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Re: Comments on the California Draft Subsequent Environmental Impact Report (DSEIR) on Suction Dredge Mining in California.

California Department of Fish and Game  
Att. Mark Stopher  
Suction Dredging Program Draft SEIR Comments.  
601 Locust st.  
Redding, Ca. 96001

Date: May 7, 2011

Dear Mr. Stopher

Public Lands for the People (PLP) is a non profit organization dedicated to keeping the public lands and the rights to use those public lands in the hands of the general public. We have a constituent membership throughout the United States of some 40,000, many who reside in California. PLP would like to thank the California Department of Fish and Game (DFG) for allowing us the opportunity to present our views and comments on the DFG's SDEIR regarding suction dredge mining.

PLP and I were participants in the rule making process that created the current Suction Dredge Regulations for suction dredge mining in the state of California in 1994. PLP feels that the scientific studies on the deleterious effects of suction dredging that have been done since the 1994 Final Environmental Impact Report (FEIR) only reinforces the fact that suction dredge mining is rarely deleterious to the environment if the regulations that are currently in place are adhered to.

Some of my personal reference are: I have been suction dredging since 1979. I have been declared as an expert witness on suction dredging in a court of law. (US v Donald Eno). I have also trained people to suction dredge over the years in the United States and the Philipines.

PLP would also like to introduce a few studies and assertions both new and old that were not addressed in the 1994 FEIR, which concluded that if the regulations were adhered to, suction dredging activities would not be deleterious to fish, fish habitat or their surrounding environment.

A recent 2003 study by Peter B. Bayley,  
Response of fish to cumulative effects of suction dredge and hydraulic mining in the Illinois subbasin, Siskiyou National Forest, Oregon, concluded:

“The statistical analyzes did not indicate that suction dredge mining has no effect on the three responses measured, but rather any effect that may exist could not be detected at the commonly used Type I error rate of 0.05. The fact that the analysis was able to detect a negative effect of another mining process, HM, on native salmonids, is an indication of the long-lasting effect that hydraulic mining has had on the environment, particularly on riparian zones and floodplain sections in

geomorphically unconstrained reaches.”

“The reader is reminded of the effect of scale. Localized, short-term effects of suction dredge mining have been documented in a qualitative sense. However, on the scales occupied by fish populations such local disturbances would need a strong cumulative intensity of many operations to have a measurable effect...”

The DFG DSEIR dwelled on the negative aspects of the scientific studies and still come up with insignificant findings, imagine what the DSEIR would have determined had they addressed all of the more positive aspects of the studies. This negative approach assures PLP that the motive of this DSEIR is politically motivated and not scientific. Below is a short list of additional studies that have been done concerning the effects of suction dredge mining on fish and aquatic species. The following are a few more positive quotes to summarize their findings:

"The results from Resurrection Creek indicated that there was no difference in the macro-invertebrate community between the mining area and the locations downstream of the mining area in terms of macro-invertebrate density and taxa richness. The sampling was done 35 days after mining had been completed for the season and shows a rapid recovery of the mined areas." (The U.S. Environmental Protection Agency – 2001.)

"Dredge tailings are often referred to as good salmonid spawning substrate. In the Trinity River, chinook salmon have been observed spawning in the tailing piles of suction dredges ( E. Miller pers. comm. ). Steelhead in Idaho streams have been reported to spawn in gravels recently disturbed by human activities ( Orcutt et al. 1968 ). In the American River , Prokopovich and Nitzberg ( 1982 ) have shown salmon spawning gravels have mostly originated from old placer mining operations." (Hassler, Somer & Stern 1986)

"Anadromous salmonids held and spawned in Canyon Creek in close proximity to suction dredge activity. During the 1984-1985 spawning season, fall-run Chinook salmon, coho salmon and steelhead spawned in areas actively dredged during the 1984 dredge season (fig.). In August 1985, spring-run chinook salmon and summer-run steelhead were holding near areas where suction dredges were being operated (fig. 23). During the 1985 spawning season, fall and spring-run chinook salmon spawned in areas actively dredged during the 1985 dredge season (fig. 24)." (Hassler, Somer & Stern 1986)

"If dredge mining regulations were expounded upon and miners were made aware of the in stream habitat needs of salmonids, the most serious impacts of suction dredge mining could be reduced. Suction dredgers may even be able to enhance certain areas of the channel for rearing and spawning fish, if some of the limiting factors of a reach of stream are identified (ie. cover, woody debris, low velocity refuges, clean gravels). In Canyon Creek, current CDFG suction dredge regulations eliminate conflicts with salmonid spawning, incubation, and fry emergence by restricting mining to summer months. The 15.24 cm maximum aperture size for dredges is appropriate since stream substrate is large, but larger apertures may be too disruptive in the small channel." (Stern 1988)

"Fish and invertebrates displayed considerable adaptability to dredging, probably because the streams naturally have substantial seasonal and annual fluctuations (Moyle et al. 1982). These fluctuations, in the form of flushing winter flows, can greatly reduce the long term impact of dredging. Even during

the relatively mild winter of 1980/81, high flows still filled the hole created by dredging on NFAR with a sand and gravel mixture and eliminated all sand from the main stream. After the high flows in winter and spring of 1981/82, no substrate changes caused by dredging in the previous summer were evident on Butte Creek. Saunders and Smith (1965) observed a quick recovery in the trout population after scouring of a heavily silted stream, which, along with the quick temporal recovery of stream insects seen in this study, implies that suction dredging effects could be short-lived on streams where high seasonal flows occur." (Harvey 1986)  
"...dredge mining had little, if any, impact on water temperature." (Hassler, Somer & Stern 1986.)

"Although distinct to even the most casual observer, dredge plumes in Canyon Creek were probably of little direct consequence to fish and invertebrates. Suspended sediment concentrations of 20,000 to 100,000 mg/l which impact fish feeding and respiration (Cordone and Kelly 1961) greatly exceed the highest level of 274 mg/l measured in Canyon Creek. In general, dredge turbidity plumes were highly localized and occurred during midday which is not a peak feeding period for steelhead (Moyle 1976). Laboratory studies by Sigler et al. (1984) found that steelhead and coho salmon preferred to stay in channels with clear water, and turbidities as little as 25 NTU's caused a reduction in fish growth. In contrast to Sigler's results, young steelhead in Canyon Creek appeared to seek out dredge turbidity plumes to feed upon dislodged invertebrates even though clear flowing water was available nearby." (Stern 1988)

"In the 1997 permit, EPA defined a small suction dredge as those with nozzles less than or equal to four inches. EPA is proposing to redefine the small suction dredge range as less than or equal to six inches. Information provided in EPA's suction dredge study and the United States Geological Survey (USGS) study support the conclusion that there are local but short term effects on both water quality and macroinvertebrate communities in the mining areas. On the Fortymile River, dredges larger than those proposed under this GP showed that turbidity was reduced to background levels within 250 feet. It is expected that small dredges would have even less impact on the downstream receiving water quality." (U.S.EnvironmentalProtectionAgency2001.)

It is PLP's position the DFG DSEIR has been twisted and skewed to a point that it is all but prohibitive on the suction dredging community and is in some cases totally prohibitive. For this reason the following comments will attempt to address those assumptive DFG errors and prohibitions. It would be near impossible for a suction dredge miner to comply with the proposed regulations and still maintain a commercial venture or to make a living or even supplement his income.

**§ 21166. SUBSEQUENT OR SUPPLEMENTAL IMPACT REPORT; CONDITIONS**  
When an environmental impact report has been prepared for a project pursuant to this division, no subsequent or supplemental environmental impact report shall be required by the lead agency or by any responsible agency, unless one or more of the following events occurs:

- (a) Substantial changes are proposed in the project which will require major revisions of the environmental impact report.
- (b) Substantial changes occur with respect to the circumstances under which the project is being undertaken which will require major revisions in the environmental impact report.

**There have not been any substantial changes in the methods or operations of suction dredge mining nor has there been any substantial changes in the scientific studies that address the effects of suction dredge mining.**

(c) New information, which was not known and could not have been known at the time the environmental impact report was certified as complete, becomes available.

PLP must ask the DFG to bring forth the new information on harm to the Coho Salmon, that was asserted in testimony by Banky Curtis and Neil Manji in the original Karuk court case. This information has not been given even in a discovery motion on the new environmental impacts related to suction dredge mining since the 1994 EIR? Otherwise DFG must be in violation of above code and probably guilty of fraud on the court.

## **Mineral Resources**

### **Introduction**

The purpose of the “**Mineral Resources**” section is to identify and evaluate the potential for the project to **adversely affect the availability of known mineral resources**. The mineral resources of concern include metals, industrial minerals (e.g., aggregate, sand and gravel), oil and gas, and geothermal resources that would be of value to the region and residents of the State.

### **EIR**

The mineral resources impact analysis should focus on the **potential loss of availability of the mineral resource due to land use conversions**. Loss of access to mineral resources would primarily be the result of conversion of lands underlain by these resources to other uses, or within close proximity to the resources, such that the construction and occupancy of the project would restrict or eliminate safe and environmentally sound measures to implement extractive operations. **Loss of access could also be the result of changes in land ownership** (e.g., non-renewal of a lease where active mining is occurring). Loss of access to mineral resources for the purposes of future extraction could be considered to be primarily an economic issue. According to CEQA Guidelines Section 15131(a)

### **Standards of Significance**

Would the project: 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?

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?

3.3.15-3

Yet, to comply with the Mining Laws the DFG will most certainly have to allow the miner to do individual mitigation in many circumstances for special uses. This is of course something the DFG seems completely oblivious to since they believe that they have discretion to deny, which of course they do not.

The only locatable mineral on the majority of un-patented placer claims held under federal law is placer gold, which is naturally concentrated in stream or river bed gravels, and usually nowhere else in worthwhile amounts. The only economically viable means to profitably recover placer gold in stream or river gravel is by “suction dredge mining”.



Has it ever occurred to the DFG or Horizon the a man who is prospecting or mining has a duty to sustain his livelihood or the livelihood of his family, it is extremely important for miner to supplement a substantive income for survival.

Accordingly, suction dredging is the “**Highest & Best Use**” of river placer mining claims. As a matter of fact, it is only viable use, as no other mining method is practical, economical, profitable or environmentally sound.

When the only viable use of an un-patented placer mining claim is by suction dredging, arbitrarily prohibiting that use (even temporarily) effects a complete “taking” of all economic benefit the owner could derive from it, for the duration of the ban.

The **Fifth Amendment to the United States Constitution**, made applicable to state and local governments by the Fourteenth Amendment, prohibits the government from taking private property for public use without just compensation.

The DFG made it quite clear at the Public Action Committee Meetings (PAC) and the Public hearings through out the state that they were not interested or willing to address or listen to any parts of mining law or rights violations to the miners possessory interests. PLP maintains that is necessary to address these laws in their comments and will do so. The reason is quite clear to us that if we do not, we will not be preserving our standing to sue if litigation is required to resolve our many issues.

Regardless of the DFG decision that the mining laws do not apply to the present DSEIR for suction dredge mining, the fact is that the proposed and final regulations outcome are the instrument of how the DSEIR has been addressed and presented to the community. It is PLP's contention that by the DFG not taking under consideration the effects of the legal end result of the DSEIR and FSEIR, DFG has ignored the basic protections to preserve the Constitutionally protected property rights afforded the suction dredge mining community under state and federal laws. For the DFG to avoid addressing these state, and federal laws and Constitutional protections in the California Environmental Quality Act (CEQA) document and not consider the outcome of those unlawful violations in the the SDEIR is fatal to the end result of the FSEIR.

DFG and Horizon both address that conflicts with other recreational uses has been a problem, so they attempt to mitigate the suction dredger to avoid this problem. It may interest the DFG and Horizon know they have their shoes on the wrong feet. It is well known fact that it is the agencies job to prevent other users from interfering with the mining claimants operation, not the other way around. It is explained full in:

United States v. Curtis-Nevada Mines, Inc., 611 F.2d at 1286:  
FN6. Cf. United States v. Curtis-Nevada Mines, Inc., 611 F.2d at 1286: “[I]n the event that public use interferes with prospecting or mining activities \* \* \* [t]he mining claimant can protest to the managing federal agency about public use which results in material interference and, if unsatisfied, can bring suit to enjoin the activity.”

PLP would suggest that DFG start mitigating the actions of the other user before they attempt to regulate the miners out of existence in their FSEIR.

The DFG DSEIR is lawfully supposed to be based on facts. Fact, there is no such thing as a recreational miner in the state of California or in federal law. The whole DSIER is flawed based upon the DFG classification that suction dredge miners and suction dredge mining are addressed as recreational. I defy the DFG to provide any California State or any Federal Law that addresses

suction dredging or any other form of mining as a recreational activity. DFG and other agencies categorize small scale miners and suction dredgers as recreational so that they can treat them as recreational and ignore all granted rights under the mining law of 1872 as amended.

