the fuel that has been brought to the site. Oil changes may also be required periodically.

5.5.7 Processing of Material

Normal conditions require that the sluice box be cleaned only once or twice per day. Generally, the sluice box does not need to be cleaned until gold is beginning to be deposited below the upper third of the box. When the sluice box is ready to be cleaned, the carpet underlay is removed and all materials captured in the box are washed into a large bucket or washtub. The contents of the washtub become known as concentrates. In addition to containing gold, concentrates can also contain mercury or other materials (e.g., lead fishing weights) that have settled to the bottom of the river alongside the gold deposits. The concentrates are filtered through a series of screens and/or panned to work the concentrates down to small batches containing gold, which then can be processed through a final dry process.

The final process is usually done at camp where there is a flat work surface and shelter from wind. This final procedure involves the drying of concentrates, filtering, and physical separation using magnets and small hand tools. In addition, chemical separation, by means of mercury and nitric acid, may be used for the amalgamation process. Amalgamation is a method of separating finer gold particles from other materials. In this process, clean mercury is brought into contact with clean gold, and the gold becomes wetted and "drawn into" the mercury. This results in a solution of gold in mercury, or an alloy of gold and mercury called amalgam. After the mercury has gathered in the gold, it is removed by dissolving it in nitric acid or by driving it off as a vapor by heat, leaving the gold behind. While mercury should be treated as a hazardous waste, some miners collect and store it, while others dispose of it by vaporizing it in a cooking pan on a camp stove. Nitric acid presents similar concerns regarding handling, storage, and disposal.

5.5.8 Location

Suction dredging can take place throughout California, though much of the suction dredging occurs on private lands or unpatented claims owned by mining clubs. In some cases individual club members pay a fee to use the club’s claim, such as with the New 49ers (New 49ers 2009). Clubs cannot prohibit the public from accessing unpatented claims for purposes other than mining. These clubs may provide facilities, infrastructure, supplies, and also have their own rules and guidelines for suction dredging and associated activities. Many miners also own their own unpatented claims to which they have an exclusive right only to the locatable minerals under claim.

5.5.9 Timing

Seasonality

Most suction dredging occurs in the summer, when flows are lower, water temperatures are higher, and water clarity is greatest. In addition to seasonal restrictions imposed by the permits, underwater visibility is a key aspect for suction dredge mining when excavating an existing dredge hole, and when working with more than one diver. Therefore, wet or rainy conditions are not favorable (McCracken N.D.)

Duration

A recreational suction dredger (representing 90 percent of all suction dredgers) may spend a total of four to eight hours per day in the water dredging an area from 1 to 10 square meters. The average number of hours has previously been reported at 5.6 hours per day (CDFG 1994). The remaining time is spent out of the water, working on equipment and processing dredged material. According to experienced dredgers, processing materials from concentrates typically takes less than an hour (McCraken N.D.).

5.5.10 Encampments

Some (but not all) suction dredgers camp near the locations where they are mining for short to extended periods of time. Basic information regarding encampments has been derived from Dave McCracken (N.D.) and the Operational Guidelines for members and guests of the New 49ers (Koons 2004). Generally speaking, gold dredging encampments are not substantially different than the encampments of other park and waterway users. There are, however, a few common considerations made by suction dredge miners that influence the type and components of their camps.

The nature of the encampment depends on the presence of nearby facilities (e.g., restrooms, showers), how uncomfortable the environment is, personal requirements, and expected duration of stay. Larger public park areas and private mining clubs often offer campgrounds and lodging facilities. These more heavily used camping areas may also provide chemical toilets and basic shower facilities. And, in addition to RV's and campers equipped with restroom facilities, personal port-a-potties and storage tanks are commonly used by those who do not have easy access to existing facilities. It is illegal to dispose of this type of waste in areas other than approved dumping stations.

Miners generally plan ahead for supplies and food based on duration of stay. Depending on the location of the nearest town, supplies may not be available for replenishment. Shorter stays can utilize tents or tarps, while longer excursions may call for RV-type vehicles to transport and keep perishable supplies. Some mining clubs do not allow any permanent structures to be constructed on club property. Because fuel is an important component of a suction dredge operation, miners often bring their own supplies of fuels and store them near campsites and mining areas. Some mining clubs impose restrictions on the volume of fuel which can be brought to a property.

Secure locations for the storage of recovered gold and other valuable possessions at the camp, such as safes, are generally necessary. Some miners carry personal firearms; however, some mining clubs require that they not be displayed or used on camp property. Also, some clubs recommend that all garbage, supply, food, and equipment items be kept safely and in a clean manner to minimize hazards. This includes the clearing of garbage and debris prior to departure.

While many suction miners adhere to these basic rules and responsible behavior, Department wardens have observed camps strewn with household garbage, industrial waste, large gas barrels, dilapidated vehicles, and human waste (1994 EIR; Sierra Fund 2009). It is unknown whether this behavior is typical of suction dredge miners.

6. CEQA Considerations

6.1 Type of EIR

The Department has prepared this Initial Study as part of its effort to conduct court-ordered environmental review of its existing permitting program for suction dredge mining in California. (See Section 1.0 Introduction.) As discussed earlier, the Initial Study is an important step under CEQA in the Department's effort to prepare the SEIR. (Pub. Resources Code, § 21166; CEQA Guidelines, § 15162.) In general, a state or local lead agency prepares a subsequent EIR when, after having prepared and certified an earlier EIR for the same project, new information, changed circumstances, or project changes are proposed that involve new significant or substantially more severe environmental effects not previously addressed in the earlier EIR. (*Id.*, § 15162, subd. (a).) A subsequent EIR is also appropriate where the prospect of such new or more severe environmental effects exist and more than minor additions or changes to the earlier EIR are necessary to provide meaningful, updated environmental review. (See *Id.*, § 15163, subd. (a).)

The Department has determined that preparation of the SEIR is necessary for its existing suction dredge mining permitting program in order to comply with the December 2006 Court Order in the *Karuk* litigation. (See Fish & G. Code, § 5653.1, subd. (b)(1).) The SEIR is also necessary for the Department to meet its broader obligations with respect to the suction dredge permitting program under CEQA. (Pub. Resources Code, § 21166; CEQA Guidelines, § 15162.) For purposes of CEQA and as detailed in the Initial Study, the Department has determined that the continued issuance of suction dredge mining permits under the existing permitting program can result in new significant or substantially more severe environmental impacts than previously disclosed in the 1994 EIR. Similarly, the Department believes the SEIR is necessary because more than minor revisions or changes to the 1994 EIR will be required, particularly with the recent enactment of SB 670 (Wiggins) and the issuance of the preliminary injunction in the *Hillman* litigation. The SEIR, in this respect, as informed by this Initial Study, will analyze the potentially significant environmental impacts associated with the Proposed Program.

Importantly, the Department is preparing the SEIR under CEQA pursuant to Public Resources Code section 21166. The SEIR is being prepared, in particular, in connection with the Department's permitting program for suction dredge mining in California. Although the permitting program and likely amendments to the existing regulations are the proposed project for purposes of CEQA, the SEIR is not a program EIR for purposes of Public Resources Code section 21094. In general, this latter provision involves the preparation of program EIRs that will serve under CEQA as, among other things, a platform for "tiering" required environmental analyses for later projects. (See generally Pub. Resources Code, §§ 21093, 21094; CEQA Guidelines, § 15152.) In the present case, in contrast, no such tiered environmental analysis is contemplated by the Department for its suction dredge permitting program. The issuance of individual suction dredge mining permits consistent with any regulations adopted by the Department is a key component of the proposed project for purposes of CEQA in the present case. (Fish & G. Code, §§ 5653, subd. (b), 5653.9.) In other words, the issuance of individual suction dredge mining permits consistent with regulations adopted by the Department under Fish and Game Code section 5653.9 is an important aspect of the discretionary project being analyzed in the SEIR that the Department proposes to carry out and approve for purposes of CEQA.

Finally, because the Proposed Program involves the adoption of regulations, the SEIR will serve as the functional equivalent environmental analysis under the Department's related "certified regulatory program" (CRP). (See generally Pub. Resources Code, § 21080.5; CEQA Guidelines, § 15251, subd. (n); Cal. Code Regs., tit. 14, § 777.5 et seq.) In general, CRPs as approved by the Secretary for Natural Resources provide a functional equivalent process for state agencies to prepare analysis and conduct related environmental review under CEQA for certain types of projects that fall within the CRP. In general, environmental documents and related review conducted pursuant to an approved CRP are exempt from Chapter 3 and a limited number of other provisions in CEQA. However, all other CEQA provisions and policies apply. (Pub. Resources Code, § 21080.5, subd. (c).) In the present case, the Department is preparing the SEIR pursuant to Public Resources Code section 21166, a section of CEQA that does not fall within the limited exemptions for CRPs provided by section 21080.5. For this and other important reasons, the Department intends to prepare the SEIR and conduct related environmental review of the Proposed Program in accordance with CEQA generally; also following the rulemaking process for regulations under the Proposed Program as set forth in the Department's related CRP and the Administrative Procedure Act (APA) (Gov. Code, § 11340 et seq.).

6.2 Baseline Conditions

Under CEQA, the environmental setting or "baseline" serves as a gauge to assess changes to existing physical conditions that will occur as a result of a proposed project. CEQA Guidelines section 15125 provides that, for purposes of an EIR, the environmental setting is normally the existing physical conditions in and around the vicinity of the proposed project as those conditions exist at the time the Notice of Preparation is published. As underscored by appellate case law, however, the appropriate environmental baseline for a given project may be different in certain circumstances in order to provide meaningful review and disclosure of the environmental impacts that will actually occur with the proposed project.

In the present case, the Department has determined that a conservative approach to identifying the environmental baseline is appropriate. As described above, instream suction dredge mining is currently prohibited in California pursuant to a recently enacted state law. (Fish & G. Code, 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins).) The same law and a related court order also prohibit the Department from issuing new suction dredge permits. The Department has determined, as a result, that the appropriate environmental baseline for purposes of CEQA and the analysis set forth below is one that assumes no suction dredging in California. This Initial Study and the SEIR will, as a result, provide a "fresh look" at the impacts of suction dredge mining on the environment generally.

6.3 Thresholds of Significance

Thresholds of significance serve as a measure under CEQA to gauge the significance of changes to the environmental baseline that will result with approval and implementation of a proposed project. For purposes of this Initial Study, the Department is using Appendix G of the CEQA Guidelines, enhanced with climate change considerations, as its thresholds of significance. These thresholds may be refined for purposes of the draft SEIR, but for now the Department has determined that Appendix G in the CEQA Guidelines along with the climate change topic provides appropriate thresholds in order to make an initial assessment of the potentially significant impacts associated with the Proposed Program that should be analyzed in detail in the draft SEIR.

7. CEQA and Rulemaking Process

Proposed amendments to the Department's existing regulations governing suction dredge mining must be promulgated in compliance with the APA (Gov. Code, § 11340 et seq.). The "formal rulemaking" under the APA to promulgate amendments to the existing suction dredge mining regulations will run concurrently with the related environmental review of the SEIR required by CEQA. Figure 5 illustrates the relationship between these dual processes. The following discusses the steps in the CEQA and rulemaking process.

7.1 Initial Study/Notice of Preparation

This Notice of Preparation (NOP) presents general background information on suction dredging, the scoping process, the environmental issues to be addressed in the SEIR, and the anticipated uses of the SEIR. Included with this NOP is the Initial Study which provides a preliminary environmental impact analysis for the Program. Through the Initial Study, the range of environmental issues to be addressed in the SEIR will be narrowed down to include only those topics with potentially significant effects. The Initial Study also describes the Program as currently envisioned. The Program (i.e., the regulatory updates) will be refined during the process of preparing the draft SEIR, depending on, among other things, the conclusions of the Initial Study and input received in comments responding to this NOP. The Department has prepared this NOP pursuant to CEQA Guidelines section 15082.

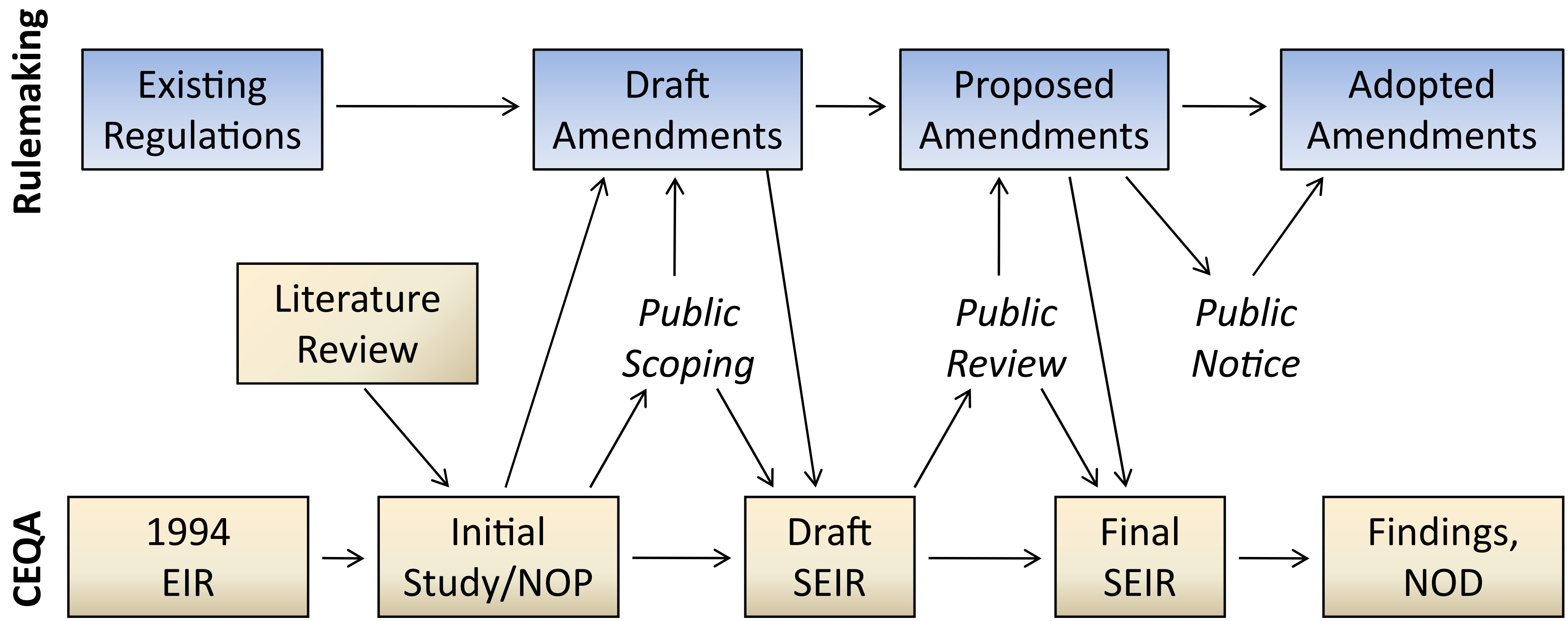
7.2 Scoping Meetings

In order for the public and regulatory agencies to have an opportunity to ask questions and submit comments on the scope of the SEIR and regulation amendments, public scoping meetings will be held during the NOP review period. Because the suction dredge permitting program is a "project of statewide, regional, or areawide significance," the scoping meetings will be conducted on consecutive days in three different locations throughout the State. The scoping meetings will be held in Fresno, Sacramento and Redding to solicit input from the public and interested public agencies regarding the nature and scope of environmental impacts to be addressed in the draft SEIR and regulation amendments.

All three meetings will use the same format, and interested parties may attend one or all meetings. A brief presentation will be made in order to provide an overview of the existing program, the legal background leading to this SEIR, the objectives and range of information to be included in the Program, and the CEQA process generally. Afterwards, an interactive session will follow where Department staff will be available to answer questions and provide information about the Program. Prepared written comments will be accepted during the meetings, as well as during the 30-day scoping period. Comment forms will also be available at the scoping meetings for those who wish to submit written comments during or at the meeting. Again, written comments may be submitted to the Department at any time during the NOP review period.

The dates, times, and exact locations of the Scoping Meetings will be as follows:

> Fresno - November 16, 2009, 5:00 to 8:00 pm. To be held at the California Retired Teachers Association building (3930 E. Saginaw Way, Fresno, 93726);



Horizon WATER and ENVIRONMENT

Figure 5
CEQA and Rulemaking Process

Sacramento - November 17, 2009, 5:00 to 8:00 pm. To be held at the West Sacramento City Hall Galleria (1110 West Capitol Avenue, West Sacramento, 95691);

Redding - November 18, 2009, 5:00 to 8:00 pm. To be held at the Shasta Senior Nutrition Programs Main Facility (100 Mercy Oaks Drive, Redding, 96003).

This Scoping Meeting information will be published in local newspapers and the Department's website (www.dfg.ca.gov) prior to the events.

7.3 Draft SEIR and Draft Regulations

The primary purpose of the SEIR is to analyze and disclose the direct and reasonably foreseeable indirect environmental impacts that may occur as a result of the Proposed Program. This Initial Study serves the important purposes of identifying the related, potentially significant environmental impacts that will be addressed in detail in the draft SEIR. The Initial Study, in turn, will also inform the Department's development of proposed amendments to the existing regulations consistent with the Department's statutory mandate to issue suction dredge permits, but only where the underlying operation will not result in deleterious effects to fish. The draft SEIR as informed by the Initial Study, and related public and agency input, will analyze and disclose the potentially significant environmental impacts associated with suction dredge mining under the Department's permitting program and, where any such impacts are significant, potentially feasible mitigation measures and alternatives that substantially lessen or avoid such effects will be identified and discussed.

Below is a preliminary list of potential environmental issues to be addressed in detail in the SEIR. The analysis in the draft SEIR ultimately will determine whether these impacts could reasonably occur, whether such direct or reasonably foreseeable indirect impacts are significant based on the identified threshold of significance, and whether such impacts can be avoided or substantially lessened by potentially feasible mitigation measures and alternatives.

- Aesthetics
- Air quality
- Biological Resources
- Cultural Resources
- Geomorphology
- Hazards and Hazardous Materials
- Water Quality and Toxicology
- Noise
- Recreation
- Cumulative Impacts
- Irreversible Impacts
- Climate Change

7.4 Public Meetings

Once the draft SEIR and draft Regulations are completed, they will undergo public review for a minimum of 45 days. The Department is also planning to hold three related public hearings in Fresno, Sacramento and Redding. The hearings will begin with a brief overview of the analysis and conclusions set forth in the draft SEIR, as well as a brief overview of the proposed amendments to the existing regulations. This introductory presentation will then be followed by the opportunity for interested members of the public to provide oral comments to the Department regarding the Proposed Program under CEQA and the APA.

The dates, times, and exact locations of the Scoping Meetings will be published in local newspapers prior to the events.

7.5 Final SEIR and Proposed Regulations

Written and oral comments received in response to the draft SEIR will be addressed in a Response to Comments document which, together with the draft SEIR will constitute the Final SEIR. In addition, the Department will consider the comments received to refine, as necessary, the proposed updates to the existing regulations. The Final SEIR, in turn, will inform the Department's exercise of discretion as a lead agency under CEQA in deciding whether or how to approve the Proposed Program as prescribed by the Fish and Game Code.

8. Submittal of Scoping Comments

The NOP and Initial Study will be circulated to local, state, and federal agencies (see page 28 -section 10 of the *Environmental Checklist*), and to interested organizations and individuals who may wish to review and comment on the Program at this stage in the process. In addition, these documents will be made available for review at the Department's offices and on the Department's internet website (www.dfg.ca.gov). Written comments concerning the scope and content of this SEIR are welcome. Due to the anticipated volume of interest generated by the Program, please submit only substantive comments, to one or more of the specific potential impacts listed above, which address one of the following topics:

- Potential impacts of suction dredging
- Scope and range of alternatives
- Types or approaches to the regulatory updates
- Information regarding deleterious effects to fish, if any; and
- Types of activities to be regulated under the Department's suction dredge permit program

Please note that, for purposes of this Initial Study and the related scope of the draft SEIR, the Department will be considering the comments and information it received in response to the October 2007 Public Notice, as well as the comments and information received by the State Regional Water Quality Control Board in response to its June 2007 public notice. Interested public agencies and members of the public need not resubmit at this time any prior comments provided to the Department or the State Water Resources Control Board in response to either agency's earlier public notice. Instead, prior commenters need only provide new technical or substantive information related to the topics identified above or any other environmental impacts that may occur as a result of the Proposed Program.

The Department understands that individuals hold strong opinions regarding the validity and/or merits of suction dredging in general. However, the purpose of scoping is not to obtain general views for or against suction dredging, and comments of this nature will not influence the scope or analysis of the environmental document. These types of comments will be noted, but will be of little informational value for the development of and analysis in the SEIR. Your comments will be most effective in influencing the Program outcome if they are substantive and focused on the SEIR analysis, and the scope and substance of the Department's related regulations under the Fish and Game Code.

Consistent with the time prescribed by State law for public review of an NOP, your response to and input regarding the Initial Study should be sent at the earliest possible date, but ***not later than December 3, 2009***. Please include your name, address, and contact number for your agency as applicable for all future correspondence related to the Proposed Program. Written comments may be sent via email or letter to:

California Department of Fish and Game
Attn: Mark Stopher
Suction Dredge Program Comments
601 Locust Street
Redding, CA 96001

Email: dfgsuctiondredge@dfg.ca.gov
Subject Line: Suction Dredge Program Comments

Environmental Checklist

1. **Project Title:**	Suction Dredge Permitting Program
2. **Lead Agency Name and Address:**	California Department of Fish and Game 601 Locust Street Redding, CA 96001
3. **Contact Person and Phone Number:**	Mark Stopher, (530) 225-2275
4. **Project Location:**	Inland waters of the State of California
5. **Project Lead Contact and Address:**	Mark Stopher, Environmental Program Manager California Department of Fish and Game 601 Locust Street Redding, CA 96001
6. **General Plan Designation:**	Multiple
7. **Zoning:**	Multiple
8. **Description of Project:**	See Program Description
9. **Surrounding Land Uses and Setting:**	Varied

10. Other Public Agencies whose Approval or Input May Be Needed:

United States Fish and Wildlife Service

National Marine Fisheries Service

California State Water Resources Control Board

Regional Water Quality Control Boards (all regions)

United States Forest Service

United States Bureau of Land Management

United States Army Corps of Engineers

California State Historic Preservation Office

California State Air Resources Board

California Department of Parks and Recreation

California State Lands Commission

California Department of Conservation

California Geological Survey

Environmental Factors Potentially Affected:

The environmental factors checked below would potentially be affected by this project (i.e., the project would involve at least one impact that is a "Potentially Significant Impact"), as indicated by the checklist on the following pages.

[X] Aesthetics	[ ] Agricultural Resources	[X] Air Quality
[X] Biological Resources	[X] Cultural Resources	[ ] Geology/Soils
[X] Hazards and Hazardous Materials	[X] Hydrology/Water Quality	[ ] Land Use/Planning
[ ] Mineral Resources	[X] Noise	[ ] Population/Housing
[ ] Public Services	[X] Recreation	[ ] Transportation/Traffic
[ ] Utilities/Service Systems	[X] Mandatory Findings of Significance	

Determination:

On the basis of this initial evaluation:

[ ] I find that the Proposed Program COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

[ ] I find that although the Proposed Program could have a significant effect on the environment,

there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

[X] I find that the Proposed Program MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

[ ] I find that the Proposed Program MAY have an impact on the environment that is "potentially significant" or "potentially significant unless mitigated" but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards and (2) has been addressed by mitigation measures based on the earlier analysis, as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

[ ] I find that although the Proposed Program could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the project, nothing further is required.

Signature: [signature] Date: 10/26/09

John McCamman, Chief Deputy Director CA Department of Fish and Game

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
I.	**AESTHETICS.** Would the project:				
a.	Have a substantial adverse effect on a scenic vista?	✓	❑	❑	❑
b.	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?	✓	❑	❑	❑
c.	Substantially degrade the existing visual character or quality of the site and its surroundings?	✓	❑	❑	❑
d.	Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	❑	❑	✓	❑

Discussion of Impacts

With respect to suction dredge mining, the primary activities which could have negative aesthetic effects include the mining activities themselves (including the presence of the suction dredge rig on the landscape, changes in water clarity downstream, disturbance of habitat, equipment and staging, etc.), and suction dredge miner encampments. Suction dredging typically occurs during the summer when conditions are most favorable for underwater mining activities. On average, suction dredge miners spend 35 days per year engaged in this activity (1994 EIR), though all of their time may not be spent in any single location. Dredgers often move up or down river, or change waterways entirely during the course of a single mining outing in pursuit of viable production areas.

a. **Effects on Scenic Vistas**

Suction dredging occurs throughout the state, where gold is found, primarily in the streams draining the Sierra Nevada and Klamath Mountains, and within the Mojave Desert. Suction dredging may also occur to a lesser extent within the Peninsular Ranges, Transverse Ranges, northern Great Valley, and Coast Ranges (California Geological Survey 2002a). Portions of these areas are open to the public for a variety of recreational uses. Scenic vistas are a common element of these natural areas and are often enjoyed by hikers, campers, and other recreationalists.

As suction dredge activities are located near waterways, they are generally screened by natural vegetation when viewed from distant vistas. However, due to the variations in vegetation density and topography, viewers may still be able to observe dredging activities, equipment, and/or encampments. The degree to which a viewer is affected by the presence of suction dredging activities is primarily related to exposure and sensitivity.

Under the Program, views on scenic vistas throughout the state could potentially be altered by the presence of suction dredging activities. This is considered to be a potentially significant impact and will be examined further in the SEIR.

b. **Effects on Scenic Resources**

As previously noted, suction dredge activities are located within undeveloped areas, which are generally valued for their inherent scenic resources.

Suction dredging activities within the waterline may result in the impairment of water clarity, changes to stream morphology, and the movement of boulders, rocks, or large debris, any of which could have an effect on the scenic value of the area. In addition, upland activities associated with suction dredging (equipment staging, encampments) could lead to the destruction of banks and riparian habitats. These impacts could result from illegal activities such as removal of anchored vegetation or dredging into banks, though permitted activities may also have incidental effects such as the trampling of habitat. In particularly sensitive areas, changes or damage could be considered substantial and inconsistent with the “wild and scenic” designations of such rivers.

This is considered to be a potentially significant impact on scenic resources and will be examined further in the SEIR.

c. **Degradation of Visual Character**

The physical appearance of suction dredges and associated equipment may affect the recreational experience of other users, both on land and in the water. Generally, public views by recreationists on land would be at least partially obstructed due to topographic and vegetative screening. The duration of views is limited to the amount of time it takes for the viewer to pass by the suction dredging activity (e.g., for rafters, hikers or motorists). In other cases, longer-term views could be affected when a viewer camps or has a residence near a dredge site or encampment.

The degree of aesthetic impact is expected to be variable based on the viewer group and their aesthetic goals and social values, in particular their opinions regarding suction dredging as an activity. In addition, density, crowding, and visual evidence of illegal operations may also play a role in a viewer’s experience. This especially applies to violations of waste or hazardous material storage and disposal regulations at encampment locations. Some violations are visually apparent and may also pose health and safety risks. In addition, some have observed semi-permanent encampments where equipment, including hazardous materials, seems to be abandoned during non-dredging seasons (Reedy 2007). However, it is beyond the scope of the Department’s jurisdiction to regulate and enforce campsite housekeeping, since camping is not an exclusive activity of suction dredge mining.

Rather, this is a general aesthetic issue that is common to all overnight recreational activities in public areas.

If the Proposed Program is implemented, the visual character of these natural areas could potentially be altered by the presence of suction dredging and associated activities.

This is considered to be a potentially significant impact and will be examined further in the SEIR.

d. **Light and Glare**

Suction dredge activities are primarily conducted during the daylight hours; therefore, lighting associated with suction dredgers is limited to night-time lights for camping. These light sources would not differ substantially from temporary lighting used by other recreational campers. As such, new sources of light or glare from suction dredgers are not anticipated to be substantial. Impacts are considered to be less than significant.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
II.	**AGRICULTURAL RESOURCES.** In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation. Would the project:				
a.	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	❑	❑	❑	✓
b.	Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?	❑	❑	❑	✓
c.	Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	❑	❑	❑	✓

Discussion of Impacts

a, c. **Conversion of agricultural lands**

The Proposed Program would not involve the development or redevelopment of lands. Therefore, the Proposed Program would not have the potential to convert prime farmland, unique farmland, or farmland of statewide importance to non-agricultural uses. Furthermore, there would be no physical changes to the environment associated with the Proposed Program that would have an impact on agricultural resources in California.

b. **Conflicts with zoning for agricultural use**

As discussed above, the Proposed Program would not involve the development or redevelopment of lands. Rather, the Proposed Program is limited to the regulation of suction dredge mining, which would only occur on lands where such activity is allowed. Therefore, the Proposed Program would not affect any existing zoning for agricultural use. There would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
III.	**AIR QUALITY.** When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a.	Conflict with or obstruct implementation of the applicable air quality plan?	❑	❑	❑	✓
b.	Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	❑	❑	✓	❑
c.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	✓	❑	❑	❑
d.	Expose sensitive receptors to substantial pollutant concentrations?	❑	❑	✓	❑
e.	Create objectionable odors affecting a substantial number of people?	❑	❑	✓	❑
f.	Impede compliance with greenhouse gas emission reductions mandated in Assembly Bill 32?	✓	❑	❑	❑

Discussion of Impacts

Air emissions from suction dredging can result from the following three activities:

1. Operation of the small engines that are part of suction dredges;
2. Operation of other equipment associated with suction dredging, such as generators used at suction dredge encampments; and
3. Use of personal vehicles traveling to and from suction dredge sites, including the hauling of suction dredges.

Small, internal combustion engines are the typical source of power on suction dredges. There are a number of popular small internal combustion engine makers, including Honda, Briggs & Stratton, Kohler, and Tecumseh (Ralph N.D.). The size of the engine varies, ranging from 2.5 to 36 horsepower (HP); some suction dredges may contain multiple engines (Keene 2008; DoradoVista, Inc. N.D.). The U.S. Environmental Protection Agency (USEPA) establishes emission standards under the federal Clean Air Act for small non-road engines such as those used for suction dredges or other suction dredge-related equipment (e.g., generators) (USEPA 2008). The California Air Resources Board (CARB) has taken initiatives to further control emissions from most mobile sources, including small engines (25 HP or less) (CARB 2009).