For the DFG to treat mining activity as a recreational activity instead of Congressionally Granted Right in this DSEIR, will in PLP's opinion, be one of the major down falls of DFG environmental document in the end. While you and others are in the process of learning your job, either in a school or in house, should we also include what you do as recreational? PLP demands that DFG remove the word recreational from their DSEIR and address the miners as holders of Mineral Estates in the FSEIR.

Just because many small scale miners, through ignorance of the laws refer to themselves as recreational does not mean that DFG should continue the abuse of the misclassification of the difference between a granted right and a recreational activity. Not being a commercial miner does not make a person recreational. In most cases in mining, not being commercial is because lack of knowledge or lack of a sufficient mineral deposit. This is called prospecting and not recreational. Instead a prospector is in possession of, *Pedis Possessio*.

For a miner to own a mining claim is not the only way the proposed regulations create a taking of granted rights and possessory interest. The granted right starts long before a miner files a claim. The grant starts with "prospecting", it is called "*Pedis Possessio*", in possession of your footprint or where you stand on the public lands.

#### PEDIS POSSESSIO

PEDIS POSSESSIO. "A foothold, an actual possession. To constitute adverse possession there must be *pedis possessio*, or a substantial enclosure. 2 possession there must be *pedis possessio*, or a substantial enclosure." 2 Bouv. Inst. n. 2193; 2 N.

#### Law of Possession

The doctrine of *pedis possessio*, which evolved from the customs of miners, has achieved statutory recognition in the Federal law as the "law of possession," 30 USC 53 (1976)

The literal meaning of *pedis possessio* is a foothold, actual *possessio*. Black's law Dictionary, 1289 (rev.4th ed. 1968). This actual occupancy must be distinguished from constructive possession...

#### *Pedis Possessio* and the Supreme Court

The classic discourse on *pedis possessio* is found in *Union Oil Company of California v. Smith*, 249 US (1919) in which the theory was recognized that if a qualifies person peaceably and in good faith enters vacant, unappropriated public domain for the purpose of discovering a valuable mineral under the mining laws -- while he is so searching, he may exclusively hold the place where he is working against those having no better right. In other words, to qualify for rights of *pedis possessio* the claimant must physically occupy the claim while excluding rival claimants and diligently in good faith attempting to make a discovery. In *Union Oil Co. of California v. Smith*, supra, at 346-347, the United States Supreme Court stated:

"... For since, as a practical matter, exploration must precede the discovery of minerals, and some

occupation of the land ordinarily is necessary for adequate and systematic exploration, legal recognition of the pedis possessio of a bona fide and qualified prospector is universally regarded as a necessity."

The doctrine (and Maley) goes on to say that if the occupancy is relaxed, the "precovery rights" are lost. "Failure to maintain such occupancy may open your claim to location by others."

A little thing called Pedis Possessio.

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1896; Union Oil Co. (on review) 25 L.D. 351, decided November 6, 1897. It was in order to obviate the effect of the former of these two decisions that Congress passed the Act of February 11, 1897, c. 216, 29 Stat. 526, which declared:

"That any person authorized to enter lands under the mining laws of the United States may enter and obtain patent to lands containing petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims,"

with a proviso saving petroleum land theretofore filed upon, claimed, or improved as mineral but not yet patented. See House Rep. No. 2655, 54th Cong. 2d Sess.; 29 Cong. Rec. pt. 2, p. 1409; *Burke v. Southern Pacific R. Co.*, 234 U. S. 669, 234 U. S. 678.

Aside from the suggested effect of the Act of 1903, it is clear that, in order to create valid rights or initiate a title as against the United States, a discovery of mineral is essential. Section 2320, Rev. Stats.; *Waskey v. Hammer*, 223 U. S. 85, 223 U. S. 90. Nevertheless, Â§ 2319 extends an express invitation to all qualified persons to explore the lands of the United States for valuable mineral deposits, and this and the following sections hold out to one who succeeds in making discovery the promise of a full reward. Those who, being qualified, proceed in good faith to make such explorations and enter peaceably upon vacant lands of the United States for that purpose are not treated as mere trespassers, but as licensees or tenants at will. For since, as a practical matter, exploration must precede the discovery of minerals, and some occupation of the land ordinarily is necessary for adequate and systematic exploration, legal recognition of the pedis possessio of a bona fide and qualified prospector is universally regarded as a necessity. It is held that, upon the public domain a miner may hold the place in which he may be working against all others having no better right, and, while he remains in possession, diligently working towards discovery.

The DFG is interfering with a well established right for the miner to take possession of a mineral grant and continue to patent. This Grant can not be considered recreational. Again PLP will reiterate, take the recreational language of the FSEIR.

With the pedis possessio, the mining laws and the state and federal constitutional protections afforded suction dredge miners, PLP continues to assert that this regulatory program in Ministerial and not discretionary.

Determination of Deleterious

The question is: how can the Department of Fish and Game DFG **make an impossible determination of an absolute fact** that the activity is deleterious or not deleterious when all of the scientific studies are speculative and not conclusive? The law does not allow for the agency or the dredger to comply with the impossible. For your information: An environmental impact report (EIR) must contain facts and analysis, not just the bare conclusions of the agency. *Gray v. County of Madera*, 167 Cal. App. 4th 1099, 85 Cal. Rptr. 3d 50 (5th Dist. 2008)



The following addresses the rights of a mining claimant as far as using the waterways in Ca. and their soil banks.

California Constitution: "It is hereby declared .... riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that [nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which the owner's land is riparian under reasonable methods of diversion and use, or as depriving any appropriator of water to which the appropriator is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained](#)". Cal., Con., Art., 10 Water Sec., 2. (California Water Code sections 101 is identical).

#### **Federal Statutory Entitlements:**

Lands open to purchase by citizens; Except as otherwise provided, [all valuable mineral deposits in lands belonging to the United States ... shall be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States ... under regulations prescribed by law, and according to the local customs or rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.](#) 30 U.S.C § 22.

(Note, with the land where the mineral deposits are situated, goes any riparian water)

Locators' rights of possession and enjoyment: The locators of all mining locations ... situated on the public domain, their heirs and assigns ... so long as they comply with the laws of the United States, and with State, territorial, and local regulations [not in conflict with the laws of the United States](#) governing their possessory title, [shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations...](#).30 U.S.C. § 26.

(Note, drives that same point home, as the water goes with the "surface".)

Use of Waters: All waters within boundaries of national forests may be used for domestic, mining, milling, or irrigation purposes under the laws of the state wherein such national forests are situated or [under the laws of the United States and the rules and regulations established thereunder](#).16 U.S.C. § 481.

(Note, applies to National Forests)

Whenever, by priority of possession, rights to the use of water for mining, agriculture, manufacturing, or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws and decisions of courts, [the possessors and owners of such vested rights shall be maintained and protected in the same...](#).43 U.S.C. § 661.

(Note, "shall" is irrefutably "mandatory".)

#### **California Supreme Court Case law**

["Whether the water right is riparian, appropriative or prescriptive in nature, it is a property interest the courts will protect. When these property rights are "taken" for public use within the meaning Fifth and fourteenth Amendments to the United States constitution, or "taken or damaged" within the meaning of Article 1, Section 14 of the California Constitution, just compensation must be paid".](#) (See *Alta Land & Water Co. v. Hancock*, 85 Cal. 219, 24 P. 645 (1890); *Collier v. Merced Irr. Dist.*, 213 Cal. 553, 2 P. 2d 790 (1931), ; *Lux v. Haggin*, 69 Cal. 255, 10 P. 674 (1886); [A riparian right is "part and parcel" of riparian land, and the right to the flow is real property.](#) *Title Ins. & Trust Co. v. Miller & Lux* (1920) 183 Cal. 71, 81.

#### **Pertinent facts**

The California Legislature has not given the SWRCB or DFG explicit authority in the Porter-Cologne Water Quality Control Act to enforce compliance with the standards it sets. [The principal enforcement mechanism](#)



[available to the Board is its regulation of water rights to limit diversions which cause degradation to water quality. No authorization, license, or permit is required from the SWRCB before exercising a riparian water right.](#)

(Note, "riparian" water rights, are not a "diversion", they go hand in hand with the land)

The SWRCB does not have the authority to determine the validity of "vested" water rights other than appropriative rights initiated after December 19, 1914 or later. Pre-1914 water rights are not under the jurisdiction of the SWRCB or the Ca. DFG.

(Note, "riparian" water rights are not "appropriative rights".

SWRCB cannot question or prohibit riparian water use. )

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The REALITY is, mining claim owners, both patented & unpatented OWN enough riparian water rights in N. CA & the Sierra slope. That if we all got together to defend those rights. We could choke off a large percentage of the FREE water SWRCB is diverting to S. CA.

Significant or insignificant

All of the subjects addressed in the 1994 EIR were found to be insignificant if suction dredge mining was performed within the new regulations. Now some 17 years later the DFG findings in the DSEIR are very similar DFG seems to feel that the 1994 regulations are no longer sufficient. PLP does not believe that there is enough new science available to the DFG to make the considerable changes that the proposed DSEIR suggests.

Most of the science used in the new SDEIR is the same science addressed in the 1994 EIR. The big difference is that now the DFG has the opposite finding on almost all of the things addressed. Other than a few new listed few federal or state listed species all of the conditions are basically the same.

Turbidity has not changed, the movement of river bottom material has not changed, the size of the equipment has not changed, The recovery of mercury and lead has not changed and there have been no changes in the methods of suction dredge mining or any additional suction dredging permits. So PLP and I have to ask the DFG, how they can justify the massive proposed negative changes to the suction dredging regulations in the SDEIR?

Each subject in the DSEIR is addressed almost identical to the 1994 FEIR. Each issue in the 1994 FEIR and the DSEIR is insignificant or significant and unavoidable, all with no changes. This leads PLP to think that the DFG and Horizon have become very creative with their proposals just to satisfy and extreme environmental community and the political atmosphere.

Here are few state codes that PLP feel have been violated by Horizon and DFG in their creative actions in the proposed regulations in the DSEIR.

**Public Resources Code 21001:** The Legislature further finds and declares that it is the policy of the state to:

**(e) Create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations** (emphasis added).

(g) Require governmental agencies at all levels to consider qualitative factors as well as economic and technical factors and long-term benefits and costs, in addition to short-term benefits and costs and to consider alternatives to proposed actions affecting the environment.

**Public Resources Code 21002:** The Legislature finds and declares that it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required by this division are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects. **The Legislature further finds and declares that in the event specific economic, social, or other conditions make infeasible such project alternatives or such mitigation measures, individual projects may be approved in spite of one or more significant effects thereof** (emphasis added).

**Public Resources Code 2650:** (a) It is the continuing policy of the State of California, in the interest of the needs of society for the wise use of mineral resources and for other sound conservation practices, to foster and encourage private enterprise in all of the following activities:

**(1) The development within the state of economically sound and beneficial mineral industries and metal and mineral product reclamation industries.**

(2) The orderly and economic exploration, development, and utilization of the state's mineral resources and reclamation of metal and mineral products emphasis added).

**Public Resources Code 2711:** (a) **The Legislature hereby finds and declares that the extraction of minerals is essential to the continued economic well-being of the state and to the needs of the society,** and that the reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety (emphasis added).

After reviewing the above legislative findings it is apparent that the DFG does not understand the importance of minerals to the economic well being to the state and the country. All of the arbitrary changes being made to the current 1994 regulations, smaller nozzles, smaller intake screens, shorter seasons, less turbidity, no winching, no dredging with in 3' of the banks, reduction of nozzle size, no open seasons, more permits, more regulations and alternative methods of recovering the gold all fly in the face of the above codes.

For example: Alternative methods of acquiring the gold. Many if not most of the mining claims on the rivers and streams do not have gold any place on them except in the stream beds. The gold comes from other sources upstream from the mining claim. What is the alternative on these mining claims. We could apply for a 1602 permit and use D-9 bulldozers, backhoes and alter or divert the water channels. What are the chances of getting a permit to use heavy equipment in a stream channel" (None)? Only the DFG could get away with such a project. Suction dredge mining is the only economically and environmentally sound method of recovering the minerals from the beds of the rivers and streams. The DFG can not prohibit what the federal government permits.

The DFG probably has no less than 1000 letters over the years that explain that suction dredges do not suck up fish through the suction nozzle, yet people who have never dredged or even been around a dredge maintain that there is the potential to do so. A group called Dredge Earth First did a test where they kept running a hot a hot dog continuously through the suction dredge. After doing this time after they found that the dredge did not even break the skin of the hot dog. So even if we were to suck up a fish, the chance of harming it are pretty neglegable.