In June 2005, California Governor Arnold Schwarzenegger signed Executive Order S-3-05, which provides for the reduction of California's greenhouse gas (GHG). Specifically, the order sets forth goals to reduce GHG emissions to 2000 levels by the year 2010, to 1990 levels by 2020, and 80% below 1990 levels by the year 2050. The passage of Assembly Bill (AB) 32 *Global Warming Solutions Act of 2006* further reinforced EO S-3-05 by setting the same overall GHG reduction goals among other requirements. Moreover, the emphases on GHG considerations are highlighted with the passage of Executive Order S-20-06, which directs state agencies to begin implementing AB 32. As such, the Department is including this issue for consideration of the Proposed Program's potential effects.

a. **Consistency with air quality plans**

The CARB and local air districts are responsible for developing clean air plans to demonstrate how and when California will attain air quality standards established under both the federal and California Clean Air Acts. For the areas within California that have not attained air quality standards, the CARB works with air districts to develop and implement State and local attainment plans (CARB 2009). These attainment plans contain a baseline emissions inventory, which includes mobile source emissions (including both personal vehicles and non-road engines). As such, emissions from suction dredging-related activities are considered to be part of relevant attainment plans. Consequently, emissions associated with suction dredge activities would not conflict with these plans. There would be no impact.

b. **Violation of air quality standards**

Individual suction dredge operations typically use, at most, a few smaller horsepower engines. These smaller engines do not generate enough emissions at any single dredge site to cause violations of the state or federal ambient air quality standards. This impact is less than significant.

c. **Cumulative contributions to non-attainment status**

Various regions throughout the state are in non-attainment for a range of criteria pollutants. As described above, attainment plans have been developed for these pollutants, and the emissions associated with suction dredging activities are considered in the baseline emissions inventories in these plans. While emissions from suction dredging would be consistent with the attainment plans, and would be relatively small compared to other sources of emissions, they would nevertheless contribute to the existing non-attainment status. This is considered to be a potentially significant impact and will be examined further in the SEIR.

d. **Exposure of sensitive receptors to substantial pollutant concentrations**

Exhaust from suction dredge engines may cause localized air pollution, particularly in locations such as confined canyons with little air movement. However, this pollution would generally be occurring in remote rural areas that are sparsely populated. Emissions in any one location would be short-term. And, over time, emissions from the small suction dredge engines would be reduced as a result of CARB and USEPA regulations. For these reasons, the exposure of sensitive receptors to air pollution as a result of suction dredging activities is not anticipated to be substantial. This impact is considered less than significant.

e. **Odors**

Suction dredge air emissions are primarily the result of gasoline combustion, which does not typically produce the type (or quantity) of odors considered to be unpleasant. In addition, these emissions would occur in rural, sparsely populated areas. Consequently, suction dredging does not generate objectionable odors that would affect a substantial number of people. This impact is less than significant.

f. **Greenhouse Gas Emissions**

Greenhouse gas emissions can result from the gasoline combustion engines typically used during suction dredge operations. These emissions may be cumulatively considerable in conjunction with the GHG emissions generated by other projects, in that emissions could impede compliance with AB 32. This is considered to be a potentially significant impact. The extent to which the Project could impede compliance with the GHG emission goals mandated by AB 32 will be evaluated further in the SEIR.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IV.	**BIOLOGICAL RESOURCES.** Would the project:				
a.	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	✓	❑	❑	❑
b.	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	✓	❑	❑	❑
c.	Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?	✓	❑	❑	❑
d.	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	✓	❑	❑	❑
e.	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	❑	❑	❑	✓
f.	Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?	❑	❑	❑	✓

Discussion of Impacts

a. **Impacts to Special-Status Species**

Numerous aquatic and upland species carry some form of protective designation within the Program area, including species listed as threatened or endangered under the federal Endangered Species Act, the California Endangered Species Act, California Species of Special Concern, and the California Natural Diversity Database "Special Animals" list. This section is divided into three main discussions: effects on fish and invertebrates, effects on wildlife, and effects on plants.

Effects on Fish and Invertebrates

For the purposes of this Initial Study, sensitive fisheries and other aquatic resources present or potentially present within the Program area were identified through a literature review using the following resources: the Department's *California Natural Diversity Data Base* (CNDDB 2009), *State- and Federally Listed Endangered and Threatened Animals of California* (CDFG 2009), the Department's *Special Animals List* (CDFG 2009), NOAA Fisheries *Species of Concern List* (January 2009) and Moyle et al. (1995). Sensitive biological resources included those species and distinct population segments (DPS) that were federally and/or State-listed, proposed for listing, or candidate species and designated as CDFG Species of Concern.

Over 70 fish species (49 native), not including distinct races, are found in California freshwater streams (Moyle 2002). Approximately 49 special-status fish species or races are associated with riverine habitats available to suction dredging impacts. Examples of these fishes include: the river lamprey (*Lampetra ayresii*), the Klamath River lamprey (*L. similis*), green sturgeon (*Acipenser medirostris*), Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), hardhead minnow (*Mylopharodon conocephalus*), Gualala roach (*Lavinia symmetricus parvipinnis*), Modoc sucker (*Catostomus microps*), rough sculpin (*Cottus asperrimus*), Santa Ana sucker (*Catostomus santaanae),* and Santa Ana speckled dace *(Rhinichthys osculus)*.

At present, the aquatic invertebrates of California's freshwater streams have not been well documented. For instance numerous aquatic insects are still being identified, suggesting the status of many of these resources have not been adequately defined (Stewart and Drake 2007). At present two mollusks, the California floater (*Anodonta californiensis*) and fingernail clam (*Pisidium ultramontanum*) are listed by the U.S. Forest Service (USFS) as sensitive species. Two crustaceans, the Shasta crayfish (*Pacifastacus fortis*) and California freshwater shrimp (*Syncaris pacifica*) are state and federally listed as endangered. However, over 16 caddisfly (*Trichoptera*) and 3 stonefly (*Plecoptera*) insect species have special status with the Department (2009), although this does not consist of any legal protection.

An intensive review of the literature was performed to determine the effects of the Program on sensitive species. The following sections outline these effects on various life stages of salmonids and other fish species, as well as effects on their associated habitat. Potential impacts of suction dredging to fish species include (but are not limited to) the following:

- Impacts on Eggs and Larvae
    - Spawning habitat
    - Embryo development
    - Direct entrainment
- Impacts on Juveniles and Adults
    - Direct entrainment
    - Heavy metal contamination
    - Behavioral effects
- Impacts on the Stream Benthic Community
    - Disturbance and disturbance frequency
    - Effects on mollusks
    - Increased exposure to predation
- Impacts from Habitat Alteration
    - Pool formation
    - Loss of woody debris and large boulders
    - Sedimentation
    - Suspended sediment
    - Temperature

The discussion below is organized around these topics.

Impacts on Eggs and Larvae

Spawning habitat

Among the possible effects of suction dredging is its potential impact on fish reproduction. Many fish species, including salmonid species such as Chinook and coho salmon, steelhead, cutthroat trout, golden trout, several lamprey species, suckers (*Catostoma* spp.), sculpin (*Cottus* spp.), stream-dwelling speckled dace (*Rhinichthys osculus*) and minnows such as hardhead (*Mylopharodon conocephalus*), etc., utilize small gravel to cobble substrates for spawning. Unlike salmonids, lamprey larvae may also emerge from the redd (i.e., nest of fish eggs) and find backwater or low gradient areas of sand and silt to continue development for up to seven years, filtering substrates to feed on detritus (Moyle 2002). Therefore, many areas of the channel may be considered sensitive to disturbance. Further, dredge tailings may offer attractive yet potentially less stable material for spawning than natural gravels. The loose substrate often found in dredge tailings may be too unstable; embryos may experience reduced survival under these conditions due to increased scouring (Thomas 1985; Harvey and Lisle 1999), which can be exacerbated as embryo development frequently coincides with periods of high flow which mobilizes streambeds (Holtby and Healey 1986; Lisle and Lewis 1992). Hence, loose tailings could have a substantial adverse effect on eggs and developing fish. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Embryo development

In addition to the effects caused by unstable substrates, dredged areas may also have negative impacts on embryo development. Dredge tailings are composed of unsorted, unconsolidated streambed materials (at least until they have been dispersed) (Hassler, et al. 1986). To produce viable young, several fish species (including salmonids and lampreys) require uncompacted gravels with high permeability that consist of unclogged interstices which allow for the removal of metabolic wastes (Hausle and Coble 1976). The availability of intragravel water flow (Vaux 1962; Cooper 1965) and dissolved oxygen are also critical for the survival of developing salmonid eggs (Cooper 1965; Daykin 1965). Reduced flow and oxygen concentrations (e.g., from higher levels of fine particles [fines] or increased organic matter) can result in a number of negative effects, including the reduced size of embryos at various developmental stages, premature emergence of alevins (newly hatched salmon still attached to the yolk sac), increased alevin development time, and higher pre- and post-hatching mortality (Silver, et al. 1963; Shumway, et al. 1964; Brannon 1965; Spence, et al. 1996; Merz, et. al. 2006). Increased fines in dredged areas may also delay emergence of fry; this may result in smaller fry that are less able to compete for resources than their larger counterparts (e.g., those that have experienced normal emergence) (Everest, et al. 1987). While the severity of these effects would likely vary depending on the species or the hydrologic conditions of the watershed, dredging may have a substantial negative effect on the spawning grounds and on the developing eggs and larvae of many fish species. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Direct entrainment effects

In addition to the dredging effects on the physiochemical conditions in rivers and streams, mortality can also result from the excavation and subsequent displacement of eggs, fry and larvae (Harvey and Lisle 1998). Harvey and Lisle (1998) state that entrainment in a dredge (i.e., being drawn into the dredge hose by suction) would likely kill larvae of several fishes. Sculpins (Cottidae), suckers (Catostomidae), and minnows (Cyprinidae) all produce small larvae (commonly 5 to 7 mm at hatching) easily damaged by mechanical disturbance. Eggs of nonsalmonid fishes, which often adhere to rocks in the substrate, also are unlikely to survive entrainment. Fish eggs, larvae, and fry removed from the streambed by entrainment that survived passage through a dredge would probably suffer high mortality from subsequent predation and unfavorable physio-chemical conditions. While little research has been performed to explore the direct effects of entrainment on eggs and larvae of fish species, the work that has been done suggests that these impacts can be severe. Suction dredging has been shown to cause high mortality among eggs and developing fishes through the direct effects of entrainment (until trout reach approximately 4 inches, at which point they can generally avoid entrainment) (Andrews 1981), or by predation following entrainment (Gerstung, pers comm., cited in the Department's 1994 EIR). Moreover, while dredging is generally limited to the summer months, these disturbances still overlap with spawning, embryo development, and rearing for a number of salmonid and non-salmonid species (Moyle 2002). For example, there are several watersheds where salmonids do not emerge from the substrate until the summer months; Sacramento River winter-run Chinook salmon incubate throughout the entire summer period (Hallock 1983; Vogel and Marine 1991); Trinity River steelhead may incubate through June with emergence into July; Late-fall Chinook salmon of many Central Valley streams incubate through June with emergence into July (Moyle et al. 1995, Moyle 2002). Golden trout (*O. mykiss* aguabonita) of the Sierra Nevada began spawning after peak stream discharge in mid-May into June, suggesting incubation and emergence occurs well into August for them and other salmonid species within some Sierran streams (Knapp and Vredenburg 1996). As a result, any dredging that occurs during the spawning and incubation period could substantially impact populations. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Impacts on Juvenile and Adults

Direct entrainment effects
While the long term impacts of entrainment (e.g., disorientation, abrasions, and secondary infections) have not been assessed, it has been shown that juvenile and adult fish avoid or survive entrainment by suction dredging (North 1993). Therefore, entrainment is not expected to have a substantial effect on juveniles and adults unless habitat is already impaired (fish are already stressed). Regardless, this impact will be analyzed further in the SEIR.

Heavy metal contamination
As further discussed in Section VIII, Hydrology and Water Quality, suction dredging activities can result in the discharge of mercury (Hg) or other toxic contaminants. These discharges may cause adverse impacts to aquatic organisms and increase the risk of mercury bioaccumulation in the foodchain. Strong experimental evidence exists for the adverse effects of mercury on fish reproductive capacity (e.g., decline in spawning activity and fecundity, impaired gonadal development, or testiticular atrophy) (Kirubagaran and Joy 1988; Wester 1991; Kirubagaran and Joy 1992; Friedmann, et al. 1996; Hammerschmidt et al. 2002). This is considered a potentially significant impact and will be analyzed further in the SEIR.

Behavioral effects
Fish behavioral responses to noises and vibrations generated by dredging have not directly been quantified, but observations have shown a range of fish behavior changes to anthropogenic noises and human activity. Fish as well as other vertebrates are capable of detecting a wide range of stimuli in the external environment (Feist and Anderson 1991). The modalities most often detected include sound, light, chemicals, temperature, and pressure. The response of fish to sounds in their environment is varied. The classic fright response of salmonids to sound is the “startle” or “start” behavior (Moore and Newman 1956; Burner and Moore 1962; VanDerwalfer 1967). These behaviors involve sudden bursts of swimming that are short in duration and distance traveled (usually <60 cm; Feist et al. 1992). Responses of other fish to sound include packing or balling, polarizing, increases in swimming speed, diving, or avoidance (Herring 1968; Olsen 1976). Few studies have shown that sound can attract or repel salmonids over great distances or for long periods of time (McKinley and Patrick 1986).

Mueller et al. (1998) subjected 30-70 mm rainbow trout (*O. mykiss*) and Chinook salmon (*O. tshawytsha*) fry to low (7-14 Hz) and higher frequency 150, 180, and 200 Hz (similar to small combustion engines) sound fields to assess the possibility of using underwater sound as a behavioral barrier for enhancing fish screening facilities. Both species responded to infrasound by an initial startle response followed by a flight path away from the source and to deeper water. These observations indicate that juvenile salmonids, as small as 30 mm long, have infrasound detection capability. They also observed a startle response in wild Chinook salmon when exposed to high-intensity (162 dB //mPa), 150-Hz pure tone sound; but no observable effects were noted on hatchery Chinook salmon or rainbow trout fry when exposed to 150, 180, or 200 Hz high-intensity sound. Therefore, the noise generated by a suction dredging motor may have mixed behavioral effects on juvenile salmonids, depending on species, age and origin.

Very little work has been done on the effects of diving and other human activity on the behavior of stream fishes. Hassler et al. (1986) observed trout actively feeding behind suction dredging operations. However, this was more a qualitative assessment and did not directly measure changes in individual fish behavior or the overall effects on the fish population. More recent work has been done on the effects of tourist diving on marine reef fishes. Ilarri et al. (2008) observed that diversity, equitability and species richness were significantly higher at a Brazilian coral reef when divers were absent. How well these results translate to California streams is unclear but it is reasonable to assume that diving activity in association with equipment operation can affect fish behavior.

While some work suggests that adult spring-run Chinook salmon behavior was unaffected by suction dredging (Stern 1988), other studies suggest that different disturbances (e.g., recreational activity) increased salmon movement in pools, and may increase adult stress (Campbell and Moyle 1992). Even minor disturbances during the summer may harm adult anadromous salmonids because their energy supply is limited, and the streams they occupy can be near lethal temperatures (Nielsen, et al. 1994). The USFS (2001; 2004) states that suction dredging can disturb spring Chinook salmon holding in deep pools during the summer, particularly if numerous dredges are operating, or if water temperatures are elevated. Suction dredging dislocates and can kill aquatic insects used as a food source by a variety of fish species in a variety of life stages. If forced to relocate to new feeding areas, fish may experience increased stress due to predation, exposure to sub-optimal conditions, and increased competition with other fish for food and space, as well as stress from agonistic behavior (i.e., contests for dominance). These are considered potentially significant impacts and will be analyzed further in the SEIR.

Stream Benthic Community

Benthic and epibenthic (i.e., stream bottom) communities, such as diatoms, periphyton, and invertebrate organisms, are an important part of the stream ecosystem because they are one of the foundational components of the food web.

Benthic communities and productivity can be altered, which can affect higher trophic levels (e.g., fish production) and other stream processes (e.g., organic matter processing).

Griffith and Andrews (1981) observed a range of mortality rates for aquatic organisms entrained into a suction dredge. Mortality among benthic invertebrates in four Idaho streams was generally low (<1% of more than 3,600 individuals) but was highest among an emerging mayfly species. Thomas (1985) and Harvey (1986) measured significant reductions in some benthic invertebrate taxa within 10 m of dredges that disturbed the substrate. Harvey (1986) found that large-bodied insect taxa that avoid sand (e.g., hydro- psychid caddisflies and perlid stoneflies) were most affected. Robinson and Rushforth (1987) observed that disturbance frequency had no effect on diatom species diversity in open canopy sections of a 3rd order tributary. However, species diversity significantly decreased as disturbance frequency increased in closed canopy areas. Frequent disturbance directly influences the diatom assemblage on rocks in streams by maintaining the community in an early stage of development.

Frequency of disturbance may keep assemblages in an early stage of development, affecting the assemblage of benthic and epibenthic invertebrate assemblages on and within the stream substrate. Robinson and Minshall (1986) examined the effects of disturbance frequency on invertebrates and periphyton. Invertebrate species richness and density were reduced as disturbance frequency increased. These trends were evident for both seasons (summer and fall) and sites (open vs. closed canopy). Invertebrate species diversity displayed no effect during the fall experiment; however, diversity was reduced at high frequencies of disturbance during the summer. Frequency of disturbance also had a statistically significant effect on the absolute number of many insect species. Colonization of the benthos by less common species is impaired by increased disturbance. Periphyton biomass is negatively correlated to increased disturbance frequency in open canopy areas and frequently disturbed areas maintained low standing crops at an open canopy site. These data suggest that disturbance frequency can directly influence the benthic community at the scale of individual rock "islands" by reducing invertebrate richness, total animal density, and periphyton biomass. Seasonality also plays a role in the effect of disturbance on species diversity.