Yes, a suction dredge could suck up fish eggs and the 1994 regulations already prohibit suction dredging during the spawning season. The DFG is already aware that the suction dredgers do not suck up eggs because of the regulations of 1994. However the DFG should look at their own significant effects of stocking predatory fish which not only eat the eggs of other fish but thrive on frog eggs as well as minnows and other juvenile fish.

Almost all of the issues that the DFG has addressed have a conclusion of less than significant or unavoidable, so how is it that the changes in the new proposed regulations are so very significant compared to the 1994 regulations? ( just because DFG says so).

The DFG and Horizon are making decisions that are:

**ARBITRARY AND CAPRICIOUS:** "Absence of a rational connection between the facts found and the choice made. *Natural Resources. v. U.S.*, 966 F.2d 1292, 97, (9th Cir.'92). A clear error of judgment; an action not based upon consideration of relevant factors and so is arbitrary, capricious, an abuse of discretion or otherwise not in accordance with law or if it was taken without observance of procedure required by law". 5 USC. 706(2)(A) (1988).

The key word to this whole projet, including CEQA, Fish and Game regulations and the 1600 series portion of the regulations is (Substantial Adverse Changes and Effects). Substantial according to the Ca. state mining law, Surface Mining and Reclamation Act (SMARA) is 1000 yards of material in one year. There is no suction dredge, even an 8" that will move that kind of material in a season.

**CEQA requires that decisions be informed and balanced. It must not be subverted into an instrument for the oppression and delay of social, economic, or recreational development or advancement.** (*Laurel Heights Improvement Assoc. v. Regents of U.C.* (1993) 6 Cal.4th 1112 and *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553) (Emphasis added)

Hydrology and Geomorphology

Although this is listed as insignificant it addresses possible streambed alteration by suction dredge activities. It is well known that healthy streams scour and are mobile to a certain degree during weathering cycles and all the way to bedrock in 100, 500 and 1000 year storms. For Rivers or streams that have dams on them and do not have the opportunity to scour on yearly or decade basis, it would appear that activities such as suction dredging would be a beneficial contribution to maintaining a healthy river system by loosening compacted gravels and should be credited for doing so. DFG has spent untold millions attempting to create spawning gravel areas for Salmon by hauling hundreds if not thousands of truck loads of gravels from unknown spots to dump into the river channels. Suction dredgers create these gravel spawning areas in their everyday dredging activities for no cost to the state. At this very time the DFG is invoved it the Trinity River Restoration Plan.

The DFG addresses destabilization of stream banks by suction dredgers and calculates that 34% of suction dredgers undermine stream banks. However if you look at the dates of the studies listed you will find that over 2/3 of them are dated prior to the 1994 regulations which made it against the law to dredge into the banks of the rivers and streams. It does not matter to the DFG that in any activity that there is a percentage of people who violate the law. All suction dredgers should not be punished for the few who do violate the law. If the DFG did diligence in there job and cited those violators it would not be necessary to even address this issue. There are all types of violators that break down and destroy the banks of rivers that are not and have not been addressed by the DFG. To name a few, the

rafting community, fisherman, day users and boaters. If the DFG wants to punish all for the actions of a few, put a moratorium on the rest of the users, make them stay 3' from the banks.

Stream bank deterioration not only applies to normal rivers and stream Hydrology and Geomorphology but applies to the habitat for Yellow Legged Frogs and other bank dwelling creatures. Suction dredging is always a site specific activity where as other uses cover the entire length of some rivers and streams with their activities. By not having a certain amount of stream bank de-stabilization stream beds widen and become more shallow, thus creating warmer stream temperatures. Channeling streams and rivers deepens them and cools them to make them healthier systems.

The DFG has determined on this issue that the stream bank erosion and stability is insignificant. Then, how is it that the new regulations require staying 3 feet or more from the bank. Does the DFG realize that many streams are not much wider than 6 feet in width and even if they are considerably wider it would be impossible to dredge to bedrock without having some sluff that would fall within that 3 foot margin. It is tantamount to making all narrow streams a class A regulation without addressing it in the regulations..

On this same issue that DFG considers insignificant they tend to use Hydrology and Geomorphology to make a determination for the smaller nozzle size from 6" to 4". This is sounding more like a predetermined political outcome than a valid reason. If Hydrology and Geomorphology are insignificant then leave it at insignificant and quit trying to use Hydrology and Geomorphology for a reason to mitigate.

The DFG reduces the 6" nozzle size to 4" making those dredgers that wish to use larger than 4" nozzles jump through all types 1600 series of hoops to appease the DFG's arbitrary decision that it somehow protects fish or reduces mercury flouting or methyl mercury.

Violation of California Office of Management and Budget. (OMB) Executive Branch  
For the DFG to require all of the personal information on the suction dredge permit and special use authorizations they have in their proposed regulations in DSEIR, would require complying with the OMB information guidelines and require an OMB number on each of the permits issued.

With the time constraints of short seasons and the requirements to list up to 6 areas a dredger might be dredging in, and then jumping through more hoops if he changes his mind on what area he chooses to run a 6' dredge is over burdensome and unreasonable to say the least. When a miner is prospecting he rarely knows the exact spots that he may be testing for a discovery. The requirement for any permit other than the original state wide permit is not only a costly project for the miner but a paperwork nightmare for the miner and the state. By the DFG's own admission most suction dredgers use a 4" or less dredge and this new proposed rule would only affect a few. Keep the 6" rule in place and the statewide permit in place, it has been affective for 14 years .

Larger suction dredges should be encouraged by the DFG and the environmental community because of the importance of stream bed porosity to the habitat for salmonoid eggs and alevins. A study which addresses this issue is attached for the convenience of Horizon environmental and the Ca. DFG. Study and report by Dr. Robert N. Crittenden, Dr. of Ecology. Exhibit - 1



For the DFG to require the information for special authorizations and permits for over 4" dredges and motorized winches create massive paperwork burden on any citizen and create the same burden on all state agencies, and is a violation of the 1995 California Paperwork Reduction Act.

Listing areas a miner wishes to dredge and the times he will be there is asking for serious trouble. There are criminals out there and they could take serious advantage of a miner if they get their hands on this type of information. Gold being around \$1500 an ounce would be a great enticement for someone to come and rob the miner and if that is not enough the would be thief would also know when the miners were or were not home and may burglarize the miners house house. If you think this is far reaching, the DFG must remember that the information on these and other permits is public information.

Limiting the suction dredge community to 4000 permits yearly is not only unreasonable would easily be a violation of the prospectors and miners rights under federal and state laws. The 4000 permit limit is also not an environmental or biological issue and is out of the DFG jurisdictional venue.

Federal lands are free and open to discovery of valuable minerals. This is not just an invitation to 4000 suction dredge permittee's only, this is an invitation to every citizen of the United States and those he intend to become citizens. This is discrimination for any person who wishes to start prospecting and mining with a suction dredge and cannot do so because the quota for permits has been filled.

To top that off the extreme environmental community has been attempting to rid the rivers and lands of mining or suction dredging for more than 20 years, what would prevent them from buying up all 4000 permits or even most of those permits? Does the DFG think this is not possible? The extreme environmental community have spent millions and millions of dollars on litigation to stop mining of all types what is few hundred thousand dollars more to insure that there is no suction dredging going on at all. The DFG is about to create a nightmare in the name of mitigation with this type of end result of their FSEIR.

What if a suction dredger in mid-season decides he wants to go somewhere that is not covered under his first permit and is required to get another permit and the 4000 limit has been reached? Suppose that he makes a good part of or all of his living by suction dredging and now because the DFG has determined that there will be no more permits issued. Now the dredger can not feed his family or even himself? The DFG had better get real here because you are going to be creating law breakers out of honest people.

At a time during the 1980's there were 12,000 permits issued. in the Ca.. Yet the rivers and streams are still in existence. There were over 6,000 permits in 1988 and the DFG raised the price on out of state permit holders for 1989. In 1989 the permits fell to 4,000. How much revenue does the DFG feel the state lost on that move? Now the DFG is driving an even a bigger nail in the states economic coffin with these new unmanageable propose regulations and limitations on issuance of those permits. The 4000 dredge permit limit is an arbitrary figure from the DFG and has no sound basis or reasoning.

Now PLP will address the DFG's lack of Safety concern by removing the use of a gas powered winch from the suction dredge mining community unless they have special use authorization. So now the

DFG has decided that if a dredger were to go on 6 different sites in a season he has to obtain 6 different listings on his permit and add on site inspections with a myriad of new requirements. On site sight inspections under section 1602 of the fish and game codes for winching, or over 4" suction dredge use on most rivers and streams. This could lead to at least 6 different on site inspections on one permit. Believe PLP when we say that the DFG could not possibly comply with handling of such a demand of on site inspections Where is the sanity in this?

Along with all of this some lone DFG employee could and probably will make a determination that some aspect of the project could be significant and the miner may have to comply with a separate CEQA document or a never ending 1600 process or possibly some far reaching TMDL or other issue with the California water Quality Control Board. This SDEIR creates the opportunity for a permitting nightmare for the miner and the agencies.

The DFG addresses Destabilization of channel profile as insignificant but says just as precaution they will not allow the use of a motorized power winch without special authorization. PLP suggest that DFG take a second look at there own reasoning. Destabilization is either insignificant or it isn't, with or without a power winch. If destabilization is insignificant, why is the DFG attempting to mitigate it by disallowing winches without a special use authorization? The 1994 regulations already addressed the miner could not move rocks from within the riverbed to outside and from outside the riverbed into the river.

When suction dredgers are under water in most of the rivers and streams it is necessary to deal with large rocks, many which way tons not just pounds. For a suction dredger to move forward with their project they must at least move those rocks either behind them or ahead of them to get to the bedrock where the gold has most times accumulated. Without the use of a gas powered winch the project can and does become boulder bound and the dredgers efforts to acquire the gold is thwarted.

However the real problem is not the operational success but the danger of being pinned by a rock that may weigh several tons. It happens almost every year that dredgers get pinned under rocks. Without the use of a strong pull gas powered winch the rock can not be removed and the dredger can lose his life or a limb. Death has occurred several times over the years because ad-aquit winching power was not available to the out of water assistant. The use of a gas powered winch is a must when working the bottoms of rivers.

Even in 1994 FEIR they had regulation such as putting a tire or some kind of protection under a cable or chain if the winch was tied down to a tree and not moving rock to and fro and in and out of the waterways. There is no sound reason not to continue with the 1994 regulations when it comes to using a gas powered winch.

It is the opinion of PLP, if the DFG continues with their plan to discourage the use of gas powered winches it may be necessary to file a complaint with the Division of Occupational Safety and Health (Cal/OSHA) and see how they feel about the DFG ignoring or not encouraging the use of safety equipment such as gas powered winches.

Cal/OSHA

How to file a complaint with Cal/OSHA

## Right to file a complaint

The California Occupational Safety and Health Act of 1973 gives workers the right to file a complaint about workplace safety and health hazards.

Names of complainants must be kept confidential

The name of any person who submits a complaint to Cal/OSHA must be kept confidential by law if the person so requests.

If you would like to report hazards at your workplace to Cal/OSHA, call the [Cal/OSHA Enforcement Unit district office](#) nearest the place where the hazards exist.

You can also mail or fax a completed [Web complaint form](#) to the [Cal/OSHA Enforcement Unit district office](#) nearest where the hazards exist.

You can also file a safety and health complaint electronically using the Federal OSHA on-line complaint form located at:

[www.osha.gov/pls/osha7/ecomplaintform.html](http://www.osha.gov/pls/osha7/ecomplaintform.html).

On this whole subject of Hydrology and Geomorphology the DFG information is based on studies, most of which are prior to 1994. Yet they conclude that the same same law violations are going on after the 1994 regulations were in place. PLP finds that to be an accusation by the DFG that a large percent of the suction dredgers are criminals and have continued old practices by ignoring the 1994 regulations.

Contrary to popular belief of the DFG and others, the miners are not criminally inclined. The miners had to face these same accusations in 1993 and 1994 because of DFG accusations that the miners were a bunch of criminals and agency personal feared for their safety. The miners in defense searched through all of the DFG citations on file from 1988 to 1993. There were 96,000 citations, out of this there were 76 suction dredging citations and only 17 convictions. That calculates to .00017 percent of those criminal citations with convictions being suction dredgers. This tells us that for the most part suction dredgers are law abiding citizens. Quit making it sound as though the DFG has to mitigate for precaution against lawbreakers. You don't take everyones drivers license because a few drivers drive a 100 miles an hour, you enforce the law on those who violate it.

## Mercury

Mercury appears to be a sore spot with the DFG and the Environmental community. Since suction dredging appears to be the only economically and environmentally sound method of recovering 98% of the mercury from the rivers and streams, it boggles the mind to think that their would be opposition to that amount of recovery and scream about the 2% loss.