Although direct disturbances to benthic invertebrate populations caused by dredging can be extreme, the effects are temporary and limited to the area immediately impacted by the dredging equipment (which is typically on the order of tens of meters). Griffith and Andrews (1981) found that benthic invertebrates in four Idaho streams suffered low mortality (<1% of over 3,600 individuals) following entrainment in a dredge. Rapid recovery (within 4-6 weeks) occurred, both in terms of numbers and species composition. In contrast, Bernell et al. (2003) stated that invertebrate colonies situated in riverbeds are almost entirely destroyed by suction dredging.

The effects of dredging are localized in that they do not extend beyond the immediate area dredged. In addition they are temporary – most invertebrates recolonize dredged areas within 1-2 months after dredging has occurred. However, this does not take into account the effects of the sediment plume or that tailing may be more susceptible to erosion. Both Thomas (1985) and Harvey (1986) measured significant reductions in some benthic invertebrate taxa within 10 m of dredges that disturbed the substrate. In general, benthic invertebrates (Mackay 1992), hyporheic invertebrates (Boulton et al. 1991), and periphyton (e.g., Stevenson 1991; Stevenson and Peterson 1991) all rapidly re-colonize small patches of new or disturbed substrate in streams. Abundance and general taxonomic composition of benthic invertebrates can be restored on dredge tailings four to six weeks after dredging (Griffith and Andrews 1981; Thomas 1985; Harvey 1986).

Boulton et al. (1991) argued that recolonization of tailings by hyporheic invertebrates (those living beneath the surface of the substrate) is probably also rapid. Griffith and Andrews (1981) studied the effects of a small suction dredge on fishes and invertebrates in Idaho streams and found that most of the recolonization of dredged plots by benthic invertebrates was completed after 38 days. Hall and Harding (1997), who observed a suction dredge experiment in a marine environment, found that it revealed some statistically significant effects; taken as a whole the results indicated that the faunal structure in disturbed plots recovered (i.e. approached that of the un-disturbed controls) by 56 days. Harvey (1986) found that dredging statistically significantly affected some insect taxa when substrate was altered; a recolonization experiment showed that numerical recovery of insects at dredged sites was rapid. In a study of dredging effects in an Alaskan stream, Royer et al. (1999) found that the density of benthic invertebrates was greatly reduced in the first 10 meters downstream of the activity. Values returned to upstream composition within 80 to 160 m. The U.S. Department of the Interior (1999) study of three Alaskan streams found short term decreases (during dredge operation) in numbers and diversity, with minimal long term (1 year later) impacts. Impacts depended on substrate size; harsh winters in Alaska were also an added factor for recovery.

However, many of these studies have been performed on streams where human impact is already present, utilized very general assessments of "similarity" and were somewhat short in duration. Fore et al. (1996) discusses the importance of assessing rare or long-lived organisms (for instance the presence or absence of a long-lived stonefly genus [e.g. plecoptera genus *Pteronarcys* spp. with a 2-3 year life cycle]) as important tools for assessing anthropogenic impacts. The effects of suction dredging on rare, long-lived macroinvertebrate species have not been well documented. The use of such terms as "minimal" and "rapid" is quite subjective. Some juvenile salmonids may spend 1 – 12 months in natal streams before emigrating. This would suggest that food and habitat within the dredging area may be affected from 8 – 100% of the residence time of an individual fish. Parameters such as food and cover quantity and quality can greatly influence energy reserves and hence, growth, behavior and metabolic processes such as smoltification.

Wright and Li (1998) found that chronic recreational impacts on caddisfly (*Dicosmoecus gilvipes*) densities within the riparian zone were apparent for instars 3-5 (the latter of five development stages), but effects were greater on earlier instars than later instars. In 1995, sites with low human use had statistically significant densities of caddisfly which were higher than sites exposed to intense recreation.

Many studies have observed increased feeding by juvenile anadromous and resident salmonids and adult resident salmonids below active suction dredging operations due to invertebrates becoming dislodged and floating downstream (Stern 1988; Thomas 1985; Hassler et al. 1986; Harvey 1986). The action of stirring up the stream bottom by suction dredgers can temporarily expose invertebrates, making them readily available as forage for fish.

In conclusion, suction dredging can have substantial short-term and localized adverse impacts on local benthic invertebrate abundance and community composition. Benthic communities seem to recover over time frames of 30-60 days after the disturbance ceases and the adverse impacts of suction dredging are not evident after one year (unless there is a very small population that is threatened or endangered). However, when discussing the extent of benthic disturbance and its recovery, the extent to which it affects a juvenile salmonid's reliance on the natal stream before emigrating is important as is larval development of other native species that depend on a healthy benthic invertebrate community. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Mollusks

Mollusks, such as bivalves (clams and mussels) and gastropods (snails and limpets), are an important component of stream ecology. However, in California, little is known about them and many have yet to be described (Taylor 1981; Frest and Johannes 1999). While the food of mussels consists primarily of fine organic detritus and to a lesser extent, plankton, the great majority of freshwater gastropods are normally vegetarians, feeding on living algae, and occasional dead plant and animal material (Pennak 1989). According to the USFS (2001), mollusks could suffer mortality during suction dredging entrainment. Excessive sedimentation from a variety of activities, including mining and road construction may also smother substrates and impair egg-laying or survivorship of eggs or young mollusks (Duncan 2005). In a study on the effects of suction dredging on freshwater mussels' short-term survival in Washington, Krueger et al. (2007) found no obvious physical damage to mussels due to entrainment by suction dredge; entrainment had no effect on mussel survival up to six weeks. While no direct studies have been conducted on the effects of suction dredging on gastropods, it is presumable that similar to mussels, adult gastropods, protected by their shells, could survive entrainment. However, many gastropods go through earlier larval lifestages (e.g. trochophore; veliger) that may not provide the protection of an outer shell and might be more susceptible to entrainment injury or mortality.

Disturbance of the substrate by suction dredging could have a variety of other effects on mollusk populations, including direct effects via displacement of individuals or indirect effects through alteration of their food source. Change or reduction in food, such as reduction in submerged macrophytes or algae, could negatively affect some snail species (Lodge and Kelly 1985). Harvey and Lisle

(1998) state that re-colonization would take longer where dredging moves substantial amounts of substrate occupied by aquatic mollusks. In general, freshwater bivalves have low dispersal rates and limited distribution. Many mollusks are not broadly abundant in river streams, may not have high dispersal rates, and may be influenced strongly by local events such as suction dredging. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Burial of freshwater mollusks in downstream fine sediments. In a study by Marking and Bills (1979), 50% of mussels buried in sand and silt to depths of 10 cm (4.0 inches) to 17.5 cm (6.9 inches) or more were prevented from emergence and eventually resulted in death. The disorientation of mussels (manually positioned on their sides during burial) also reduced their ability to emerge (Marking and Bills 1979). However, burial by dredge tailings resulted in the death of a substantial percentage of the two mussel species studied, and no mussels were able to excavate from experimental dredge tailings. While no such work has been carried out on gastropods, many pulmonate snails must come to the surface to access air or at least remain in water with dissolved oxygen levels above 1.5 – 1.8 ppm (Pennak 1989), suggesting that burial within dredger tailings could have a negative effect. This is considered a potentially significant impact and will be analyzed further in the SEIR.

Effects from habitat alteration

<u>Pool formation</u>

Suction dredging can lead to sedimentation of pools downstream of the dredging site, thus filling in pool habitat. For example, after one year of dredging activity on Gold Creek in Missoula County, Montana, all of the gravel deposited at the dredged area had moved downstream and completely filled in a downstream pool (Thomas 1985). However, the authors of this study found, overall, that the creation of a pool at the dredged site led to no net loss of pool habitat in the stream. Moreover, dredging can have several positive effects, including the creation or deepening of pools, which can provide refuge for fish from predation by birds and mammals (Harvey and Stewart 1991). It is unclear how sustainable pools created by dredging activity are compared to those that develop under more natural conditions. However, pool loss and formation are considered potentially significant impacts, and will be analyzed further in the SEIR.

<u>Loss of Woody Debris and Large Boulders</u>

Dredge operators may remove coarse woody debris (CWD) and large boulders from stream channels or reduce the stability of these elements by removing surrounding material (Harvey and Lisle 1998). Many pools are formed by scour around large roughness elements (Keller and Swanson 1979; Lisle 1986a; Montgomery et al. 1995; Merz et al. 2006) and therefore, the stability and maintenance of these structures are important to the long-term maintenance of such habitat. CWD, especially in smaller streams, increases flow complexity and water retention (Gurnell et al. 2002). When the flow of the water is backed up by CWD, pools may form, which are an important habitat for many species of fish (McIntosh et al. 2000). This can become especially important during dry periods to maintain stream biota

(Lisle 1986). The influences of instream structure on juvenile salmonids have been extensively discussed in the literature (Ward and Slaney 1979, Ward and Slaney 1981, House and Boehne 1985, Fuller 1990). Woody debris is also an important energy source for benthic invertebrates (Anderson et al. 1978, Bisson et al. 1987), a principal food of juvenile salmonids (Mundie 1974). Woody debris provides cover for adult salmonids (Bjornn and Reiser 1991) and low gradient sediment deposits upstream of debris accumulation can provide suitable spawning substrate in sediment-poor drainages (Everest and Meehan 1981). Large pieces and conglomerations of CWD are especially important because they cause scour of larger pools with tail-outs appropriate for redd construction in sediment-rich streams and can be more stable than smaller pieces (Sedell et al. 1982; Bilby 1984). House and Boehne (1985) found that superior salmon spawning material accumulated near boulder and wood structures placed in East Fork Lobster Creek, Oregon. Furthermore, large roughness elements (such as CWD) can govern the location of scour and deposition at the scale of pools and riffles (Lisle 1986b; Montgomery et al. 1995). Dolloff (1983) suggested that the visual isolation provided by the matrix of a root system reduces the frequency of aggressive encounters in other Pacific salmon. Merz (2001) found that female Chinook salmon selected spawning sites containing woody debris in some instances and that woody debris may make less desirable habitats more suitable for spawning and may allow for greater concentrations of redds on suitable sites.

Many studies provide evidence that CWD and other large elements affect various ecological processes and conditions in streams, including the microbial uptake and transfer of organic matter (Tank and Winterbourn 1996), the species composition and productivity of benthic invertebrates (Benke, et al. 1984), and the density of fish (e.g., Fausch and Northcote 1992; Crispin et al. 1993). CWD and snags are important habitat components for benthic macroinvertebrate communities (Brown and May 2000). Woody debris is an important refuge and source of macroinvertebrate recolonizers. Loss of wood structure can have a negative effect on macroinvertebrate diversity and production in streams (Hax and Golladay 1998). Sundbaum and Näslund (1998) demonstrated that the presence of woody debris decreases intraspecific competition through visual isolation, allowing fish to reduce aggressive interactions and energy expenditure.

While fish may not always be associated with large substrate elements, these features may be limiting during critical events such as concealment by salmonids in winter (Heggenes, et al. 1993; Smith and Griffith 1994) or reproduction by sculpins (Mason and Machidori 1976; Moyle 2002).

Harvey and Lisle (1998) state that suction dredging likely only affects the presence of CWD locally; thus, it has a limited effect on a stream's aquatic biota. However, many western streams may be particularly vulnerable to CWD removal or disturbance because other human activities have already depleted them (Bilby and Ward 1991; Ralph et al. 1994).

Removal or reduction of CWD retention in river channels can have variable and substantial impacts on the stream environment. Warren and Kraft (2006) found that in a New York stream, substrates did not change significantly in response to wood removal. However, the relative proportion of macroinvertebrate grazers increased upstream and downstream from removed woody debris dams in all streams. Smith, et al. (1993) found that wood removal from a gravel-bed stream resulted in dramatic redistribution of bed sediment and changes in bed topography. Removal of CWD changed the primary flow path, thereby altering the size and location of bars and pools, and causing local bank erosion and channel widening. Increased bed material mobility was attributable to destabilization of sediment storage sites by removal of debris buttresses, elimination of low-energy, backwater environments related to debris, and an inferred increase in boundary shear stress resulting from the removal of debris-related flow resistance. Sediment deposition was favored by the elimination of debris-related scouring turbulence and by increased flow resistance from a developing sequence of alternate bars. Mean spacing of thalweg (i.e., the low point in the stream) cross-overs and pools did not change measurably following debris removal, although variability of spacing between thalweg cross-overs tended to decrease with time as the location of bars stabilized. However, Smith et al. (1993) found no consistent pattern of change in mean residual depth of pools or in distribution of depths occurred within the first 4 years following debris removal.

Wondzell, et al. (2009) found that in the first few years after CWD was removed from a stream, hyporheic exchange flow was reduced by smoothing of the streambed and water surface elevation profiles due to streambed scour and sediment deposition. Also, large contiguous patches of downwelling or upwelling were fragmented. These flows are important to the production of benthic invertebrates and the survival and development of developing fish embryos (Fowler and Death 2001; Merz et al. 2006; Bilski 2008). This information suggests that suction dredging may have substantial effects on the quantity and quality of aquatic habitat available to fish species. This is considered a potentially significant impact, and will be analyzed further in the SEIR.

Sedimentation
Sedimentation of habitat downstream of dredging activity can negatively impact the microhabitats of bottom-oriented stream fish such as dace, sculpin, and juvenile salmonids because these fishes rely on cover that can become embedded during dredging operations (e.g., creating flat and featureless stream beds) (Harvey 1986). The increased presence of fine sediment has been shown to negatively impact growth in some species (Suttle, et al. 2004). As interstitial refuges and prey decline, fish spend more time actively swimming (rather than sheltered behind or under cobbles). Moreover, a study on steelhead found that there was more intraspecific aggression as prey availability and visual separation between fish decreased (e.g., with higher fine sediment levels), which was found to cause an increase in mortality in more heavily-embedded channels. These effects suggest that increased sedimentation from dredging could have a substantial effect on sensitive species. This is considered a potentially significant impact, and will be analyzed further in the SEIR.

Suspended Sediment

Strand and Merrit (1997) found that daily exposure to moderate levels of suspended sediment did not alter the relative growth rate of two common caddisfly species (family: Hydropsychidae); although they did observe decreased likelihood of survival for caddisflies due to sediment.

Observed sublethal effects of elevated suspended sediment on stream salmonids include impaired respiration (Berg and Northcote 1985), increased physiological stress (Redding et al. 1987), lower feeding success because of reduced reactive distance to drifting prey (Barrett et al. 1992; Sweka and Hartman 2001a), and lower growth rates in short-term experiments (Shaw and Richardson 2001; Sweka and Hartman 2001b). While suspended sediment has the potential to adversely affect fish physiology (e.g., retard growth, clog delicate membranes, cause skin irritation, damage gills, facilitate infections), fish often appear to seek out turbid waters (e.g., to avoid predation), which would suggest that the effects are not always severe, and that elevated turbidity may provide some benefit to fish at certain times. Salmonids are visual predators and turbidity is believed to influence their foraging efficiency (Sweka 1999). Several studies have shown that, in some instances, turbidity negatively affects salmonid foraging success (Berg and Northcote 1985; Redding, et al. 1987; Barrett et al. 1992; Gregory and Northcote 1993; Sweka and Hartman 2001a; Zamor and Grossman 2007). Steelhead and coho salmon have shown decreased growth rates when reared in turbid water (Sigler et al. 1984). Also, coho salmon actively avoid turbid waters (Bisson and Bilby 1982). Reactive distance of rainbow trout has been found to decrease linearly and the reactive distance of brook trout (*Salvelinus fontinalis*) has been found to decrease exponentially as turbidity increases in artificial stream channels (Barret et al. 1992; Sweka 1999). High turbidity does not always appear to affect feeding ability (Hassler, et al. 1986); salmon spend more time foraging in water of moderate turbidity than in clearer water (Gregory 1993). However, Sweka and Hartman (2001) found that as turbidities increased from <3.0 NTU to >40 NTU, brook trout became more active and switched foraging strategies from drift feeding to active searching. This switch was energetically costly and resulted in lower specific growth rates in turbid water as compared with clear water.