Mercury Effects, Sources and Control Measures, Sept. 1996, Exhibit 3

Prepared by

Alan B. Jones, Brooks Rand, Ltd., Seattle, WA

Darell G. Slotton, University of California, Davis

Review contributions by



Chris Foe, Central Valley Regional Water Quality Control Board  
Joe Domagalski, United States Geological Survey  
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This above study needs to be taken under consideration in the DFG FSEIR as Attached, Exhibit-3

The effectiveness of a suction dredge recovering mercury is verified in the peer reviewed suction dredge study conducted by the Environmental Protection Agencies (EPA) 1998.

EPA, Suction Dredge Study (1998)

“Values of dissolved mercury actually were greater upstream of the dredge, suggesting that any effect of the dredge was likely within the range of natural variation. (The operator reported observing deposits of liquid mercury within the sediments he was working.)”

Here PLP will adopt the comment on the mercury portion of another party who participated in the Alpers mercury study. Mr. Dave McCracken, who has some 30 years of dredging and teaching experience. Mr McCracken helped set up the test equipment on the project and has explained his reasoning in his comments on the DSEIR and Mr McCracken's comments as to the conclusions of the Charles Alpers study are as follows:

**Improper Conclusion:** "In fact, the water from my closed system appeared to be so contaminated, USGS staff ordered special stainless steel containers flown in so they could send the water out by helicopter and dispose of it properly! It was mainly from these water samples which Charles Alpers formed his conclusion that suction dredges may discharge mercury into the active waterway. But the water from my tank had been continuously used over and over again to excavate and capture 100% of the mercury from highly-contaminated material. It is unreasonable to take water from a closed circuit system like that and attempt to relate to what might come off the back of a dredge system which only uses water one time (in a completely different way) to excavate material. **This is bad science!"**

**Improper Conclusion:** "Then Charles Alpers concluded that the levels of mercury captured from our second excavation could be used as a baseline of how much mercury might exist throughout all of California's waterways. He makes some estimations of how much mercury suction dredgers could potentially re-suspend, based upon the amount of mercury that we excavated off bedrock, just below the source of mercury, in one of California's worst mercury hot spots? **How scientific is that?"**

**Improper Conclusion:** "Furthermore, Alpers related the potential statewide impacts to the estimated production yardage figures which Keene Industries (dredge manufacturer) publishes in their promotional material. Even though the USGS team stood by and watched my team excavate using a 3-inch dredge, they did not take the opportunity during the study to measure the volume so they could come up with a real production estimate for suction dredges. **Therefore, Charles Alpers reached out to projected estimates in a promotional brochure?** There are so many variables in play while dredging (make up of the streambed, speed of the river water, depth of the excavation, type of power jet, experience of the operator, etc), that there is no way Charles Alpers could use unproven



information from a promotional brochure to make reasonable statewide projections in a scientific conclusion!"

**Improper Conclusion:** "Alpers suggests that most mercury contamination at the bottom of California's waterways is locked in place by armored streambed and should be left in place until some better method of recovery is developed. However, any experienced suction dredger will tell you that annual flood events, especially the larger ones, naturally tear up armored streambeds and move the material further downstream. The fact that we find man-made objects underneath the armoring is testimony that streambeds are highly mobile. Besides, your own SEIR's entire section on river ---- defeats this Alpers Study."

The DFG should totally ignore the non PEER reviewed recent study of Charles Alpers, et al. Mr. Alpers has shown in the Public Action Committee (PAC) meetings, his speaking engagements, his organizational affiliations and his past studies that his science is not true science but a politically slanted bias. He should be ashamed to refer to himself as a scientist. Those who except this type of work as science are not better.

No one could even consider a recirculation tank that was used in the mercury study as being comparable to a suction dredge study for mercury. I think the DFG knows this and is planning on turning this hot potato over to another agency, mainly California Water Quality Control Board.

Here, PLP will adopt the comments given on the DSEIR submitted on (May 1, 2011) to the Ca. DFG by Joseph Greene and Claudia Wise (**RE: Comments regarding SEIR and Proposed Regulations for suction dredge mining in California in Favor of Maintaining Current 1994**). "**Attached**" as **Exhibit-2**

It has been suggested by many that even the mercury test done by Rick Humphries is a far better document than that of Charles Alpers and PLP would have to agree. However even Mr. Humphries Mercury test (not a study) has considerable flaws in it. For example Mr. Humphries states that the 2% of the Mercury that was lost by the suction dredge (old header box style) not the new flair jet, was floured and was more susceptible to mercury methylation. However, Mr. Humphries did not bother to check the soil overburden prior to it entering the intake nozzle to see if in fact the mercury may have been floured prior to being sucked up into the dredge box.

Mr. Humphries also explains that the 2% of floured mercury that was discharged from the dredge sluice box would eventually end up somewhere in an area that was conducive to the bacterial required to methylate the floured mercury. The bacteria required to methylate mercury is not commonly found in rivers and stream where suction dredging normally prevails because of the high dissolved oxygen (DO) content. The bacteria required is associated with low oxygen areas such as swamps and lakes. Along with the fact that most suction dredging is done in streams and rivers and the action of the suction dredge also creates its own dissolved oxygen.

Along with this assertion Mr. Humphries in his test mentions that while the suction dredging was being done that they noticed that there was mercury falling to the bedrock in front of the suction nozzle and re-conglomerating. So my question to the DFG and Mr. Humphries is, what is going to prevent the floured mercury that comes off the the end of the dredge sluice box from re-conglomerating as it did in front of the suction nozzle when it fell to bedrock? Because of mercury's ability to re-conglomerate, it shoots holes in Mr. Humphries assumption that the mercury would be more suseptible to methylation because it was floured by the suction dredge.

During the Public Action Committee Meetings, Claudia Wise a retired Environmental Protection Agency (EPA) spent the best part of one hour and a 30 minute power point presentation explaining the actions of Selenium vs Mercury and how they cancel each others toxicity. In the DFG DSEIR we are very luck to see any reference to her presentation, one short paragraph that could have been missed even with a diligent reading. The selenium issue needs to addressed in full because there are several good PEER reviewed documents on the subject. For Horizon and the DFG to ignore this issue is a violation CEQA best science procedures.

It appears that DFG is ignoring anything that has been presented to them in a positive manner in favor of balancing the negatives in the DSEIR on suction dredging. This would include the lack of DFG addressing Joseph Greene's power point presentation on turbidity as well as Claudia Wise's mercury presentation. PLP suggest that the DFG spend some time on these issues in their FSEIR, with diligent research instead of just blowing it off as not worth addressing. (Joseph Greene and Claudia Wise comments attached)

This whole attack on suction dredging losing 2% of the recoverable mercury being made as a big deal is a Chicken Little fear tactic to discredit an honest endeavor. Even a fish is probably smart enough to see the advantage of removing 98% of a poison from the waterways, that which will never have an opportunity to methylate. If the DFG or some other California Agency had a lick of sense they would take advantage of this opportunity by rewarding the recycle of mercury instead of attacking it, other states do.

Lead is another toxic material the the DFG attempts to ignore and in the past has stated that they are not concerned. Let me say that there was a real danger from lead getting into the water system, so much as a matter of fact that over the years since I was a child the government has banned many of its uses. Stopped the use of lead solders for water pipes especially to a residence, laws have been passed as to the types of fishing weights fisherman use or the use of lead bullets and the list goes on.

Lead left in the river and stream systems from hunters and fisherman eventually chrystalize's and becomes part of the water system through ionization. People have become very ill from lead sources in drinking water. Lead has affected human brains, nervous systems and even caused death. Suction dredging removes the mercury, lead and other heavy metals and should be rewarded, if not by money, then credit for mitigation. If the DFG and Horizon feel there is no concern, why is it that other agencies have banned the use of lead?

Other prohibitive activities included in the proposed regulations, such as mechanized winching, (high banking", removal of vegetation, dredging outside of the wetted channel and diversion of flows already have laws in place. Additionally the proposed regulations require dredgers to take reasonable care to avoid dredging silt and clay materials. Thus, the 1994 regulations already provide enforceable conditions by which CDFG and other local, state or federal law enforcement officers can act and stop activities that may result in violation of turbidity/TSS conditions that are inconsistent with suction dredging.

To Start with this DFG SEIR is about suction dredging and does not allow for the DFG to create regulations for activities other than a suction dredging program. The proposed regulations already address suction dredging outside the wetted channel, They have already addressed power winching (illegally I might add) and now they want to regulate "high banking". There are already guidelines in place for reducing silt deposit in the waterways from high banking by creating settling ponds between the high banking operation and the river or stream. This allows the sediment (turbidity) to settle out prior to the water returning to the stream. This is a Suction Dredge SEIR not a High Banking SEIR.

As far as requiring a special permit for high banking under 1600 series of the fish and codes, the DFG is reaching way out there in (we assume) requiring a permit for a 1602 stream bed alteration permit or some form of TMDL permit. What PLP would like to know is where does the DFG get the authority to create guidelines or regulations for another activity other than suction dredging in the DSEIR, or are we mistaken and this DSEIR is on high banking, turbidity or streambed alteration or something other than suction dredging mining. We suggest you drop the high banking issues and stick with suction dredging.

The 1602 stream alteration permit regulations addresses "substantial" stream bed alteration not some poor miner operating a high banker moving a few yards of material with a shovel or miner having created settling ponds to prevent allowing turbidity to enter back into the river system. If the DFG or other government agencies can not avoid making and enforcing regulations that completely stifle an activity and especially an activity with in granted rights, then they are way out of line. Addressing the high banking issue in this DSEIR or FSEIR is completely out of character for the purpose of this CEQA document.

It would be extremely important for the DFG and Horizon to address the mining laws and the rights that go with them in the FSEIR, especially since they have ignored them up to this point. It has already been explained to me by Mark Stopher, that his primary job is to complete the FSEIR and come out with new regulations as was dictated by court order, and that what ever the outcome from the SFEIR is not the issue in his process. If this is the opinion of Mr. Stopher, Horizon and the DFG, they are all making a sad mistake.

Requiring Permit Number on suction Dredge

A suction dredge is not a boat and even a boat does not require motor number on it. Posting a dredge permit number on the a suction dredge that would be visible to all. Law enforcement have the ability to speak to the operators and ask for their permit, the rest of the world has no business knowing what the dredgers permit number is or even if he does or doesn't have a permit. A citizen could use that number on the suction dredge for unsavory reasons. Secondly, attaching a permit would be difficult to even keep it dry, and third, in many cases there are several dredge operators on one dredge operation. If there are say 4 dredgers with permits on site do they have to all post a permit number on the dredge or do they have to continuously keep changing the permit each time a new dredger enters the water. There is absolutely no reasoning to require permit posted on a dredge, Better yet since the DFG is locked into biological jurisdiction maybe they can explain what this has to do with biology.

Engine I D is another area of biology that PLP and I have never heard of. Engine I D is an over regulating requirement from the DFG. Engines break down and need replaced or repaired. If it is in the shop being repaired and you have a spare engine, I suppose that the operator must stop his operation, get another permit or he goes to a DFG office and informs them that he will be using a different motor. All of these minor requirements are out of the DFG jurisdiction and are doing nothing more than attempting to create law breakers out of otherwise honest people. The DFG needs to get real. DFG mandate is to protect fish not broaden there regulatory powers that are outside their jurisdiction. The suction dredge is not like a car where you license it and put the engine ID on the title.

Smaller screens on suction dredge foot valves, for what, to keep it from sucking up small fish. I think that if the DFG or Horizon consulted with any Hydrologist or Engineer they would find out that the smaller the holes in the screen the more suction would be created in a more concentrated area. This would be natural because the pump is going to be trying to pull the same amount of water through a smaller hole.

The DFG SDEIR, Did not address the CEQA requirement as to the physical harm to business's in small community's located in the rural areas where most suction dredging takes place.

Title 14, Article 9, Section, 15131

"In *Citizens Association for Sensible Development of Bishop Area v. Inyo* (1985) 172 Cal. App. 3d 151, the court held that "economic or social change may be used to determine that a physical change shall be regarded as a significant effect of the environment. Where a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment." In this case, the Court held that an EIR for a proposed shopping center located away from the downtown shopping area must discuss the potential economic and social consequences of the project, if the proposed center would take business away from the downtown and thereby cause business closures and eventual physical deterioration of the downtown."

The DSEIR does not address the Economic or social physical changes that are faced by small communities and counties that are screaming for economical and sustainable business opportunities. The small scale suction dredge community brings big business to local rural economies and businesses. By the DFG's own admission the suction dredge community has considerable expenditures in local economies. Many of the counties have gone to the trouble of constructing



referendum's to the state encouraging them to reinstate suction dredging. This is because of the loss of revenues to their local economies that are in desperation to be sustainable. All of this in an unusually stressed economy to start with. By outlawing suction dredging in the State, the court, the legislature and the DFG created a physical threat that needs to be addressed in the FSEIR. (review example: Exhibit-4, Eldorado County) attached.

The DFG survey on the amount of gold recovered by the suction dredge community from 1994 to 2009 was approximately seven tons of gold. At today's prices that is over \$17 million dollars a year and over a 14 year span we are talking over 240 million dollars of new wealth brought to the economy California and the nation as a whole from average of only 3200 permittees.

The suction dredge community, by the DFG's own calculations have removed somewhere in the neighborhood of four tons of mercury in those same 14 years, that is far more than all of the water purification plants in all of California can remove and it would be absolutely economically prohibitive for the government to even attempt to remove mercury from the waterways, and if they did it would cost billions and billions of dollars out of government coffers.

These above figures do not even address the amount of monies spent in the local communities by the suction dredge community which is some were between 60 and a 100 million a year in California. Even at the lowest count of 60 million we are still looking at almost another 840 million in expenditures for the 14 years. So with approximately 840 million spent in local Ca. economies and 240 million from mined gold we are talking well over a billion dollars in 14 years.

The state is at least 28 billion dollars in debt with their budget deficit and is discussing bankruptcy, and the DFG and the DSEIR doesn't seem to feel that 1 billion dollars over 14 years is significant enough to consider the social and economic "physical" consequence of their environmental impact document. What a travesty, it is no wonder the state and the local community's are screaming for help. This problem is a significant physical problem and needs to be addressed in the FSEIR for the overall state and local budgets and especially in small town community's and business's.

### Yellow Legged Frog

The Yellow Legged Frog has become a major issue as a candidate species for the ESA. It is PLP's opinion that site specific occurrences such as suction dredging are not and have not been the problem to the yellow legged frog. However we are well aware that some of the major problems the DFG's reckless stocking practices of voracious predatory fish, the many dams in the state, wading indiscriminately by day users, rafters and fisherman. There is no proof in the DSEIR that preventing a suction dredger from dredging within 3' of a bank has created a single problem. However there is tons of proof on other things that are responsible for the demise of the Yellow Legged Frog. The DFG needs to focus on the problems and not speculate on some assertion.

Pollutants created from outside the waterways create problems such as with pesticides, oils, road grime, fertilizers and many other forms of daily contaminants being washed into the Foothill Yellow-Legged Frog's habitat.

"in Trinity County, California there is a dam on the major river of the frog's home. By placing it there, they have altered about 94% of the possible procreation areas for the frogs, which has greatly

affected the population".[3] One study suggests that the "data from a comparably-sized undammed river fork in the same system...demonstrated that both the number of potential sites and the total number of egg masses were...higher on this fork than in our main stem," and so the unseasonal flooding required by the dam was negatively affecting the mating behavior of the frog.[9] The temperature of the water in Trinity County is also lower than it was before the dam was put into place. To keep up with demands of fisheries, the water's temperature is kept artificially lower than normal, which consequently slows the development of *R. boylei*. [9] Therefore, the colder temperatures are making it more difficult for the frogs to grow quickly, which sometimes leaves the species prey to many other animals that dine on their young. The problems occurring between the Foothill Yellow-Legged Frog and the dam are being handled by several herpetological organizations, along with the Forest Service, to find ways to alter the effects in a beneficial way for the frog".

During the PAC meetings there were a lot of heavy discussions on the definition of the word deleterious. There were all types of interpretations, especially from the opposition to suction dredging and the DFG went right along with the opposition as though they didn't know the definition. It appeared that the more broader the definition the DFG could use the more ability they had to declare as a significant effect so they could over regulate the suction dredge miner. As you can see from the DFG's own regulations (Above) that in order to be deleterious there has to be long term harm. "*Section 5653, is one which manifests at the community or population level and persists for longer than one reproductive or migration cycle*"

**2.2.2 Definition of "Deleterious to Fish:** Generally, CDFG concludes that an effect which is deleterious to Fish, for purposes of section 5653, is one which manifests at the community or population level and persists for longer than one reproductive or migration cycle. The approach is also consistent with the legislative history of section 5653. The history establishes that, in enacting section 5653, the Legislature was focused principally on protecting specific fish.

PLP maintains that none of the studies referred to and used by DFG and Horizon will reach the threshold of the lawful definition of the above code. By all of the studies used by DFG and Horizon, none have described this type possible Harm or any where near this type of harm. By interpretation, if this is what it takes to be deleterious, then suction dredging should not even require a permit of regulation.

#### Total Maxim Dailey Load (TMDL)

For example, Total Maxim Dailey Load (TMDL) or turbidity for short term caused by suction dredging could not possibly qualify for being deleterious by DFG's own 5650 or 5653 regulations.

In the PLP and my comments on the DFG Proposed Supplemental Draft Environmental Impact Report (PSDEIR) a turbidity study done in a 2 year period from 1936 and 1937 by one of the top fish biologist of that time (Dr. Henry Baldwin). No where in the SDEIR do we find any mention of this study. It was a very thorough study on turbidity and should be considered a plus for suction dredging in the DFG SFEIR. I have re-addressed it below for the DFG convenience. We have also reiterated for the convenience of the DFG information from the Siskiyou National Forest Draft Environmental Impact Statement (DEIS) on the total TMDL's from suction dredging compared to natural erosion and this should be carefully scrutinized as to what the minimal effects of a suction dredge really does by comparison.

Turbidity is not Deleterious to Fish but is beneficial to their survival and even if it was it is temporary, short term and definitely does not exist for one complete reproductive cycle. PLP suggest that the DFG again take a close requisite look at their definition of damage from TMDL's and turbidity.

#### Siskiyou National Forest Draft EIS on Suction Dredging

With the following information it would be very hypocritical for the (DFG) or any other agency or persons to show the massive concern, over a few thousand suction dredge operators spread out over tens of thousands of miles of rivers. Suction dredges only recirculate back into the river, gravels that have already been deposited by man or nature. Even though the suction dredging materials that are considered TMDL's are only .7 of one percent of total gravel and soils added from the riparian area erosion in any given year, the suction dredging process does not add anything to the water such as additional soils from the riparian areas. (Siskiyou National Forest DEIR on suction dredging).

Political bias and not sound science. DFG and Horizon acting as though they are attempting to fix or protect a problem without precise knowledge of what the cause of that problem is, is a problem. And, to speculate what that problem is and speculate how to fix that problem is an effort in futility and the result of an uninformed decision that will most likely be in error. If it ain't broke, don't fix it most likely applies here.

This study was done on the Rogue River in Oregon by Dr. Henry Baldwin to resolve issues on high turbidity caused by silt and turbidity created by hydraulic and other forms of placer mining. The following are quotes from a 2 year study by Dr. Henry Baldwin on these types of placer mining operations and the effect it would have on the rivers and the fish in those rivers. Dr. Baldwin's credentials were and still are beyond reproach.

Placer Mining on the Rogue River, Oregon, in its Relation Ship to Fish and the Fishing in the Stream (Dr Henry Baldwin Ward. 1937 and 1938)

#### Sediment Appendix - A

The Rogue River has always carried loads of silt.

“All the evidence that has been obtained justifies the conclusion that no present-day contributions of materials produced by bank erosion differ in character or exceed in amount those added periodically by purely natural processes in past times. Splendid runs of salmon and Steelhead were established and maintained under truly natural conditions which were certainly on occasion more extreme and violent before man ever came into the picture than they are today.”

“The coming of man has wrought many changes in the environment which have been clearly unfavorable to fish.” These changes have been (1) The Construction of Dams; (2) The building of diversion ditches; (3) The development of agriculture interests, such as farms, orchards, forests nurseries; (4) the organization of towns and cities; (5) the establishment of factories and industrial enterprises.”



(1) "Dams interfere with upstream migration of adult fish." "Dams also modify the natural temperature of river water" "It looks as if the migrating young would be drawn into the turbines and destroyed"

Fish ladders on dams are not very successful in as much as the water that is utilized is not the same temperatures that attract the fish and many fish go to cooler breeches in the dams and never reach the ladders. Dams prevent natural storm flushing flows required for keeping the river gravels loose and not cemented and available for ideal spawning of fish.

(2) "Diversion ditches have also modified the Rogue River." "The entrance to such ditches has created severe problems for fish, including fry, fingerlings and even adult fish, attempting to ascend rivers." "That such as the case abundant testimony can be furnished."

This causing fish to be stranded and dying in evaporating holes after the water is cut off. Man attempting to protect this from happening by putting screens of the ditch entries is not always successful.

"One feature is less widely recognized and deserves mention because of its intimate relation to the welfare of Salmonoid fishes, The diversion of river water through ditches, its dispersion over fields, and slow return to the river by seepage channels results in raising the average daily temperature of the river during the dry summer season."

This making the temperatures of the river unsuitable for fish because warm waters do not hold the dissolved oxygen required for fish and healthy rivers. Suction dredges create cooler waters and help re-oxygenate these rivers. Addressed in another comment.

(3) Towns, cities, canneries, factories packing plants, and animals all creating organic and inorganic wastes and all ending up in the river to help degenerate the conditions that fish rely on.

"These wastes contain organic materials in the process of disintegration or chemical substances which are by products of industrial plants. The latter are often toxic in character and the former take up oxygen with such avidity that the water of the stream is deprived of this essential element"

"Further in Oregon, Finley and his associates have tested the results of placing young Salmon in municipal wastes and found the fatal effects of such an environment to be almost immediate."

Here on; "All of these tests show that the amount of colloidal material in the water of the Rogue River and its tributaries below the point at which the run-off of placer mine workings has been added to the stream is too small to produce and the bottom a "blanket" which might affect adversely young fish, eggs in nests if present. Of the fish food in the water." The placer mines were operating actively and the run off was a conspicuous feature in smaller tributaries and at points on the main river also." "The supplementary report of Mr. A. M. Swartley, who aided me in the part of the survey made in September, 1937, is of value in giving the views of a careful and experienced geologist. He confirmed fully statements I had reached in my preliminary report as to the physical conditions found in the Rogue River drainage, and especially the small amount of clay and other material on shores and stream bottoms, in backwaters and otherwise in our examination of the river and its tributaries. He discussed fully the methods of rock disintegration and the transportation and ultimate character of the materials produced. He emphasized the fact that mining debris "is chemically inert, makes no oxygen

demand on the stream and therefore takes away from the flowing water nothing which the fish require. This is equally true of this material whether placed in transit by nature or by man since (the products) are alike in nature, come from the same sources and are only being accelerated by man in their journey to the sea." Further he stated: " All these materials entering the streams, whether by natural or human activity, whether coarse or fine, whether traveling on the bottom, in suspension or solution ,are almost altogether inert, suffer little change on their way to the sea, and having reached the end point of chemical change do not rob the water of oxygen which the fish demand, or add to the water toxic agents injurious to fish (fish food or other forms of life)."

"The placer mine run-off is waste in the sense that it is superfluous. And unserviceable material, but it is not material that has been modified by process of manufacturing or chemical treatment. The placer mine run-off is composed of good water and normal unaltered soil; it carries no materials that can rightly be called deleterious substance. This distinction is fundamental and should be emphasized." "To designate placer mine as run-off pollution is a confusion of terms. Neither the dictionary definition nor in scientific analysis can the use of this term be justified. To pollute is to defile: to contaminate with waste of man or animals: this is don by introducing domestic and community wastes, or such as produced in manufacturing and industrial processes. Chemically these include toxic materials or unstable compounds which have a high affinity for oxygen and withdraw promptly so much oxygen from the water that they threaten the life of organisms in it."

(Bulletin U.S. Bureau of Fisheries, No. 22, 1937) by Dr. M. M. Ellis, in charge Interior Fisheries investigations. On page 432 Dr. Ellis points out that erosion silt has no effect on streams (a) in decreasing dissolved oxygen, (b) in increasing acidity, (c) in increasing alkalinity, (d) in increasing specific conductance, (e) in increasing ammonia, (f) in specific toxic action on fishes."

A suction dredge miner cannot introduce anything into the river that is not already there and will not stir up anything that the flushing flows will not stir up. Like stirring a pot of soup that has settled, the dredge stirs up only to allow the soup to resettle in a relative short period of time.

"Fish live and thrive in rivers carrying large loads of silt." "Engineers and other experienced men have in personal discussion borne positive testimony to this view, both as to the relative amount of silt and to the presence of vigorous and healthy fish."