In contrast, the effects of turbidity on nongame fishes (i.e., the majority of fishes in North America) are not well understood. Several studies have shown that turbidity may negatively affect feeding success (cyprinids; Zamor and Grossman 2007), reproductive success (cyprinids: Burkhead and Jelks 2001), and microhabitat selection (coregonids: Swenson and Matson 1976) in fishes. In terms of toxic effects, while extremely high levels of sediment can be lethal (or at least very harmful), lethal concentrations of suspended sediment are probably rarely produced by small suction dredging because fish can usually avoid those concentrations (Bernell, et al. 2003; Harvey 1986). In large streams where dredges operate at low density, suspended sediment is likely not a significant concern because effects are moderate, highly localized, and readily avoided by mobile organisms (Thomas 1985; Harvey 1986). On the contrary, in smaller streams where a single dredging unit may influence a significant part of the channel volume and fish may not have the ability to avoid effects, impacts may be more substantial.

Nevertheless, for salmonids, dissolved or suspended solids usually cause greater stress for earlier life stages (e.g., eggs, larvae and fingerlings) than for adults. Therefore, increased suspended sediment loads can negatively impact the quality and quantity of fish produced if they coincide with the emergence and rearing of young salmonids (Sigler, et al. 1984). This is considered a potentially significant impact, and will be analyzed further in the SEIR.

Temperature
While suction dredging operations do not ordinarily change the amount of solar radiation input into the stream, suction dredging operations may result in temperature stress for fish if they interfere with pool occurrence. Spring-run Chinook and summer steelhead are susceptible to stresses as a result of warmer water temperatures. According to Spence, et al. (1996), dredging and other mining practices may cause loss of riparian vegetation (see effects to riparian habitat below) and changes in heat exchange, leading to higher summer temperatures. Bank instability can also lead to altered channel width-to-depth ratios, which further influences temperature. Any activity that reduces the condition or inhibits recovery of the pool frequency, pool quality, or in-stream wood could further cause stress on salmonids (e.g., due to lack of suitable cover or cold water refugia) (USFS 2001). This is considered a potentially significant impact, and will be analyzed further in the SEIR.

Effects on Wildlife

For the purposes of this Initial Study, sensitive wildlife resources present or potentially present within the Program area were identified through a literature review using the following resources: the Department's *California Natural Diversity Data Base* (CNDDB 2009), *State- and Federally Listed Endangered and Threatened Animals of California* (CDFG 2009a), the *California Department of Fish and Game's (CDFG) Special Vascular Plants*, *Bryophytes and Lichens List* (CDFG 2009b) and the California Native Plant Society's (CNPS) electronic inventory (2009). Sensitive biological resources included those species and distinct population segments (DPS) that were federally and/or State-listed, proposed for listing, or candidate species and designated as CDFG Species of Concern.

In addition, the most comprehensive body of information for the largest portion of California, the Sierra Nevada, from the *Sierra Nevada Ecosystems Project* (1996), as well as the *Southern California Mountains and Foothills Assessment: Habitat and Species Conservation Issues* (Stephenson and Calcarone 1999), which covers the southern portion of the state, was also used. Additionally, the *Suction Dredging Activities Operating Plan Terms and Conditions for Programmatic Approval for Suction Plans of Operation DEIS* (USFS 2001), which covers Del Norte County, was used. No other comprehensive body of literature was identified for the Klamath Basin area in northern California.

In 1994, approximately 91 special-status wildlife species were identified as being associated with riparian habitats (CDFG 1994) and ranged in habitat use from riverine species, such as mountain yellow-legged frog (*Rana muscosa*), Sierra

Nevada yellow-legged frog *(Rana sierrae)*, foothill yellow-legged frog (*Rana boylii*), Cascades frog (*Rana cascadae*) and yellow-breasted chat (*Icteria virens*), to riparian obligate species, such as arroyo southwestern toad (*Anaxyrus californicus*), Yosemite toad (*Anaxyrus canorus)* California red-legged frog (*Rana draytonii)* and willow flycatcher (*Empidonax trailii*), to species using the upland habitats adjacent to riparian areas, such as western pond turtle (*Actinemmys marmorata*), Swainson's hawk (*Buteo swainsoni*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Plecotus townsendii pallescens*), and western red-bat (*Lasiurus blossivillii*).

In 2009, a total of 118 special-status animal species are reported to occur in riparian habitats that include riparian forest, riparian scrub and riparian woodland (CNDDB 2009). Seventeen of these species are federally listed, including terrestrial vertebrates, and 24 species are state listed. A total of 45 species are classified as California Special Concern Species by the Department and the remaining 32 species are classified as Special Animals. Even though species are listed, which affords some protection, the small sizes of many listed populations, such as arroyo toad, make them particularly vulnerable to anthropogenic changes to their habitat (Jennings and Hayes 1994). Although not addressed previously in the 1994 EIR, there are at least 15 special-status mammalian species associated with riparian corridors, eight of which are bat species.

The potential impacts of suction dredging on wildlife species identified as candidate, sensitive, or special status species include, but are not limited to, the following:

- Instream Effects
    - Entrainment/excavation
    - Turbidity and sedimentation
    - Impacts to the stream benthic community (prey base)
    - Changes to channel morphology and associated habitat
    - Mercury contamination or other toxicological effects
    - Behavioral effects
- Off-Stream Effects
    - Indirect disturbance from suction dredging (e.g., disturbance to nesting raptors)
    - Loss of riparian habitat
    - Disturbance and displacement by campers
    - Disturbance from off-road vehicle use

This discussion builds on the previous discussions above related to fish for the impacts in the aquatic environment.

Instream Effects

Entrainment/excavation

While adult amphibians are likely to be able to avoid entrainment within a suction dredge, suction dredging activities could lead to entrainment or excavation of sensitive amphibian life stages (including eggs, tadpoles and recently metamorphosed amphibians). Impacts could include mortality or becoming directly or indirectly affected by increased susceptibility to other stressors because of the physical displacement that results from entrainment. Although focused on fisheries, Harvey and Lisle (1998) cite that eggs adhered to rocks, such as those by foothill yellow-legged frog, are unlikely to survive the entrainment process. They also report that if young were to survive the passage through the dredge they would most likely suffer from predation and physiological stressors. This impact is considered potentially significant, and will receive further analysis in the SEIR.

Turbidity and Sedimentation

The USFS 2004 *Sierra Nevada Forest Plan Amendment FEIS* states that suction dredging constitutes a significant amount of the mining activity in the Sierra Nevada and that suction dredging mobilizes sediment in the stream, increasing water turbidity (suspended sediment) and sedimentation (coating substrates downstream of the action).

Increased suspension of solids in the water column, like fisheries, can affect embryos and tadpoles of amphibians. Dissolved oxygen is critical for the survival of developing amphibian eggs (McDiarmid and Altig 1999), which may suffocate when waters become suspended with solids. Pre-metamorphic larvae, those that are at the hatchling development stage (Gosner stage 21 through 24), are also at risk for suffocation during this period as they are respiring aquatically (McDiarmid and Altig 1999). It has been reported that some species, such as American bullfrogs (*Lithobates catesbeiana*), are able to breathe air while aquatically respirating; however, this is for buoyancy rather than gas exchange from the lungs (Ultsch et al. 1999).

Because of their tendency to inhabit the areas in between loose, coarse substrates that comprise a typical streambed, increased siltation within a stream can affect populations of stream amphibians, (Welsh and Ollivier 1998). Gillespie (2002) found that spotted tree frog (*Litoria spenceri*) tadpole growth and development were significantly reduced by increases of sediment and activities in catchments that increase sediment loads in streams. Disturbance processes that increase stream sediment loads may have contributed to the observed declines of spotted tree frog and other lotic anurans (frogs living in flowing water) in south-eastern Australia (Gillespie 2002).

In California, several amphibian species have been identified as being directly impacted by the increase in sedimentation that results from suction dredging. Sweet (2007) cites a USGS file report (Sweet 1992) in which the direct effect of mortality on the eggs and larvae of arroyo toad was described. USFWS (2002) predicts that suction dredge mining may threaten California red-legged frog, based on evidence observed in red-legged frog occupied Piru Creek, Santa Barbara County, where heavy siltation caused by upstream suction dredging was documented. USFWS (2002) states that disturbance to streambed substrates and water quality resulting from extensive suction dredging activity at or near a mountain yellow-legged frog breeding site could have harmful effects on eggs and developing larvae.

Changes to hydrologic conditions and associated sediment loads during the spring breeding and summer larval rearing season are the principal threat to the conservation of foothill yellow-legged frog (Kuperferberg et al. 2007).

Sediment increases in a stream in northern California caused significantly lower densities of amphibians (Welsh and Ollivier 1998). Although the sediment effects were species- specific, reflecting differential use of stream microhabitats, the reflected decrease in densities by these species (such as tailed frog, *Ascaphus truei*) due to increased fine sediments on the streambed matrix is probably the result of their common reliance on the interstitial spaces in the streambed matrix for critical life requisites, such as cover and foraging (Welsh and Ollivier 1998). Other species that may be subject to similar effects and present in locations of suction dredging include arroyo toad, as described above, and foothill yellow-legged frog. This impact is considered potentially significant, and will receive further analysis in the SEIR.

Transfer of gold dredging equipment, which is not disinfected between uses, from waterway to waterway can cause cross contamination of these various waters with chytrid fungus, associated with reduced viability and death of susceptible amphibians. In addition, moving gold dredging equipment between waterways and watersheds could transfer zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena rostriformis bugensis*) and New Zealand mudsnails (*Potamopyrgus antipodarum)*, which are invasive species, between waterways.

Impacts to the Stream Benthic Community (Prey Base)

As discussed above under *Effects on Fish and Invertebrates*, the benthic community would be directly impacted from the action and may affect amphibians, based on the temporal loss of the prey base. The USFS 2004 *Sierra Nevada Forest Plan Amendment FEIS* states that suction dredging constitutes a significant amount of the mining activity in the Sierra Nevada and that suction dredging causes short-term sterilization of the gravel at the dredging site. Short-term sterilization of sands and gravels occurs not only at the dredging site, but also downstream. Aquatic amphibian species have adapted their life cycles to correspond to natural seasonal water flow (USFS 2001); however, suction dredging displaces gravel, which causes the food (algae and diatoms) attached to the rocks to be unavailable to the larvae and some adults. Sweet (2007) states that the sedimentation downstream of the dredging area coats the sand and gravel on which arroyo toads feed, by inserting their heads in the substrate and ingesting loose organic material such as detritus, interstitial algae, bacteria and diatoms (Jennings and Hayes 1994). Although this is a temporary effect, it may occur at a critical developmental stage, and therefore, have substantial negative impacts on the organisms. This impact is considered potentially significant, and will receive further analysis in the SEIR.

Changes in Channel Morphology

Sedimentation during the breeding season may be harmful to amphibians, but channel manipulation, although typically occurring in a dynamic stream corridor, may also impact amphibians if conducted during the breeding season (USFS 2001). Channel manipulation may include the following effects:

- **Dewatering.** Dewatering in the channel may occur in places where the streamflow has been directed to the sluicebox. Dewatering may expose tadpoles, such as foothill yellow-legged frog tadpoles (USFS 2007), to unnatural conditions and increase predation.
- **Increased water flows due to directionality of the stream.** Increased water velocities, as low as 10 cm/sec, caused negative reactions from foothill yellow-legged frog and caused 25% of the tadpoles studied to be displaced, with recently hatched tadpoles lethally affected (Kupferberg et al 2007).
- **Creation of new holes in the streambed.** Large holes in channel could increase the presence of non-native predatory fish that prey on amphibians (USFWS 2002).
- **Damming of waterway.** Damming a waterway to increase the level of water to float dredges could flood suitable amphibian breeding habitat. For example, Rana boylii in the Sierra Nevada typically deposit egg masses in shallow edgewater habitat <40 cm deep.

  Damming in some cases may create increased marsh/standing water habitat, providing an extension of habitat of embryonic forms and spawning habitat. Lowered water velocities as a result of damming may also have positive effects. However, if damming results in water that is too deep, then it becomes unsuitable to certain species. Also, ponding in streams with high banks will not result in additional marsh habitat.
- **Loss of woody debris and large boulders.** Removal of refugia that is important to metamorphs and adult frogs, as well as other amphibians and reptiles, could cause a localized shift or decrease in the population.

These impacts are considered potentially significant, and will receive further analysis in the SEIR.

Mercury contamination

As discussed later in greater detail in Section VIII, Hydrology and Water Quality, suction dredging activities can result in the discharge of mercury (Hg) or other toxic contaminants, and the potential exists for discharges to cause adverse impacts to aquatic organisms and increase the risk of mercury bioaccumulation in the foodchain. Among various metals tested, mercury was found to be the most toxic to aquatic organisms, and organomercury compounds showed the greatest biocidal (destructive to life) potential (Eisler 1987). Lethal concentrations of total mercury to sensitive, representative organisms varied from 0.1 to 2.0 ug/l (Eisler 1987), with anuran embryo-larvae reacting to doses between 2.4 to 67.2 ug/l (Lethal Concentration-50% mortality). Mercury in the natural environment, as tested on American bullfrog, foothill yellow-legged frog and northern Pacific treefrog (*Pseudacris regilla)*, showed no evidence of bioaccumulation (Hothem et al. 2009).

However, the elevated concentrations in bullfrogs may pose a risk to human health if the legs are consumed (Hothem et al. 2009). Studies conducted in higher vertebrates such as birds found mercury residues were high enough to predict ecotoxicological effects, but they fluctuated over the years (Suchanek et al. 2008). This impact is considered potentially significant, and will receive further analysis in the SEIR.

<u>*Behavioral Effects*</u>

Responses by adults and metamorph amphibians to noise and vibrations have not been quantified; however, avoidance by individuals of disturbances is likely. Research shows that abundance of Iberian frogs (*Rana iberica*) has been reported to decrease with proximity to recreational areas (Rodríguez-Prieto and Fernández-Juricic 2005). Human visitation along streambanks resulted in 80 to 100 percent decrease in frog use with a five-fold and 12-fold increase in direct disturbance (Rodríguez-Prieto and Fernández-Juricic 2005). Avoidance behaviors by frogs to humans, including suction dredgers, could remove individuals from an existing established territory, and push them into either marginal or unsuitable habitat or into a new, already occupied territory, potentially impacting the relocated individual and the defending individual, expending critical energy reserves.

Off-Stream Effects

<u>*Recreation Use*</u>

Activities associated with suction dredging, such as camping, may have effects on special status wildlife. In general, recreational activities can change the habitat of an animal, which can affect the behavior, survival, reproduction, and distribution of individuals (Cole and Landres 1995). The displacement of individuals can result from site-specific human disturbances such as noise, reduced snag or downed logs (from firewood consumption), and increased edge effects (Gaines et al 2003). Despite some species benefits from edge effects it would be difficult to manage edge effects from suction dredging practices for such benefits. Although no specific studies have been conducted related to suction dredging, several references refer to the decline of wildlife populations due to activities associated with suction dredging, such as camping (Harvey and Lisle 1998, USFWS 1999a, 2002). For example, entire families or groups of suction dredge miners may camp together for weeks at a single location or encampment (USFS 2001). Dumping of trash and toxic materials (soap, motor oil, mercury), associated with dredging operations, can degrade water quality, and may also have adverse effects on eggs and developing larvae (USFS 2001, USFWS 2002). Light and noise from riparian adjacent campsites may hinder or reduce the calling rate of some amphibians, such as arroyo toad, potentially reducing reproductive effort (USFWS 1999b). Poaching of animals in and around the encampments may also occur. Nesting birds near the encampments, both passerine and raptors, may be impacted by: 1) physical harm or killing of eggs, young or adults; 2) altered habitats; 3) increased predation by attraction to human food and waste; 4) decreased prey species for the area; and 5) disruption of normal behaviors, i.e., causing adults to prematurely desert the nest, or causing premature fledging in nestlings (Hammann et al 1999). Riverine-associated species potentially impacted by recreational use include nesting reptiles, such as western pond turtle (*Actinemys marmorata*), nesting passerines, such as yellow warbler (*Dendroica petechia*), nesting raptors, such as red-shouldered hawk (*Buteo lineatus*) (RHJV 2004) and mammals, such as roosting bats (pallid bat, *Antrozous pallidus* and silver-haired bat, *Lasionycteris noctivagans*).