"More recently the problem has been studied by Cole (1935) has demonstrated experimentally that fish move uninjured through very muddy waters." "Swartly in his supplementary report gives a table of the amount of suspensoids recorded in a group of streams, some which are good salmon rivers, these carry from 137 to 395 ppm of solid materials. And have turbidities varying from 27 to 245. In his experiments Griffin maintained for some weeks young salmon in good condition in water containing more that 1000 ppm of mud from placer mine areas in the Rogue River Valley, whereas the maximum amount actually found in water taken form the river at Agness was 440 ppm.

"I have seen among these Alaska rivers in which salmon run and spawn some so heavily loaded with mud that one could not trace the body of an adult Solomon ascending the river even when the dorsal fin cut the surface of the water. Yet the fish examined on the spawning grounds just before and just after death showed that gills had suffered no injuries" "The examination was made in connection with the study on the cause of death after spawning and all organs were closely inspected. The gills were reported as apparently in perfect condition."

"In further comment I desire to call attention first to the fact that these experiments were performed

with young fish. Despite their far greater sensitiveness to changes in the environment and subsequently to injury, the young salmon lived heartily in a concentration of sediment which was at its minimum (760 ppm) twice as much as the maximum recorded at Agness." Indeed the average amount of turbidity in Griffins experiments was 10 times the average recorded at Agnes."

"I am confident that the food supply of the fish is abundant and well distributed and also adequate to sustain a large run of fish." "Certain it is that neither natural nor artificial erosion up to date has exerted any demonstrable change in the fish food supply in the Rogue."

"The discussion would not be complete if I omitted to mention certain ecological relations which indicate that placer mining run-off may be of advantage to the fish. One of these is protection afforded by the turbidity of the water and the other is the suggested increase in the primitive food supply."

"Most significant is a possible fine silt to the food of young fish." "It is even possible that colloidal particles encased by bacterial cultures may form an element in the direct food supply of young fish." "I am clear that evidence thus far obtained from many streams, and at many times, shows that such material does not under conditions already outlined do damage to the gills or to the digestive system even of the young fish at the most susceptible period of life."

#### Appendix – B

##### Experiments on Tolerance of Young Trout and Salmon for Suspended Sediment in Water.

"The experiments covered two periods. One of three weeks, and the other for four weeks. In the first period the fish tested were cutthroat fingerlings; in the second, young Chinook salmon. The fish were kept in troughs, similar to those used in fish hatcheries, in which a depth of 5" of water was maintained. The water was kept flowing by circulation through a centrifugal pump, and aeration by secured by ejection of the water into troughs in a heavy spray." "The slow stream like movement of the water along the troughs was sufficient to keep a much heavier load of fine sediment in suspension to keep a much heavier load of sediment in suspension than is ordinarily found even in muddy streams, but was not rapid enough to keep in suspension all of the sediment which was put into the troughs, or to maintain a turbidity of more than 750 parts per million for 24 hours." "(suspended silt remained nearly constant)."

"The constant load varied from day to day from 360 ppm to 600 ppm, being 500 or more ppm on all but six of the 19 days during which the test lasted."

"When the test was ended on December 30, it was found that a much larger proportion of the fish in sediment-containing trough had survived (56%) than in the clear-water trough (10%). There was no noticeable difference in the color of the surviving fish in the two troughs, and the fish which had lived in the muddy water where as large as the survivors from the clear-water trough."

"On January 12 1938, a second experiment was begun in which 150 Chinook salmon fingerlings, 1 ¾ to 2 inches long were divided equally among the two troughs." during the period of the test, which lasted 28 days, until February 9, the load sediment was greater than in the first test. The maximum load at the time of the stirring was from 3100 to 6000 ppm on most days. The constant load after the sixth hour was from 300 to 480 ppm from January 22 to January 25; and from 650 to 750 from January 26, to February 9, except on 2 days when the load fell to 380 and 410 ppm."



“At the close of the 28-day experimental period, 88% of the fish kept in the muddy were alive, while 38% of the controls lived.”

“The results of the experiments indicate that young trout and salmon are not directly injured by living for considerable time in water which carries so much soil sediment that is made extremely muddy and opaque. They also indicate cutthroat trout and salmon fingerlings can feed and grow apparently well in very muddy water.”

#### Suction Dredging Benefits not addressed - Dissolved Oxygen

One of the major requirements for healthy river and healthy fish life is dissolved oxygen (DO). DO is required for all life to whatever degree. Waves across the water create DO, turbulent water creates DO, Aeration of water creates DO and water running across clean gravels create DO.

Cool waters contain and hold more DO than warm waters. Shade and deep channels and pools help create cooler water so that the water can retain more DO.

High stream temperatures (warming) may result from removal of riparian trees, over grazing, water flow depletions and decaying or addition of nutrients.

Suction dredges reproduce all of the above listed positives.

#### General Information on Dissolved Oxygen by Sheila Murphy

Colorado information on dissolved oxygen is attached:

All it takes is a simple meter reading, above and below a suction dredge to determine if there is a difference bring made by the activities of a suction dredge in adding dissolved oxygen to the water way.

“There are a number of natural ways that dissolved oxygen is introduced into water. 1. Photosynthesis of aquatic biota is a major contributor to dissolved oxygen. This process takes place during the day when there is sunlight and is most active during the noon to afternoon period. This process does not contribute any oxygen during the nighttime hours. 2. Dissolved oxygen concentrations increase wherever the water flow becomes turbulent, such as in a riffle area or a waterfall. In flowing water, oxygen-rich water at the surface is constantly being replaced by water containing less oxygen as a result of turbulence, creating a greater potential for exchange of oxygen across the air-water interface. 3. Another physical process that impacts dissolved oxygen concentrations has to do with the temperature of the water. Cold water can hold more gas – that is dissolved oxygen– than warm water. So, during the summer months when stream water is warmer, oxygen can be limited by the ability of the water to "soak up" more oxygen. 4. Dissolved oxygen can be created by clean gravels and a proper stream current. See Knights Ferry Gravel Replenishment Project (KFGRP)Page 10.”

#### City of Burnaby

“Dredging would produce increased open water habitat in Burnaby Lake, improving conditions for fish movements” “This in turn could improve depressed dissolved oxygen problems in the lake, but shortening the period over which dissolved oxygen concentrations are unsuitable for salmonids.

So we ask, what has all of this got to do with suction dredging and the environment? Lets look at the things that create DO. (Aeration) In many cases the diver operating the suction dredge uses direct air for breathing, which creates the effect of aeration system in a fish tank.

(Waves across the waters from winds) The mere movement and vibrations of the suction dredge floating on the rivers create the same effects of nature.

(Turbulent and fast moving waters) The suction dredge creates this scenario in two ways, one, is the fast moving water over the sluice box as the dredge is operating and two, is the cascading or waterfall effect as the water comes tumbling out over the end of the dredge sluice box.

(Water running across clean gravels) Maybe the most important aspect of the suction dredge creating clean gravels is that it is not just short term but the exposed clean gravels remain long after the suction dredge removed from the water and back in storage for the winter.

As discussed above, cool waters hold more DO than do warm waters. Consequently it stands to reason that since the suction dredger is moving cooler gravels and cooler water from the bottom depths of the streams and rivers and bringing it to the warmer water of the surface, it stands to reason that the surface waters are going to be cooler and be able to retain certain amounts of the additional dissolved oxygen created by the actions of the suction dredge.

These aspects of mitigation by suction dredgers to create DO and cooler water conditions is rarely if ever discussed and should be a positive factor in environmental benefits from this point on. It should also be considered as a positive mitigation as to any other minimal effects that may be cause by suction dredges. What other form of human river use activity has even one benefit in its endeavors?

#### DFG Proposed Seasons and Regulations

The DFG proposed seasons are not acceptable to any suction dredge miner. Contrary to the DFG's opinion that suction dredge mining or prospecting are is a recreational activity, it is not. Those suction dredge miners that are owners of un-patented mining claims have a possessory interest in the land and own the minerals out right. The prospectors also have possession mineral rights under Pedis Possessio and can not be prohibited temporarily or permanently.

#### US v HICKS 2002.

Steve A. Hicks, Defendant Appellant NO. 01-30146, 9th Circuit Court (2002)

"Mineral rights are ownership in land, and therefore Lewis is a landowner. See, e.g., [United States v. Shoshone Tribe of Indians of Wind River Reservation in Wyo.](#), 304 U.S. 111, 116, 58 S.Ct. 794, 82 L.Ed. 1213 (1938) (with respect to question of ownership, "[m]inerals ... are constituent elements of the land itself"); [British-American Oil Producing Co. v. Bd. of Equalization of State of Mont.](#), 299 U.S. 159, 164-65, 57 S.Ct. 132, 81 L.Ed. 95 (1936) (finding a mineral estate an estate in land); [Texas Pac. Coal & Oil Co. v. State](#), 125 Mont. 258, 234 P.2d 452, 453 (1951) ("[l]ands as a word in the law includes minerals"). We need not decide whether the term "landowner" as it is used in **Forest Service** regulations and orders always includes owners of mineral estates. Here, the government conceded at oral argument that Lewis is a landowner under the terms of the closure order before us and thus exempt from this closure order. The landowner exemption in this closure order must necessarily apply to agents of landowners. For example, corporate landowners can only access their land through agents. Hicks, as Lewis's agent, is therefore also exempt."

"Because the trial courts did not recognize mineral rights as ownership in land, and because this error adversely affected Hicks's entitlement to the landowner exemption, we exercise our discretion to correct this plain error."



Any prohibition, either temporary or permanent is a violation of the property right of the mining claim owner or prospector. This prohibition on that possessory interest is protected under the 5th and 14th amendment of the U.S. Constitution and is also a violation of property rights under the California Constitution.

Most of the proposed rivers and streams that the DFG is declaring as Class A, "closed all year round," have unpatented mining claims on them and are open to prospecting and have prior existing rights. All federal laws that close lands to mineral entry, (that is not allowing any more claims to be filed), have a savings clause included in them to protect prior existing rights of the miners. The state of California is required by law to use the same savings clause in any new regulation or law that they impose on the mining community to protect the claim owners interest and prior existing rights.

The DFG Class E seasonal regulation set from September through January is also tantamount to a year round closure. Most of the rivers and streams under class E categories are at higher elevations and have no access or possible bad weather conditions during those months. Consequently it is either near impossible or extremely dangerous to dredge during this period.

The above seasonal classifications do not follow the state or federal mandates to foster and encourage mineral exploration. As a matter of fact these proposed seasonal regulations do the contrary by discouraging the mineral exploration. Actually the DFG is not recognizing the possessory interest of the Mining Claim owner as a landowner with protections under the California and Federal Constitutions. This point needs to be recognized and addressed in the FSEIR.

The proposed regulations in DSEIR are a direct violation of the Federal Supremacy Clause: and State and Federal Property Clause

The preemption doctrine derives from the Supremacy Clause of the Constitution which states that the:

"Constitution and the laws of the United States...shall be the supreme law of the land...anything in the constitutions or laws of any State to the contrary notwithstanding." This means of course, that any federal law--even a regulation of a federal agency--trumps any conflicting state law.

Preemption can be either express or implied. When Congress chooses to expressly preempt state law, the only question for courts becomes determining whether the challenged state law is one that the federal law is intended to preempt. Implied preemption presents more difficult issues, at least when the state law in question does not directly conflict with federal law. The Court then looks beyond the express language of federal statutes to determine whether Congress has "occupied the field" in which the state is attempting to regulate, or whether a state law directly conflicts with federal law, or whether enforcement of the state law might frustrate federal purposes.

Federal "occupation of the field" occurs, according to the Court in *Pennsylvania v Nelson* (1956), when there is "no room" left for state regulation. Courts are to look to the pervasiveness of the federal scheme of regulation, the federal interest at stake, and the danger of frustration of "federal goals" in making the determination as to whether a challenged state law can stand.

Supreme Court of Colorado, En Banc.



Earl J. BRUBAKER, Rexford L. Mitchell, and Valco, Inc., Plaintiffs-Appellants, The BOARD OF COUNTY COMMISSIONERS, EL PASO COUNTY, Defendant-Appellee, and The Springs Area Beautiful Association, Intervenor-Appellee. No. 81SA186. Sept. 13, 1982.

The Supreme Court, Lohr, J., held that: "(1) where test drilling operations had received federal approval, preemption doctrine precluded the board from denying permission to conduct test drilling, and (2) general policy reflected in National Environmental Policy Act and Environmental Quality Improvement Act did not justify the state prohibition.

Underlying rationale of the preemption doctrine is that the supremacy clause invalidates state laws that interfere with, or are contrary to, the laws of Congress." U.S.C.A. Const. Art. 6, cl. 2

"Federal preemption generally is applicable in two situations: first, where congressional legislation either explicitly or implicitly reflects an intent to occupy an entire field, state legislation dealing with that same area is precluded and, second, even if Congress has not completely preempted an area, a particular state statute is void to the extent that it actually conflicts with valid federal law." U.S.C.A. Const. Art. 6, cl. 2.