Stern (1988) stated that recreational impacts, such as trails and campsites, should be planned and carefully constructed to avoid gully erosion, bank wasting and vegetation damage. In the Siskiyou National Forest, the USFS (2001) recommends that dredgers should camp within USFS-designated camping sites and plans for human waste disposal should be created to reduce the impacts from recreational activities.

These impacts are considered potentially significant, and will receive further analysis in the SEIR.

Off-road use

Suction dredgers may use off-highway vehicles in transit to and from suction dredging sites or encampments. Riparian associated species may be impacted by the following factors: collision, displacement or avoidance, habitat loss and fragmentation, edge effects, snag or downed log reduction, increasing routes for predators/competitors, and disturbance at a specific site (Gaines et al 2003). Marhdt, et al. (2002) and Sweet (2007) state that off-road vehicle use has contributed to the decline of the California arroyo toad. Other species are also affected by associated recreational activities. For example, western pond turtles nest in the upland habitats adjacent to the riparian corridor and will overwinter up to 168 meters from the channel (Brodie 2001). Off-highway vehicle use may crush nests and overwintering individuals and may compact the soils, degrading the upland habitat. Off highway vehicle use may directly kill herpetofauna and indirectly impact populations by creating migration barriers, destroying habitats, and increasing sedimentation and chemical contamination (Maxell and Hokit 1999). Recreational impacts to raptors (birds of prey - such as goshawks [*Accipiter gentilis]*), and passerine (perching birds - such as yellow-breasted chat [*Icteria virens]*), could include altered behavior, movements and distributions, increased nesting failure, and expenditure of critical energy reserves (Knight and Skagen 1988).

Within the forest system, roads can affect surface and subsurface hydrology, causing erosion, which is variable, depending on many factors such as the erodibilty of the exposed surface, the slope of the roadway, and the area of exposed surface that generates and concentrates runoff (USDA 1999).

These impacts are considered potentially significant and will receive further analysis in the SEIR.

Effects on Plants

For the purposes of this Initial Study, sensitive plant resources present or potentially present within the Program area were identified through a literature review using the following resources: CDFG's *California Natural Diversity Data Base* (CNDDB 2009), *the* Department's *Special Vascular Plants*, *Bryophytes and Lichens List* (CDFG 2009) and the California Native Plant Society's (CNPS) electronic inventory (2009). Review of the CNDDB (2009) revealed a total of 64 plants species occurring in riparian habitats, including riparian forest, scrub and woodland. Of these four species are federally listed, nine are state listed and 51 species are listed by the CNPS. Impacts to plant species identified as candidate, sensitive, or special status species include, but are not limited to the following:

- Trampling
- Duff removal
- Soils compaction
- Changes in soil moisture
- Vegetation diversity reduction

These impacts are considered potentially significant, and will receive further analysis in the SEIR.

b. **Effects on Riparian Habitats and Sensitive Natural Communities**

Riparian areas, including wetlands and meadows, comprise a total of 3 wildlife habitats: montane riparian, Valley Foothill riparian and desert riparian (CDFG 1988). Within the Sierra Nevada alone, riparian areas comprise 7 vegetation communities, including Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, Great Valley valley oak riparian forest, white alder riparian forest, aspen riparian forest, montane black cottonwood riparian forest, and montane riparian forest (Holland 1986). These communities provide essential habitat for terrestrial and aquatic species, by stabilizing stream banks, providing shade that moderates the water temperature and algal growth, adding nutrients from plant materials and insects that fall into the stream, and "buffers" the littoral and upland habitats. However, impacts to riparian communities from recreation activities have received little attention (Moyle, et al. 1996).

That said, recreational impacts have the potential for long-lasting damaging effects (Moyle et al. 1996). For example, analysis of aerial photography in 1996 showed that fragmentation of riparian corridors was usually associated with vehicular access, often originating from logging activities but continued afterwards by recreationists (Kattelmann and Embury 1996). Bank erosion and channel widening were found to be more common around areas of concentrated use, such as campgrounds (Kattelmann and Embury 1996).

Direct impacts from suction dredging, such as excavation of stream banks, may have long-lasting impacts, as stream banks are slow to rebuild (Wolman and Gerson 1978 *in* Harvey and Lisle 1998), and banks with vegetation removed saw increases in bank erodibility by 80% or more (Micheli et al. 2004). Root composition plays a significant role in stream bank erosion; woody vegetation provides better reinforcement of stream bank soils than herbaceous vegetation (Wynn 2004). Impacts are expected to be greater due to dredging where: (a) banks and riparian vegetation are directly disturbed by suction dredging and related activities, (b) banks are composed of erodible alluvial soils, (c) channels are deepened along banks, and (d) the roughness (large rocks, roots, and bank projections) or bank and bed are reduced, thereby increasing the hydraulic forces on the bank (Thorne and Furbish 1995 *in* Harvey and Lisle 1998). Lastly, the loss of riparian vegetation would have an impact on wildlife species that rely on riparian vegetation for food, forage and cover, and include amphibians (such as California red-legged frog), reptiles (such as western pond turtle), and nesting birds (such as willow-flycatcher), among others.

Suction dredge-related impacts on riparian habitat or other sensitive natural communities include suction dredging methods that could degrade the riparian corridor by removing existing trees, removing large woody debris, undermining banks, and possible fuel leaks and spills, among other concerns.

These impacts are considered potentially significant, and will receive further analysis in the SEIR.

c. **Effects on Federally Protected Wetlands**

Wetland areas, including perennial, intermittent and ephemeral streams, rivers and their associated seasonal wetlands and seeps, may be considered jurisdictional features by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act and are protected along the stream corridor to the top of bank, as well as isolated wetlands that are associated with riparian corridors. Impacts resulting from suction dredging activities include altered bank/shoreline characteristics, altered bed/bottom characteristics, altered organic matter and removal of downed woody debris, which could lead to water velocity changes and habitat alteration.

Impacts on federal and state protected wetlands, including impacts resulting from direct and indirect impacts are considered potentially significant, and will receive further analysis in the SEIR.

d. **Effects on Fish and Wildlife Movement**

Throughout their lives, both adult and juvenile fish may make distinct movements; from small, localized daily shifts to large migrations that may take months and span thousands of miles. Fish migrations are made for numerous reasons including access to richer feeding areas, increased growth rates, habitat exploitation and avoidance of habitat extremes (Dittman and Quinn 1996). The collective specializations of numerous discrete fish stocks allows the exploitation of a river system's resources in time and space more thoroughly than a single stock could

(Quinn 2005). Homing instinct further isolates spawning groups. While migratory movement has been studied or documented for several California fish species (e.g., Miller 1972; Villa 1985; Moyle et al. 1995; Harvey and Nakamoto 1999; White and Harvey 1999; Jeffres et al. 2006), the majority of migratory studies have been carried out in the larger context of the anadromous salmonids of western North America.

Stream trout may make considerable migrations to avoid seasonal freeze-over and dry periods and density dependent constraints. Similar to anadromous salmonids, genetically controlled movements are made by young fish spawned in inlets and outlets of lakes (Brown and Mackay 1995; Meka et al. 2003). While there is much to be gained through migration, it also has many associated costs including high energy use, missed cues, dense concentrations of young and adults during the migration period and greater exposures to disease, toxins and physical challenges (Quinn 2005). Because fish must be able to access optimal habitat and return to natal areas to reproduce under specific energy requirements and time constraints, delayed movement or avoidance of areas can have significant impacts on fish populations (Budy et al. 2002). Avoidance can be defined as a reluctance or refusal of an organism to move from one place or situation to another and can be immediate or from long-term exposure to a changed condition (Bell 1991).

Human activity can often have significant impacts on wildlife activities (Skagin et al. 1991; York 1994). Fish may avoid sudden noise or movement, but ignore the same noise or movement if it continues over a long period of time (Bell 1991). Fish are affected by sound waves and the resulting pressure changes as well as changes in turbidity, light and chemicals (Bell 1991). Anthropogenic noises, such as those created by combustion engines, can have far-reaching impacts on fish (Skolik and Yan 2002). Cambell and Moyle (1992) found that recreational activity, such as rafting and snorkeling, could increase stress on holding spring-run Chinook salmon in Butte Creek California which could later impair migration or spawning success. Fish may avoid or be attracted to certain odors. For instance, salmon can recognize the representative odor of their natal stream (Dittman and Quinn 1996). Odors that can cause sharp reactions are those of mammalian skin, particularly humans, dogs and bear in which L-Serine has been identified (Alderdice et al. 1954 as cited in Bell 1991). A single introduction of L-Serine may cause avoidance of up to 20 minutes. The synergistic effects of several stimuli must also be taken into consideration when evaluating avoidance and its effect on migration (Bell 1991).

Both day and nighttime migration has been documented for numerous salmonid species. For adult salmon, Neave (1943) reported that adult salmon passage occurred almost exclusively during daytime on the Columbia River; whereas Johnston and Hopelain (1990) observed Klamath River migration occurring primarily at night. Brege et al. (1996) showed that ~80% of yearling and sub-yearling Chinook salmon, steelhead, coho salmon, and sockeye salmon movement occurred at night on the Columbia River, Oregon. Similar observations have been made for juvenile Chinook salmon and steelhead in the California Central Valley (Bianchi et al. 1992; Vogel and Marine 1999; Workman 2005). Moser et al. (1991) indicated that emigrating coho salmon on the Chehalis River, Washington, moved primarily during the day. However, migration is not continuous but is interspersed by periods of holding. Moser et al. (1991) implied that 40% of coho time was spent moving with 60% holding. Even juvenile fish that exclusively migrate during the night have been observed seeking refuge during daylight hours within stream gravel (Neave 1955), demonstrating the difficulty in avoiding direct impacts to migrating fish.

McMahon and Holtby (1992) observed an affinity of migrating coho smolts to woody debris and cover, suggesting that impacts to these structures could effect coho migration as well. These data demonstrate that suction dredging activity could have significant impacts on fish migration, even if dredging could be restricted to times of day when fish are not actively moving.

For the smaller vertebrates, wildlife movement could be impeded if suction dredgers are densely active or consistently active within a season within a stream corridor. This could result in the sterilization of a once viable and active movement corridor along the littoral area, thus barring movement. Movement from the main channel into small tributaries, or vice versa, may be impeded by suction dredging. This impact is considered potentially significant, and will receive further analysis in the SEIR.

e. **Conflicts with Local Policies or Ordinances**

The Department's regulations would not supersede any local policies or ordinances, or authorize any activities that are otherwise prohibited in those local policies or ordinances. Therefore the Proposed Program would have no potential to conflict with such policies or ordinances. There would be no impact.

f. **Conflicts with other Plans**

There are no known habitat conservation plans or natural community conservation plans that specifically address suction dredge mining activities in California. However, there are several habitat conservation plans, natural community conservation plans, or other approved local, regional, or state habitat conservation plans within the program area (www.dfg.ca.gov/habcon/nccp/status.html). Some of these efforts are occurring in the following counties: Butte, Yuba/Sutter, Placer, Yolo, El Dorado, Santa Barbara, Orange, Western Riverside, Coachella Valley and San Diego.

That said, the Proposed Program would not authorize activities that are otherwise prohibited in any conservation plans covering the geographic areas where suction dredging may occur. Therefore the Proposed Program would have no potential to conflict with such plans. There would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
V.	**CULTURAL RESOURCES.** Would the project:				
a.	Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	✓	❑	❑	❑
b.	Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	✓	❑	❑	❑
c.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	❑	❑	✓	❑
d.	Disturb any human remains, including those interred outside of formal cemeteries?	✓	❑	❑	❑

Discussion of Impacts

a. **Adverse change in the significance of a historical resource.**

The CEQA Guidelines (Cal. Code Regs., tit. 14, § 15064.5) requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the California Register of Historical Resources (CRHR), or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. The following discussion will focus on architectural/structural resources. Archaeological resources that are potentially historical resources according to Section 15064.5 will be addressed in checklist question (b) below.

A potentially significant impact would occur if suction dredging activities would cause a substantial adverse change to a historical resource through demolition, construction, conversion, rehabilitation, relocation, or alteration.

Shipwrecks

Potential historic-era resources that might be located within areas of suction dredging include sunken vessels submerged within California's river system. The California State Lands Commission maintains a Shipwreck Database that currently identifies 1,547 recorded shipwrecks in California, of which about 70 are recorded in California's river system (California State Lands Commission 2009). The vast majority of the riverine resources are wood-hulled, Gold Rush-era vessels submerged within the Sacramento, American, Feather, Yuba, and San Joaquin rivers in Central California. Submerged historic-era vessels, both recorded and unrecorded, which have the potential to yield information important to California history, would be considered historical resources for CEQA purposes. Damage to, or destruction of, historically significant sunken vessels would be a potentially significant impact under CEQA. As both recorded and unrecorded submerged vessels may exist in locations where suction dredging may also occur, damage to such resources is considered potentially significant. Therefore, potential impacts to historic-era resources including sunken vessels will be analyzed further in the SEIR.

Architectural/Structural Resources

Other historic architectural/structural resources potentially located within or immediately adjacent to California's rivers and tributaries include historic bridges, piers, seawalls, levees, or other structural elements. Due to the nature of in-water suction dredging activities, it is not anticipated that destruction of or damage to such fixed and permanent architectural/structural resources would occur. Remnants of historic structures, such as building foundations that were formerly located within or immediately adjacent to rivers, would likely have been destroyed by river flows or natural stream course alterations. Such structures would have reduced integrity, and as such, would no longer be considered historically significant properties. Therefore, damage or destruction to historic architectural resources due to suction dredge activities would have a less-than-significant impact.

b. **Adverse change in the significance of a unique archaeological resource.**

This section discusses prehistoric and historic-era archaeological resources, both as historical resources according to Cal. Code Regs., tit. 14, § 15064.5 as well as unique archaeological resources as defined in Pub. Resources Code, § 21083.2, subd. (g). This section also discusses places of importance to Native Americans considered historical resources according to Cal Code Regs., tit. 14, § 15064.5.

Prehistoric and Historic-Era Archeological Resources

Prehistoric archaeological sites generally found along riverways include permanent or semi-permanent habitation sites, temporary camps or food processing localities, and isolated artifacts. Although it is less likely that these types of resources are located within the riverbed and the immediate area of impact of suction dredging, there is a high potential that prehistoric resources are located on the adjacent riverbanks and surrounding vicinity. Furthermore, there is potential for disturbance from historic-era mining to have buried prehistoric archaeological resources (Meyer and Rosenthal 2008).

Historic-era archaeological sites that might be present in the study area include remains associated with riverway activities, especially mining. Extensive historic-era mining activities began in California with the discovery of gold in 1848 on the

South Fork of the American River. Historic-era mining sites and features are abundant in California, including those adjacent to the state's rivers and tributaries. Property types might include placer mining remains such as tailing piles and river diversions; water conveyance features such as ditches, flumes, and dams; and community remains including foundations, dugouts, and refuse deposits located along riverbanks and in the surrounding vicinity (Caltrans 2008).

It is possible that suction dredging and related activities could cause a substantial adverse change to an archaeological resource through demolition, construction, or other activities that could disturb remains. This is considered a potentially significant impact, and potential impacts to unique archaeological resources will be analyzed further in the SEIR.

Traditional Cultural Properties

Places of importance to Native Americans can be considered historical resources as "areas" or "places" determined to be significant in the "social" and "cultural annals of California" (Cal. Code Regs., tit. 14, § 15064.5, subd. [a][3]). Defined as Traditional Cultural Properties (TCPs) in the federal nomenclature, a TCP is generally significant because of its association with the "cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998). One defined type of TCP is a "Riverscape," or "a river and its environs, including their natural and cultural resources, wildlife, and domestic animals, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (King 2004). Riverscape analysis requires that the entire river system be holistically considered for the cultural values that it conveys for Native peoples, and includes contributing elements such as spatial organization, topography, vegetation, wildlife (including fish), water features, and sites, structures, and objects (Gates 2003).

It is possible that suction dredging and associated activities could cause a substantial adverse change to a place of importance to Native Americans through demolition, construction, or other activities that could disturb remains. This is considered a potentially significant impact, and potential impacts to unique archaeological resources will be analyzed further in the SEIR.

c. **Destroy a unique paleontological resource.**

Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and marine coral), and fossils of microscopic plants and animals (microfossils). The age and abundance of fossils depend on the location, topographic setting, and particular geologic formation in which they are found. Fossil discoveries provide scientific value because they help establish a historical record of past plant and animal life and can assist geologists in dating rock formations.

While fossils may be present within the areas subjected to suction dredging, it is unlikely that suction dredging activities would destroy such resources. Smaller fossils may become entrained in the suction dredge, and would be moved, but would be unlikely to experience substantial damage as a result of passing through the suction dredge. Larger fossils may be manually placed by a miner out of the path of the suction dredge, and would similarly have a low potential for adverse effects to the resource. This is considered to be a less than significant impact.

d. **Disturb any human remains.**

The potential for human remains to be located within or adjacent to areas of suction dredge mining activity cannot be entirely discounted. There is potential for archaeological sites with human remains to be located in areas subject to suction dredge mining or associated activities. To unearth, expose, or disturb buried human remains would be considered a potentially significant impact, and will be analyzed further in the SEIR.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VI.	**GEOLOGY AND SOILS.** Would the project:				
a.	Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
	1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	❑	❑	✓	❑
	2. Strong seismic groundshaking?	❑	❑	✓	❑
	3. Seismic-related ground failure, including liquefaction?	❑	❑	✓	❑
	4. Landslides?	❑	❑	✓	❑
b.	Result in substantial soil erosion or the loss of topsoil?	✓	❑	❑	❑
c.	Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	❑	❑	✓	❑
d.	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	❑	❑	✓	❑
e.	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?	❑	❑	✓	❑

Discussion of Impacts

a. **Earthquakes and Ground Failure**

Individuals recreating on public or private lands in California are inherently susceptible to risks involving strong seismic groundshaking, ground failure, and liquefaction in the event of an earthquake. The use of suction dredges on these lands would have no effect on the level of risk normally associated with outdoor recreation. This is a less than significant impact.

b. **Soil Erosion**

In-stream suction dredging activities that result in physical changes to stream morphology may result in increased soil erosion downstream. Similarly, upland activities associated with trail use, camp locations, and staging areas may also have incidental impacts on soil loss and/or erosion. This is considered a potentially significant impact and will be examined further in the SEIR. Please refer to Section VII, *Hydrology and Water Quality*, for a full discussion of potential impacts on this resource.

c., d. **Unstable Geologic Units and Expansive Soils**

While areas of suction dredging activity may occur on unstable or expansive soils, activities are temporary and located throughout the state. Furthermore, the Proposed Program does not involve the construction of any new or permanent structures that could be susceptible to risks associated with these soil types. The presence of suction dredging and related activities would not increase exposure or susceptibility of life or property to the risks of unstable or expansive soils. This is a less than significant impact.

e. **Septic Systems**

The Proposed Program does not involve the construction of new septic tanks or alternative wastewater facilities. It is likely that suction dredge miners may require the use of septic or alternative wastewater facilities; however, the Proposed Program is not anticipated to result in a demand beyond the current capacity of existing facilities. This is considered to be a less-than-significant impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VII.	**HAZARDS AND HAZARDOUS MATERIALS.** Would the project:				
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	✓	❑	❑	❑
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	✓	❑	❑	❑
c.	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	✓	❑	❑	❑
d.	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	❑	❑	✓	❑
e.	Be located within an airport land use plan area or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area?	❑	❑	✓	❑
f.	Be located within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area?	❑	❑	✓	❑
g.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	❑	❑	❑	✓
h.	Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	✓	❑	❑	❑

Discussion of Impacts

a, b. **Use and Disposal of Hazardous Materials**

Activities associated with suction dredging include the use of gasoline and oil for equipment maintenance, chemicals for materials processing (primarily nitric acid and/or mercury), and the creation of wastewater if encampments are not located in proximity to campground or overnight facilities. In addition, suction dredge equipment often collects mercury or lead (bullets, metal debris, etc.) that that have accumulated in the sediments of waterways. When used or disposed of improperly, these materials pose a risk to public health and safety from contamination or exposure. This includes accidental or purposeful spillage into waterways and/or upland areas. Because suction dredging and related activities are associated with the routine use of hazardous materials, the implementation of the Program could potentially endanger the health of the public or the environment. This is considered to be a potentially significant impact and will be examined further in the SEIR.

c. **Hazards near School Facilities**

In general, suction dredging sites are located within the waterways of undeveloped natural areas. Although it is possible that suction dredging could occur within proximity of a school, it is highly unlikely. However, due to the sensitivity of such receptors, the possible use of hazardous materials near these facilities is considered to be a significant impact and will be examined further in the SEIR.

d. **Location on a Known Hazardous Materials Site**

Suction dredge activities are primarily situated within waterways and campgrounds of public and private recreation areas. While these recreation areas are generally not known to be contaminated by hazardous materials, it is possible that some areas may contain hazardous materials from historical uses or accidental spills. However, in general, the potential for suction dredge activities to expose the public to known or previously undiscovered hazardous materials sites is considered low. This impact is less than significant.

The potential mobilization of elemental mercury deposits from historic mining is discussed in Section VII, Hydrology and Water Quality.

e, f. **Hazards to Airports**

Suction dredge activities would not generally be located near airports. However, given the expansive program area, it is possible that activities may occur near some airports or airstrips, or within an airport land use area. While this is true, the Proposed Program does not involve the construction of any new or permanent facilities, and suction dredge activities are not anticipated to create any safety hazards related to airport or airstrip operation. This impact is considered to be less than significant.

g. **Interference with Emergency Plans**

The Proposed Program does not involve any new permanent or altered structures. As such, it would not have a physical effect on the provisions of any adopted emergency response or evacuation plans. There would be no impact.

h. **Increased Wildfire Risk**

Due to the naturally wooded and undeveloped characteristic of many recreation areas, there is an inherent risk of wildfire associated with most outdoor activity in California. Under certain conditions, fires may result from careless or improper practices involving equipment, supplies, or outdoor practices. Because suction dredging activities generally involve the use of flammable supplies for fuel and materials processing, there is a greater risk of fire associated with this activity as compared to some other forms of recreation (such as day-hiking or picnicking). As such, this activity has the potential to expose the public to an increased risk of wildfire. This is considered to be a potentially significant impact and will be examined further in the SEIR.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VIII.	**HYDROLOGY AND WATER QUALITY.** Would the project:				
a.	Violate any water quality standards or waste discharge requirements?	✓	❑	❑	❑
b.	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	❑	❑	❑	✓
c.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation onsite or offsite?	✓	❑	❑	❑
d.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite?	❑	❑	✓	❑
e.	Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	✓	❑	❑	❑
f.	Otherwise substantially degrade water quality?	✓	❑	❑	❑
g.	Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	❑	❑	✓	❑
h.	Place within a 100-year flood hazard area structures that would impede or redirect floodflows?	❑	❑	✓	❑

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
i.	Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	❑	❑	✓	❑
j.	Contribute to inundation by seiche, tsunami, or mudflow?	❑	❑	❑	✓

Discussion of Impacts

a. **Violation of Water Quality Standards or Waste Discharge Requirements**

Contaminant Discharges from Onshore Dredge Site Encampments

The suction dredging activity that would be authorized by the proposed regulations would occur specifically along the surface streams and rivers of the State, and many areas where suction dredging is conducted are remote and distant from developed facilities. As such, activities associated with suction dredging may include gaining access to stream sites with motorized transportation (e.g., boats, automobiles, off-highway vehicles), establishment and occupation of temporary encampments for extended stay periods, use of fuels for suction dredges and other hazardous substances (e.g., oil for equipment maintenance and use of chemicals for dredge material processing including primarily nitric acid and/or mercury), and creation of wastewater if encampments are remotely located from campground or overnight facilities, or incidental discharges of trash or other debris. These activities have the potential to discharge constituents of concern directly into surface waters, or to groundwater by discharges onto land. Additionally, debris, trash, or hazardous substances remaining at encampments during the winter months may be exposed to rainfall and runoff, or entrainment by high streamflow, and may present a hazard to humans and wildlife throughout the year. Finally, suction dredges operate using internal combustion engines while floating on the surface of the water. Therefore, the potential exists for oil and gas leaks or spills to occur, resulting in direct discharges of these contaminants to water bodies and possible adverse water quality effects. Discharges of constituents of concern may adversely affect water quality for aquatic organisms, wildlife, domestic water supplies, recreational uses, or other beneficial uses. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

Turbidity/Suspended Sediment Discharges from Dredging Operations

Suction dredging involves the movement of stream channel substrate and sediments (e.g., boulders, cobble, gravel, and sand) by manual and engine-powered methods and hydraulic dredging. Dredging activity thereby causes resuspension of coarse and fine sediments into the water column. Fine sediment resuspension increases water turbidity levels immediately downstream of dredging (i.e., near-field effects) and increase near-field and far-field transport of total suspended solids (TSS) downstream of the dredging. Both turbidity and TSS are regulated water quality parameters, and increased water column concentrations of turbidity and TSS have the potential to adversely affect aquatic organisms (e.g., reduced sight feeding), recreation, or other beneficial uses. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

Water Quality Effects of Mercury Discharges from Dredging Operations

Mercury (Hg), including elemental mercury, is commonly found in the sediments of streams that were mined for gold or mercury and/or received mercury-contaminated hydraulic mine debris and hardrock mill tailings. Suction dredging in areas of historic gold-mining or in areas that contain natural deposits of mercury has the potential to result in discharges of mercury through resuspension of mercury-contaminated sediment and discharges of elemental mercury “floured” into fine particles by a dredge.

Mercury is a toxic constituent that bioaccumulates in the foodchain of aquatic organisms and terrestrial wildlife, and is ultimately a human health concern primarily through the consumption of mercury-contaminated fish. The greatest toxicological concern is that dredges discharge mercury that was otherwise unavailable for methylation, and that the newly discharged mercurty is then converted by bacteria into methyl mercury (MeHg), which is a bioavailable compound.

Because suction dredging activities can result in the discharge of mercury, the potential exists for discharges to exceed regulatory standards, to limit the beneficial uses of the stream, or otherwise cause adverse impacts to aquatic organisms and increase the risk of mercury bioaccumulation in the foodchain. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

Water Quality Effects of Other Constituent Discharges from Dredging Operations

Other natural or human-generated contaminants such as trace metals or synthetic organic compounds such as pesticides may be present in the sediments where suction dredging activities typically occur. The other toxic trace metals that may be present and could be discharged during suction dredging include arsenic, copper, silver, zinc, lead, chromium, nickel, antimony, cadmium, and selenium. Release of these metals is dependent on many factors, including levels present in sediment, which will be variable from stream to stream and between reaches of a single stream. Legacy chlorinated hydrocarbon pesticides (e.g., dieldrin, dichlorodiphenyltrichloroethane [DDT], and chlordane) and polychlorinated biphenyl compounds (PCBs) can be transported to remote or high altitude waterways by atmospheric deposition.

Because suction dredging may occur in areas where other toxic constituents may be present, the potential exists for discharges of contaminated sediments to cause water column concentrations to exceed regulatory standards, or otherwise cause adverse impacts to aquatic organisms. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

b. **Substantially Deplete Groundwater Supplies or Interfere with Groundwater Recharge**

Suction dredging is a water-based activity that occurs within rivers and streams in the State. However, suction dredging does not involve the diversion of water outside of these streams or reduction in streamflow. Additionally, dredging activities do not involve the use of groundwater from wells or installation of site dewatering wells. Neither the current regulations, nor the modifications of the regulations, would involve the authorization of any water diversion or well construction activity. Suction dredging may alter water surface elevations to a small degree in and around the site of suction dredging activity via changes in the elevation of the bed as material is moved during dredging. However, the potential minor alterations in surface water levels would not be anticipated to adversely affect long-term water levels in wells. Therefore, implementation of the Program would not be anticipated to result in any substantial depletion in groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level. There would be no impact.

c. **Onsite or Offsite Erosion or Siltation**

As described above, suction dredging activities may involve the development of encampments. Such activity may involve transport of materials, vegetation removal, trail construction, and other activities that would disturb, compact, or expose soils and increase the risk of soil erosion during rainfall and stormwater runoff events. The implementation of the Program could potentially result in erosion and sedimentation leading to exceedances of water quality standards. This is considered to be a potentially significant impact and will be analyzed further in the SEIR.

d. **Onsite or Offsite Flooding from Drainage Pattern Alteration or Flow Contribution**

Suction dredging does not involve substantial land disturbances, water diversions, or contribution of additional flow such that onsite or offsite flooding conditions would be changed from existing conditions. Moreover, neither the current regulations, nor any anticipated modifications of the regulations, would involve the authorization of any land alterations, water diversions, or flow contributions. The minor alterations that occur to stream beds and river beds is not likely to result in any measureable alterations to the drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite. Therefore, this impact is considered to be less than significant.

e. **Contribute Runoff that would Exceed Stormwater Conveyance Capacity or Contribute Polluted Runoff**

Suction dredging does not involve construction of stormwater conveyances or contributions of additional stormwater runoff to constructed stormwater facilities. Moreover, neither the current regulations, nor any anticipated modifications of the regulations, would involve the authorization of discharges to stormwater facilities. However, it is possible that receiving waters downstream are covered under a municipal National Pollutant Discharge Elimination System permit under the federal Clean Water Act, and increases of pollutants from this Program have potential to negatively impact the downstream permit holder. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

f. **Otherwise Substantially Degrade Water Quality**

The activities described in the discussion of checklist questions (a) and (c) above including suction dredging operations and associated activities (e.g., encampments) have the potential to incrementally degrade water quality through contaminant discharges, even if the resulting conditions still meet water quality standards. This is considered to be a potentially significant impact, and will be analyzed further in the SEIR.

g, h, i. **Place Housing or Structures in a 100-year Flood Hazard Area, or Expose People or Structures to a Significant Risk Involving Flooding**

As a water-based activity within California's rivers and streams, suction dredging occurs within 100-year flood hazard areas. Other activities associated with suction dredging, such as the construction and occupation of temporary encampments, may also be located within 100-year flood hazard areas, and these activities may occur year-round in some areas. However, suction dredging typically is a summer seasonal activity and does not involve construction of permanent housing or structures in flood hazard areas. Moreover, neither the current regulations, nor any modifications of the regulations, would involve the authorization of permanent housing and structures in flood hazard areas. Because suction dredging activities involve temporary and minor amounts of human activity in potential flood hazard areas, such activities are not anticipated to substantially affect existing flood hazard areas, flooding hazards, or increased risk of exposure to flooding. Therefore, the potential impact of the Program to flood hazards is considered to be less than significant.

j. Contribute to Inundation by Seiche, Tsunami, or Mudflow

Suction dredging does not involve substantial land disturbances or diversion or use of additional water such that onsite or offsite conditions and exposure to seiche, tsunami, or mudflow would be changed from existing conditions. As such, there would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IX.	**LAND USE AND PLANNING.** Would the project:				
a.	Physically divide an established community?	❑	❑	❑	✓
b.	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	❑	❑	❑	✓
c.	Conflict with any applicable habitat conservation plan or natural community conservation plan?	❑	❑	❑	✓

Discussion of Impacts

a. **Physical Division of an Established Community**

The Proposed Program would not result in the creation of any permanent structures or barriers that could physically divide an established community. There would be no impact.

b. **Land Use Planning Conflicts**

While the regulations under the Program may specify location and seasonal restrictions on operations, they would not provide authorization to operate on any public or private lands where such activity is not otherwise allowed. Indeed, the suction dredging regulations resulting from the Program would not override any existing laws or policies governing land uses on public or private lands which are under the jurisdiction of another agency. All suction dredgers would be responsible for obtaining any necessary authorizations from the relevant land use authority or property owner. Therefore, the Proposed Program would not conflict with any applicable land use plan, policy, or regulation of an agency jurisdiction adopted for the purpose of avoiding or mitigating an environmental effect. There would be no impact.

c. **Conflicts with Conservation Plans**

There are no known habitat conservation plans or natural community conservation plans that specifically address suction dredge mining activities in California. However, there are several habitat conservation plans, natural community conservation plans, or other approved local, regional, or state habitat conservation plans within the Program area (www.dfg.ca.gov/habcon/nccp/status.html). Some of these efforts are occurring in the following counties: Butte, Yuba/Sutter, Placer, Yolo, El Dorado, Santa Barbara, Orange, Western Riverside, Coachella Valley and San Diego.