"Federal mining law has its foundation in the Mining Law of 1872, and underlying purpose of the Mining Law is to encourage exploration for and development of mineral resources on public lands. 30 U.S.C.A. §§ 22-54; Mining and Minerals Policy Act of 1970, § 2, 30 U.S.C.A. § 21a; Mineral Lands Leasing Act," §§ 1-25, 30 U.S.C.A. §§ 181-263.

"Even if holders of unpatented mining claims located on federal land were merely "explorers" on federally contested claims it could not be said that county's denial of special use permit authorizing core drilling, which has been approved by federal officials, did not frustrate any rights of patent holders under federal mining laws so as not to be preempted as even "exploration" activities fall within express scope of federal mining laws." 30 U.S.C.A. § 22; U.S.C.A. Const. Art. 6, cl. 2

"Statute providing for exploration of mineral deposits on federal land provided the explorer complies with applicable state law and statute providing for exclusive right of possession and enjoyment of the surface on compliance with state laws merely recognize a role for nonconforming state and local laws and do not authorize state regulations that would bar the very activities

authorized by mining laws." Mining and Minerals Policy Act of 1970, § 2, 30 U.S.C.A. § 21a

### Proposed regulations Violate the Federal Goal

The federal goal at this time is found in the Minerals Policy Act 1970 30 USC 21(a).

"The Congress declares that it is the continuing policy of the Federal Government in the national interest to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries, (2) the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs"

National Environmental Policy Act was not intended to repeal by implication any other statute and where there is unavoidable conflict between NEPA and other federal authority, it is the NEPA that must give way. National Environmental Policy Act of 1969, § 102(2)(C) as amended 42 U.S.C.A. § 4332.

The Supremacy Clause provides:

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

The underlying rationale of the preemption doctrine is that the Supremacy Clause invalidates state laws that "interfere with, or are contrary to, the laws of Congress." *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1, 211, 6 L.Ed. 23, 73 (1824); accord, \*1055 *Chicago & N.W. Transp. Co. v. Kalo Brick & Tile Co.*, 450 U.S. 311, 101 S.Ct. 1124, 67 L.Ed.2d 258 (1981). The departure point for application of preemption is a recognition that the "exercise of federal supremacy is not lightly to be presumed." *Schwartz v. Texas*, 344 U.S. 199, 203, 73 S.Ct. 232, 235, 97 L.Ed. 231, 235 (1952); accord, *Alessi v. Raybestos-Manhattan, Inc.*, 451 U.S. 504, 522, 101 S.Ct. 1895, 1905, 68 L.Ed.2d 402, 416 (1981); *New York State Department of Social Services v. Dublino*, 413 U.S. 405, 413, 93 S.Ct. 2507, 2513, 37 L.Ed.2d 688, 695 (1973)

"[T]he mere fact that federal legislation sets low standards of compliance does not imply that the federal legislation grants a right to an absence of further regulation. On the other hand, where a right is granted by the federal legislation, state regulation which rendered it impossible to exercise that right would be in conflict."

### Proposed Regulations Violate the Federal Property Clause

**Property Clause**" The Congress shall have power to dispose of and make all needful Rules and Regulations respecting...property belonging to the United States "Property Clause", Article IV, Section 3, U.S. Constitution

Congress has overlooked a powerful tool for regulating within state jurisdictions: the **Property Clause** of the United States Constitution. The United States Government owns land in every state and approximately thirty percent of the total land in the United States. The federal government's authority to regulate its **property** within states derives from the **Property Clause** and has been described by the Supreme Court as "**without limitation**

US v Shoemaker, IBLA - 87-340 (1989)

3. Mining Claims: Surface Uses--Surface Resources Act: Management Authority--Words and Phrases

"Endanger" and "materially interfere." The terms "endanger" and "materially interfere" used in subsec. 4(b) of the Surface Resources Act, 30 U.S.C. § 612(b) (1982), set forth the standard to be applied to determine whether a specific surface management action must yield to a conflicting legitimate use by a mining claimant.

Where there is no evidence that such action endangers the claimant's operations, the question is whether the surface management activity will substantially hinder, impede, or clash with mining operations or a reasonably related use.

The miners seeing the possibility of temporary or permanent closure, are not going to stand still for having their ability to mine their minerals (Real Property) taken from them without compensation. The case law on attempting to take these claims through regulation or otherwise is extensive. A prohibition of their ability to mine their minerals (property) is addressed in U.S. Statute, U.S. Constitution, State Constitution and Case Law. See:

Recreation is a privilege in most cases and mining is a property right, a grant of land under the federal mining laws of 1866 and 1872. (21(a) & (30 USC 22 – 54). For the DFG to treat miners, prospectors or mining claim owners, (Mineral Estate Grantees) with the same disrespect as given to the recreational activities will certainly exceed DFG's regulatory authority. It would appear that DFG believes they have discretion to regulate suction dredge mining to the point of prohibition. **Case Law says that they can not prohibit prospecting or mining either temporarily or permanently.**

**The proposed regulations are prohibitory, not regulatory, in their fundamental character."**

*Ventura County v. Gulf Oil Corporation, 601 F.2d 1090 (1979)*

(2) Despite this extensive federal scheme reflecting concern for the local environment as well as development of the nation's resources, **Ventura** demands a right of final approval. **Ventura** seeks to further activity by Gulf until it secures an Open Space Use Permit which may be issued on whatever conditions **Ventura** determines appropriate, or which may never be issued at all. The federal Government has authorized a specific use of federal lands, and **Ventura** cannot prohibit that use, either temporarily or permanently, in an attempt to substitute its judgment for that of Congress.

AND

*South Dakota Mining Association v. Lawrence County, 155 F.3d 1005 (8th Cir. 1998)*

"The Supreme Court has set forth the analysis we must apply to determine if a state law is preempted by federal law: State law can be pre-empted in either of two general ways. If Congress evidences an intent to occupy a given field, any state law falling within that field is pre-empted. If Congress has not entirely displaced state regulation over the matter in question, state law is still pre-empted to the extent it actually conflicts with federal law, that is, when it is impossible to comply with both state and federal law, or **where the state law stands as an obstacle to the accomplishment of the full purposes and objectives of Congress.** A local government cannot prohibit a lawful use of the sovereign's land that the superior sovereign itself permits and encourages. To do so offends both the Property Clause and the Supremacy Clause of the federal Constitution. **The ordinance is prohibitory, not regulatory, in its fundamental character.**" (emphasis added)

**A conflict exists if a party cannot comply with both state law and federal law.** In addition, even in the absence of a direct conflict between state and federal law, a conflict exists if the state law is an obstacle to the accomplishment and execution of the full purposes and objectives of Congress. *Crosby v. Nat'l Foreign Trade Council, 530 U.S. 363, 372-73 (2000).*



Furthermore, the state here, either is not cognizant of, or intentionally ignores several unequivocal constraints it is bound by. Article VI, Section 2, of the U.S. Constitution provides that the "... **Constitution, and the Laws of the United States ... shall be the supreme Law of the Land.**"

The Court of Appeals, Hansen, Circuit Judge, held that: (1) preemption claim was ripe, and (2) Federal Mining Act preempted ordinance. Affirmed; South Dakota Mining Association Inc v. Lawrence County, 155 F.3d 1005

### **United States v Kosanke Sand Corporation**

(cite as: 12 IBLA 282)

\*288 "It is our conclusion that 'existing law applicable to the agency's operations,' viz., the General Mining Act of 1872, as amended, supra, under which the claims herein involved were located, and which opens to location and purchase, '[e]xcept as otherwise provided, all valuable mineral deposits in lands belonging to the United States, \* \* \* and the lands in which they are found \* \* \*', 30 U.S.C. § 22 (1970), 'makes compliance impossible **"This comports with the position of the Department when it reported in 1971 to the Council on Environmental Quality that the General Mining Act of 1872 do[es] not admit of environmental considerations."**

"To the extent that the mining laws give to individuals the right to enter the public domain, to locate claims thereon, to discover minerals therein, and to extract and remove those minerals there from, all without prior approval of the United States, **the development of a mining claim cannot be tortured into 'Federal action,' major, minor or otherwise.**" (emphasis added)

If a mining claimant can not be tortured in a Federal action, neither can it be tortured into a State action.

Federal laws are always preeminent: once Congress passes laws that occupy an area, **no government at a lower tier, i.e., at the state or local level,** may pass laws that conflict with the federal laws.

As a miner operating under the U.S. Mining law (30 U.S.C. 22-54) **has a non-discretionary agency "advisory" relationship.** A miner cannot be legally tortured into a CEQA, NEPA, CWA, or ESA scenario. The law also, as the Supreme Court ruled, "stays" the application of the ESA "where it would effectively override otherwise mandatory statutory duties" like (for the purposes of this argument) the mining law. The mining law (Congressional grant) does not by its very nature admit to a permissive system (lease system), otherwise the mining law would be rendered meaningless. The California Department of Fish and Game (DFG) does not authorize mining (the mining law does), the DFG does not fund mining, and the DFG does not carry out the mining, therefore mining under the U. S. Mining law is not by definition a "federal action" subject to the CEQA, NEPA or CWA due to this fact that federal and state involvement or control is non-discretionary in fundamental character. (See also **Karuk v. Forest Service, Supra.**)

In U.S. v. Weiss 642 F.2d at 296:

"Although authority exists for the promulgation of regulations, those regulations may, nevertheless, be struck down when they do not operate to accomplish the statutory purpose or where they encroach upon other statutory rights."

**The purpose of the Mining Act is to encourage mining on federal lands.** United States v. Weiss, 642 F.2d 296, 299 (9th Cir.1981) (Weiss); see also United States v. Goldfield Deep Mines Co., 644 F. 2d 1307, 1309 (9th Cir.1981), cert. denied, 455 U.S. 907, 102 S.Ct. 1252, 71 L.Ed.2d 445 (1982).

**Unpatented mining claims are self-initiated rights granted under the General Mining Law.**

Congress exercised that discretion in granting those rights under the law. (30 U.S.C.A. § 23, 27-28; 43 U.S.C.A. § 1744; Cole v. Ralph, 252 U.S. 286, 296 (1920).)

In ordinary English, a "claim " is merely a demand for something, or an assertion of a right where the right has not been established. The phrase "mining claim" therefore probably connotes to most laymen an unsupported assertion or demand from which no legal rights can be inferred. **But that is emphatically not so, as follows;**

In law, the word "claim" in connection with the phrase "mining claim" represents a federally recognized right in real property. The Supreme Court has established that a mining "claim" is not a claim in the ordinary sense of the word--a mere assertion of a right--but rather is a property interest, **which is itself real property in every sense, and not merely an assertion of a right to property.** Benson Mining & Smelting Co. v. Alta Mining & Smelting Co., 145 U.S.428 (1892)

**Prospecting, locating and developing of mineral resources in the national forests may not be prohibited nor so unreasonably circumscribed as to amount to a prohibition.** Weiss, 642 F.2d at 299, United States Court of Appeals, Ninth Circuit,(1980).

What becomes plain to anyone knowledgeable in the area of federal lands, and mining law, in reading, and trying to respond to this initial study report. Is that DFG themselves & the company that they contracted to compile, and perform the EIR, lack a basic understanding of fundamental law, and facts governing federal public domain & mining on it.

**FACT 1.** The vast majority of all suction dredge gold mining in California takes place on federal public domain lands.

**FACT 2.** The vast majority of those same federal lands, are open to mineral entry under federal mining laws & where gold exists are held under mining claims.

**FACT 3.** Mining on federal lands, is encouraged by federal policy directive & governed by federal law & regulation.

**FACT 4.** Once a valid mining claim is established, it grants the owner various protected private property rights.

**FACT 5.** State law, and regulation cannot prohibit what federal law encourages, and allows.

**"Under the mining laws a person has a statutory right,**

consistent with Departmental regulations, to go upon the open (unappropriated and unreserved) Federal lands for the purpose of mineral prospecting, exploration, development, extraction and other uses reasonably incident thereto." (See 30 U.S.C. § 21-54, 43 C.F.R. § 3809.3-3, 0-6).

**16 U.S.C. § 481, Use of Waters**

: All waters within boundaries of national forests may be used for domestic, mining, milling, or irrigation purposes under the laws of the state wherein such national forests are situated or under the laws of the United States and the rules and regulations established thereunder.

**Federal mining claims are "private property"**

Freese v. United States, 639 F.2d 754, 757, 226 Ct.Cl. 252 cert. denied, 454 U.S. 827, 102 S.Ct. 119, 70 L.Ed.2d 103 (1981); Oil Shale Corp. v. Morton, 370 F.Supp. 108, 124 (D.Colo. 1973).