That said, the Proposed Program would not authorize activities that are otherwise prohibited in any conservation plan covering a geographic area where suction dredging may occur. Therefore the Proposed Program would have no potential to conflict with such plans. There would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
X.	**MINERAL RESOURCES.** Would the project:				
a.	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	❑	❑	✓	❑
b.	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	❑	❑	✓	❑

Discussion of Impacts

a, b. **Loss of Mineral Resources**

Gold is the primary mineral resource sought by suction dredge miners. Gold naturally occurs in two types of deposits: lode or placer. Lode gold is found within solid rock, commonly as veins formed in quartz, while placer deposits are found within unconsolidated sediments typically but not always in stream beds. Suction dredge gold mining involves the pursuit of placer deposits. Areas rich in placer gold deposits in California include the streams draining the Sierra Nevada, Klamath Mountains, and within the Mojave Desert. Placer deposits also occur to a lesser extent within the Peninsular Ranges, Transverse Ranges, northern Great Valley, and Coast Ranges (California Geological Survey 2002a). The “Mother Lode Region” includes the American, Bear, Calaveras, Consumnes, Feather, Merced, Mokelumne, and Yuba rivers.

By permitting the use of suction dredges, the Program provides another means for recovery of gold from placer deposits. Recovery of such gold through suction dredging would make it unavailable for other means of gold recovery. However, suction dredging under the Program is not anticipated to exhaust the placer deposits of the State, and other means of gold recovery (panning, high-banking, etc.) would remain possible. It should also be noted that placer gold mining in various forms will continue with or without the Program. Program effects are considered to be less than significant.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XI.	**NOISE.** Would the project:				
a.	Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?	✓	❑	❑	❑
b.	Expose persons to or generate excessive groundborne vibration or groundborne noise levels?	❑	❑	❑	✓
c.	Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	❑	❑	❑	✓
d.	Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	✓	❑	❑	❑
e.	Be located within an airport land use plan area, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?	❑	❑	❑	✓
f.	Be located in the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels?	❑	❑	❑	✓

Discussion of Impacts

a, d. **Generation of Noise**

Gasoline-powered engines are a primary component of suction dredge equipment. The operation of such noise-generating equipment in the existing quiet environments of the surrounding recreational areas could result in a perceptible increase in noise. Although noise generated from these engines does not differ substantially from those used in motorized boats or other motorized recreational equipment, the manner in which it is operated may distinguish suction dredging from other activities. Suction dredge activities are generally stationary and equipment may be operated for extended periods throughout the day (5.6 hours per day on average) (CDFG 1994). Although temporary, this stationary source of noise may affect recreationists or other sensitive receptors in the vicinity of operations.

Another potential source of noise generation associated with suction dredge activities is the use of generators for power at remote camp locations. However, this type of equipment is commonly used by campers in general, and noise generated specifically from suction dredge miners would not be substantially different or greater than that generated by other campers.

The operation of gasoline-powered engines for suction dredging would involve temporary noise-generating activities that could exceed noise standards and increase ambient noise levels above existing conditions on a periodic basis. This impact is considered potentially significant and will receive further analysis in the SEIR.

b. **Groundbourne Noise and Vibration**

Suction dredging activities do not involve actions that cause groundbourne noise or vibration. Therefore the recreational use of suction dredges would not result in a significant source of groundbourne noise or vibration. There would be no impact.

c. **Permanent Ambient Noise Levels**

The Proposed Program does not involve the construction or placement of permanent noise generating features. Noise generated from suction dredges is short-term and seasonal. As such, a permanent increase in ambient noise from the Proposed Program is not anticipated. There would be no impact.

e, f. **Noise in Vicinity of an Airport or Airstrip**

Although it is possible that some dredging sites may be located near existing airports or airstrips, suction dredging is not anticipated to expose nearby residents or workers to substantial additional noise levels beyond those already generated by the airport or airstrip. There would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XII.	**POPULATION AND HOUSING.** Would the project:				
a.	Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	❑	❑	❑	✓
b.	Displace a substantial number of existing housing units, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	✓
c.	Displace a substantial number of people, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	✓

Discussion of Impacts

a-c. **Population and Housing**

The suction dredge permitting regulations would have no effect on population and housing. The Proposed Program does not involve the construction or displacement of housing, nor would it directly or indirectly result in measurable increases in population growth. As such, there would be no impact.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIII. PUBLIC SERVICES. Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
Fire protection?	✓	❑	❑	❑
Police protection?	❑	❑	✓	❑
Schools?	❑	❑	❑	✓
Parks?	❑	❑	✓	❑
Other public facilities?	❑	❑	❑	✓

Discussion of Impacts

a. **Police and Fire Protection**

Suction dredge mining is primarily a recreational activity that occurs on both public and private lands. When conducted on public land, this and all recreational activities are required to abide by any applicable regulations and guidelines that generally provide for the protection of the land and its natural resources. Public land managers (including the U.S. Bureau of Land Management (BLM), USFS, and the Department) provide enforcement of regulations in public recreation areas to encourage protection of natural resources. When responding to calls, these agencies often work in cooperation with the local authorities, including sheriff and police departments.

In testimony to the California Assembly Committee on Water, Parks, and Wildlife (WPW) in 1994, Dean Swickert, a BLM representative, cited that illegal trespass and health and safety violations are the primary issues of concern when members of BLM staff are summoned to suction dredging sites. He noted that, throughout 19 California counties, approximately 50-100 cases a year addressed by the BLM are related to suction dredge mining trespass in BLM lands. The concern about health and safety issues comes from the observations that the encampments often pose hazards to the surrounding area due to use of firearms, unsanitary conditions, and irresponsible treatment of equipment and hazardous or flammable materials. Additional concerns include the likely destruction of public and private lands for hunting, firewood, and other subsistence needs.

However, a review of state police logs and Oregon Department of State Lands monitoring reports conducted by Bernell, et al. (2003) found that 0.05% of police hours spent reporting to calls on scenic rivers were related to suction dredge mining activities. The remaining 95.5% of hours were spent addressing calls of various unrelated issues. Out of more than 1,500 reported contacts with river users, including suction dredge miners, 130 people were found to be in non-compliance with some type of law, regulation, or permit. And while the study also found that approximately half of the suction dredge miners encountered did not have a current permit to conduct dredging activities, Best Management Practices contained in the permit requirements were adhered to by over 80% of miners, including non-permit holders, during the survey years of 1997-1998.

Operations on private lands often have self-regulating bodies that enforce similar rules to ensure the long-term sustainability of the area. One such private mining club is the New 49ers. New 49er Club members are required to abide by established rules and are encouraged to monitor the activities of adjacent users. Violators can be reported to the club management and are subject to eviction from the club and its properties (Koons 2004).

Discussion

All suction dredgers are responsible for obtaining permission from the operating land-managing agency or owner and for being aware of any applicable laws or rules prior to entering and mining. The regulations resulting from the Proposed Program would not override any existing laws or policies related to the use of suction dredges on public or private lands (or associated activities) under the jurisdiction of another agency. Violations of laws or policies, while a concern, are a common issue for all recreational activities occurring in the state.

The 1994 testimony from D. Swickert and the 2003 Bernell study indicate that violations of laws or policies by suction dredgers do not comprise a significant portion of the overall enforcement effort provided by local, state, or federal authorities. And while enforcement and protection services will remain an important factor in providing for the safety of the public and land, the proposed regulations would not impose a substantially greater demand for these services beyond that which already exists for recreational users overall. As such, the Proposed Program would not result in a need for altered or new facilities to provide law enforcement or fire protection services.

The impact on police protection is considered to be less than significant.

The impacts of suction dredging and associated activities on fire protection have been previously discussed under Section VII, Hazards and Hazardous Materials, checklist question (h). These impacts are considered potentially significant and will receive further analysis in the SEIR.

Parks Facilities

The Proposed Program's potential to affect park facilities is detailed in Section XIV, *Recreation*.

Schools and Other Public Facilities

The Proposed Program would have no effect on the provision and demand for school and other public facilities. There would be no impact.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIV.	**RECREATION.** Would the project:				
a.	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	❑	❑	✓	❑
b.	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	❑	❑	✓	❑

Discussion of Impacts

a, b. **Recreational Facilities**

The Proposed Program would not provide or require newly-created recreation areas or facilities specifically for the purpose of servicing suction dredging activities.

The number of permits issued for suction dredge mining generally ranges from 3,000 to 4,000 per year. As noted in the 1994 EIR, suction dredge miners often camp for extended periods and spend an average of 35 days per year mining (California Department of Fish and Game 1994), although only a portion of this activity is conducted on public land. During the same time, the California Department of Parks and Recreation estimated that the total number of California state park and recreation area visitors averaged 80,564,776. Of that total, the average number of users who stayed overnight was 7,019,142 (California Department of Parks and Recreation 2001-2007).

Given this information, suction dredgers appear to represent a very small proportion of the total number of recreationists, and thus use only a small fraction of the over 20 million acres of recreation area available in the California State Park and National Forest systems. As such, the Proposed Program is not anticipated to result in substantial changes in visitation or use volumes to the extent that substantial deterioration of recreational facilities would result.

This impact is considered to be less than significant.

Recreational Conflicts between User Groups

Suction dredgers and their associated campsites may conflict with other recreational users' activities or expectations regarding their recreational experience, and vice versa. Rafters are commonly perceived as the recreational group most in conflict with suction dredge activities, and they often cite noise and aesthetic effects associated with dredgers and equipment, as well as dangers related to snagging on floating equipment/cables as major concerns (CDFG 1994; Bernell et al. 2003). Anecdotal complaints from other recreational users include issues related to barriers to access, reduced fishing success or quality of recreational experience from the use of gas powered motors, overall reduction in aesthetic quality of the surroundings, and safety hazards related to suction dredge equipment use and practices (dredge holes, gas leaks, encampments). In addition, some recreational users report experiencing a sense of intimidation when they approach or situate near suction dredging operations.

The main issues underlying these conflicts relate to a recreationist's recreational goals and social values (i.e., attitudes toward suction dredging as a recreational activity). This issue of recreational conflict is considered to be a potentially significant impact, and will be examined further in the SEIR for this Program, specifically in terms of the potential of suction dredging activities to:

- alter visitor perception of a site or enjoyment of existing uses,
- eliminate or reduce existing uses, and/or provide new and/or beneficially modified uses, or
- create or relieve conflicts between designated uses.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XV.	**TRANSPORTATION/TRAFFIC.** Would the project:				
a.	Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., rsult in a substantial increase in the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?	❑	❑	✓	❑
b.	Cause, either individually or cumulatively, exceedance of a level-of-service standard established by the county congestion management agency for designated roads or highways?	❑	❑	✓	❑
c.	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	❑	❑	✓	❑
d.	Substantially increase hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	❑	❑	❑	✓
e.	Result in inadequate emergency access?	❑	❑	❑	✓
f.	Result in inadequate parking capacity?	❑	❑	✓	❑
g.	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	❑	❑	❑	✓

Discussion of Impacts

a-g. **Transportation and Traffic**

In general, projects could affect transportation or traffic patterns if they introduce a new or altered destination and/or roadway configuration. These types of changes could increase hazards, reduce accessibility, and impair service standards. Because the Proposed Program does not involve the construction of any new transportation infrastructure, it would have no effect on airport locations, emergency access, design hazards, or adopted policies, plans, or programs supporting alternative transportation.

Secondary activities of suction dredge mining include transportation trips and parking requirements. The majority of suction dredgers use personal vehicles to transport equipment and supplies to sites. However, transportation trips related to suction dredge miners would be virtually indistinguishable from the other recreational trips made in California.

As noted previously in Section XIV, *Recreation,* suction dredge miners represent only a small percentage of the overall number of those engaged in recreational activity in California annually. As such, the Proposed Program would not have a noticeable effect on the volumes and patterns of traffic beyond that which is normally associated with outdoor recreation.

Impacts are considered to be either less than significant, or there would be no impact, depending upon the specific topic.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVI.	**UTILITIES AND SERVICE SYSTEMS.** Would the project:				
a.	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	❑	❑	✓	❑
b.	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	✓
c.	Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	✓
d.	Have sufficient water supplies available to serve the project from existing entitlements and resources, or would new or expanded entitlements be needed?	❑	❑	❑	✓
e.	Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	❑	❑	✓	❑
f.	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	❑	❑	✓	❑
g.	Comply with federal, state, and local statutes and regulations related to solid waste?	❑	❑	✓	❑

Discussion of Impacts

a, e. **Wastewater Treatment**

Discharges of wastewater are regulated under the federal Clean Water Act and the State Porter-Cologne Water Quality Control Act. These laws are administered by the

State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs). Currently, the SWRCB and RWQCBs do not regulate discharge from suction dredge equipment in California.

Sewage and gray water is also produced as a result of suction dredging encampments. Campers in developed campgrounds would dispose of such wastewater to septic systems or facilities connected to a sewage treatment facility. Suction dredgers are not anticipated to generate sufficient wastewater that would exceed the capacity of existing systems or wastewater standards.

Those camping in undeveloped areas may store wastewater in recreational vehicles or utilize outdoor areas for disposal. All recreationists, including miners, are responsible for the proper containment, disposal, and treatment of any such wastewater.

As such, the Proposed Program would not result in an increase in wastewater quantities that would exceed wastewater treatment requirements or require new or expanded wastewater treatment facilities. This impact would be less than significant.

b, d. **Water Supply and Treatment Facilities**

As with all recreationists, suction dredge miners are responsible for providing their own personal water supplies when a public source is unavailable. Otherwise, water may be available from any number of sources, including the public facilities that are provided by local, state, or federal land managers at recreation and park areas. The Proposed Program would not affect water demand, nor would it involve the construction of any new water treatment facilities. There would be no impact.

The generation of wastewater has been discussed under checklist question (a) and (e) above.

c. **Stormwater Facilities**

Suction dredging would not generate any new sources of stormwater runoff, and would not propose or require the creation of any new or permanent stormwater drainage facilities. There would be no impact.

f, g. **Solid Waste Disposal**

Implementation of the Proposed Program would not result in a new source of waste generation. As with all other recreational users of public or private lands in California, suction dredge miners must comply with applicable state, federal, and local regulations regarding the proper disposal of solid wastes. This impact would be less than significant.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVII.	**MANDATORY FINDINGS OF SIGNIFICANCE.**				
a.	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	✓	❑	❑	❑
b.	Does the project have impacts that are individually limited but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	✓	❑	❑	❑
c.	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	✓	❑	❑	❑

Discussion of Impacts

a. As discussed in the resource-specific impact discussions, the Proposed Program may result in potentially significant effects on the environment. An SEIR will be prepared for the Proposed Program, focusing analysis on the following factors that may be affected by significant adverse impacts:

- Aesthetics
- Air quality
- Biological resources
- Cultural resources
- Hazards and Hazardous Materials

- Hydrology/water quality
- Noise
- Recreation

b. The Proposed Program may have impacts that are individually limited but cumulatively considerable. This issue will be analyzed in the SEIR.

c. The Proposed Program may be located near sensitive receptors, and could result in potentially significant effects on the environment, which may cause substantial adverse effects upon human beings. As described above under checklist item (a), the SEIR will include analysis focused on several environmental factors that could directly or indirectly affect people.

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