**This possessory interest entitles the claimant to "the right to extract all minerals from the claim** without paying royalties to the United States." Swanson v. Babbitt, 3 F.3d 1348, 1350 (9th Cir. 1993).

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forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law:

Fourteenth Amendment -- All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law.

### CONSTRUCTIVE NOTICE

PLP and I feel that their have been civil and criminal in-discretions in the SEIR process and their proposed regulations. The conclusions we have researched from scientific studies, the speculations of maybe and could be and possibly, are not available to solid conclusions reached by DFG and Horizon.

DFG and Horizon coming to definite conclusions are contrary to common sense and fairness and contain some DFG Jurisdictional Violations. Do not violate the miners rights.

PLP feels that these in-discretions and unsupported decisions are open to civil criminal penalties, both against the DFG and Horizon, their Director and some employees. The SEIR process and the conclusions that were reached DFG and Horizon in order to come up with the proposed regulations on suction dredging are suspect and flawed.. The proposed regulations themselves are violations of all the mining laws, the supremacy clause, the property clause, civil rights laws and violations to the United States Constitution and California Constitution.

With these violations in mind, we feel that it is in the best interest to the suction dredge mining community to serve this Direct and constructive notice on the California Department of Fish and Game and Horizon Environmental. If the SEIR proceeds as it has since its beginning, PLP will have no choice but file Notice on the proper parties.

#### Title 18, § 241. Conspiracy against rights

If two or more persons conspire to injure, oppress, threaten, or intimidate any person in any State, Territory, Commonwealth, Possession, or District in the free exercise or enjoyment of any right or privilege secured to him by the Constitution or laws of the United States, or because of his having so exercised the same; or If two or more persons go in disguise on the highway, or on the premises of another, with intent to prevent or hinder his free exercise or enjoyment of any right or privilege so secured—  
They shall be fined under this title or imprisoned not more than ten years, or both;....

#### Title 18 § 242. Deprivation of rights under color of law

Whoever, under color of any law, statute, ordinance, regulation, or custom, willfully subjects any person in any State, Territory, Commonwealth, Possession, or District to the deprivation of any rights, privileges, or immunities secured or protected by the Constitution or laws of the United States, or to different punishments, pains, or penalties, on account of such person being an alien, or by reason of

his color, or race, than are prescribed for the punishment of citizens, shall be fined under this title or imprisoned not more than one year, or both;.....

Title 42, sec. 1983

Every person who, under color of any statute, ordinance, regulation, custom, or usage, of any State or Territory or the District of Columbia, subjects, or causes to be subjected, any citizen of the United States or other person within the jurisdiction thereof to the deprivation of any rights, privileges, or immunities secured by the Constitution and laws, shall be liable to the party injured in an action at law, suit in equity, or other proper proceeding for redress,....

PLP will also be adopting forth coming comment papers on the DFG 2011 SDEIR that are presented by Dr. Robert C. Crittenden.


#### CONCLUSION

PLP has addressed violations committed by DFG and Horizon of protocol, user profiling, state and federal laws, scientific conclusions and ethics in their DSEIR if they continue on the same path with the FSEIR and proposed regulations.

We have shown how important it will be to make the changes addressed in the FSEIR. Without proper and diligent attention to the fallacies we have addressed, it is very possible that the whole SEIR process will fall if it is scrutinized by a court of law.

It is the direction of PLP to recommend to the DFG that a different alternative be recommended in the FSEIR. The alternative that we recommend is the 1994 regulations alternative with no "absolute limits" also to add in the FSEIR to expand the ability of suction dredging mining opportunities for commercial purposes. For example: Special use permits on larger nozzle restrictions and longer dredging seasons and the ability to use gas powered winches.

Respectfully Submitted



Gerald Hobbs

President

Public Lands For The People Inc.

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PUBLIC LANDS FOR THE PEOPLE INC.

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Re: Comments on the California Draft Subsequent Environmental Impact Report (DSEIR)  
on Suction Dredge Mining in California.

California Department of Fish and Game  
Att. Mark Stopher  
Suction Dredging Program Draft SEIR Comments.  
601 Locust st.  
Redding, Ca. 96001

May 9, 2011

Dear Mr. Stopher

Public Lands For The People Inc. (PLP) has asked Dr. Crittenden to review and comment on the Ca. Department of Fish Game (DFG) Draft Subsequent Environmental Impact Report (DSEIR) for the purposes educating and advising the DFG in a direction to re-think and change their proposed alternative on suction dredge mining regulations.

Dr. Crittenden has 2 PHD's is a Doctor of Biology and Ecology and has several PEER reviewed papers to his credit. He has agreed to do these comments for PLP and this is notice to the DFG that PLP is adopting Dr. Crittendens comments on the DFG DSEIR 2011.

We have attached Dr. Crittenden's comment papers on the DSEIR to this notice to Mark Stopher, DFG.

Respectfull Submitted



Gerald Hobbs

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**Comments on the Suction Dredge Permitting Program**  
**Draft Subsequent Environmental Impact Report (February 2011)**

***By Dr. Robert N. Crittenden***

P.O. Box 222, Carlsborg WA 98324 Phone: (360) 504-2405  
Prepared for Public Lands for the People,  
7194 Conejo Dr. San Burnadino, CA 92404, Phone: (909) 889-3039

***Summary:***

1. The Draft Subsequent Environmental Impact Report (DSEIR) does not adequately consider the beneficial effects that hydraulic dredging can have, due to its cleaning silt and fine sediment particles out of the salmon spawning and rearing gravels and, also, by removing lead and mercury from the system.
2. I am concerned that the proposed regulations may over-regulate.
3. The proposed regulations use a one-size-fits-all approach and do not employ local scientific knowledge where it is available. Consequently, they can be expected to not be reasonable for many specific locations.
4. Restricting the permits to three listed locations is another example of over-regulation.
5. The proposed regulations need to be careful not to constitute an illegal tax.

**1. The DSEIR does not adequately consider the beneficial effects that hydraulic dredging can have, due to its cleaning silt and fine sediment particles out of the salmon spawning and rearing gravels and, also, by removing lead and mercury from the system.**

This omission from the DSEIR may be due its authors relying upon the (1998) review by Harvey and Leslie on the impacts of dredging. They said that dredging would decrease the stability of the stream-bed and, thereby, increase scour and the resulting mortality rate of eggs and alvins. However, that was only conjecture on their part, unsupported by any scientific study. In contrast, earlier studies on the use

of dredging and related equipment to restore or enhance spawning gravels showed that these activities enhanced salmonid survival. Those studies were entirely omitted from their review and, also, from the DSEIR.

So, below, I will briefly review the importance of spawning and rearing gravels; next, I will briefly review those early studies on the use of dredging and related equipment for the restoration and enhancement of spawning and rearing gravels; and, finally, I will recommend not only that these beneficial effects be considered as mitigation or partial mitigation but that, when the hydraulic dredging equipment is appropriately applied or modified, its use should be regarded as, being primarily environmental restoration or enhancement.

#### **Habitat for salmonid eggs and alevins — the importance of stream-bed porosity:**

The following brief review of the importance of the porosity of spawning gravels is taken from a report that I wrote, in 1996, for a group of recreational gold miners in Washington State. That report was submitted in a public hearing and is, therefore, a public document. It rests primarily upon Groot and Margolais's, 1991, comprehensive review, *Pacific Salmon Life Histories*.

Salmonid eggs and alevins (alevins are tiny newly hatched salmonids which still reside in the interstitial spaces among the gravel of the stream-bed) need clean gravels through which interstitial water can flow, providing them with oxygen. Silts and fine sands reduce the porosity of the stream-bed, thereby, reducing the interstitial flow and the oxygen supply. It can also reduce the amount of interstitial space for alevins. Reduced porosity has been shown to be directly related to reduced survival of salmonid eggs and alevins.

**Pink Salmon:** As William R. Heard pointed out in his (1991) review "Pink salmon choose a fairly uniform spawning bed in both Asia and North America. Generally these spawning beds are situated on riffles with clean gravel or along the borders between pools and riffles in shallow water with moderate to fast currents. . . . pink salmon avoid spawning in quiet deep water, in pools, in areas with a slow current, or over heavily silted or mud-covered stream-beds."

Pink salmon (*Oncorhynchus gorbuscha*) spawning sites may be characterized as being clean gravels. However these sites may also have a few cobbles, a mixture of sand, but relatively little silt (Semko 1954; Kobayashi 1968; Dvinin 1952; Smirnov 1975; and Hunter 1959).

The faster the current, the larger the particle which will be suspended and carried off by it. Hence, a strong current provides some guarantee that silts and fine sands will not plug up the interstitial spaces. The more rapid flow is also turbulent. The eggs and alevins are provided with a good oxygen supply by the turbulent mixing of water into the interstices of the stream-bed.

The porosity of a stream-bed and the survival of eggs and alevins has been demonstrated to be directly related to the composition of the stream-bed, being lower where there are more fine sands and silt (McNeil and Ahnell 1964; Rukhlov 1969; Brannon 1965; Bams 1969).

**Chum Salmon:** In contrast, to pink salmon which preferentially select riffles, chum salmon (*Oncorhynchus keta*) tend to select sites of upwelling spring water (Kobayashi 1968). These sites often have a lower flow rate than is found at pink salmon sites (Bams 1982; Soin 1954; Sano and Nagasawa 1958). Chum salmon spawning sites may be found directly below a pool which is partially obstructed at its lower end by a gravel bar. The water infiltrates the gravel bar, travels through the bar as ground

water, and reemerges into the water column below the bar.

Interstitial flow is as important for the survival of their eggs and alevins, as it is for the pink salmon. However, in this case the oxygen is carried into the groundwater by convection (that is by the net movement of water into and then out of the stream-bed) rather than by turbulent mixing. However, in some cases turbulent mixing may also be an important factor at chum spawning sites.

**Sockeye Salmon:** The southern limit of their range is in Washington State, so, they are not a concern in California. Nevertheless, I include them to show how very general the effects of porosity are. --- Sockeye salmon (*Oncorhynchus nerka*) spawn either in streams or in areas along lake shores which have underwater springs. . There is also a case of beach spawning where turbulence provides the oxygen supply (Olsen 1968). Spring-fed and Beach spawning sites often have lower oxygen levels than stream sites and sockeye eggs have some ecological and physiological adaptations which improve their survival under those slightly reduced oxygen levels. (Smirnov 1950; Soin 1956, 1964). However, their oxygen supply (and, hence, substrate porosity) remain an important factor affecting their survival.

**Coho Salmon:** Coho salmon (*Oncorhynchus kisutch*) mostly spawn in small streams in areas of gravel of 15 cm or less in diameter (Burner 1951). In some cases Burner found that the spawning sites contained mud, silt, or fine sand, but that this was removed in the nest-building activity. Chamberlain (1907) concluded that coho are the least selective of the salmon species about their spawning site — he found them spawning in almost every stream or river in a very broad range of sites from smoothly flowing to white water and from cobble to muddy His conclusion was also supported by Foerster (1935) and Pritchard (1940).

However coho appear to prefer small streams (Gribanov 1948) and select a site at the head of a riffle where there is a good interstitial flow (Shapovalov and Taft 1954). The porosity of the stream-bed and the flowrate of the stream are also important factors affecting site selection (Briggs 1953; Gribanov 1948). Survival has been shown to be related to the porosity of the stream-bed (Tagart 1984).

**King Salmon:** King Salmon (*Oncorhynchus Tshawytscha*) show strong selectivity for spawning areas with high interstitial flow rates (Vronskiy 1972; Russell et al. 1983). Mike Healey (1991) suggests that of all the salmon species, king salmon may be the most sensitive to reduced oxygen levels during the egg and alevin stages. Their sensitivity to the oxygen level was experimentally demonstrated by Silver et al. (1963). The strong relationship between survival and the percolation rate of oxygenated interstitial water was experimentally demonstrated by Shelton (1955) and demonstrated under field conditions by Gangmark and Broad (1955) and Gangmark and Bakkala (1960).

As Mike Healey (1991) points out, "There is no doubt that percolation is affected by siltation and that siltation in spawning beds causes high mortality (Shaw and Maga 1943; Wickett 1954; Shelton and Pollock 1966).

**Caveats:** Bear in mind that limitation of spawning and rearing habitat may not be the mechanism limiting the abundance of any specific stock of salmon and that there is a general lack of support for the hypothesis that freshwater habitat is limiting. However, the full life-histories are known with statistical significance, for very few salmon stocks. As of the early 1990's, there were only two such studies. These were William Ricker's (1956) study of an Oregon coastal coho salmon stock and my (1993a,b) study of a sockeye stock in British Columbia. In both of those cases, the bottleneck in their



life cycle was predation during their smolt migration. Dr. Ricker concluded that the limiting factor was the availability of hiding places for the migrating smolts, whereas, for the sockeye stocks that I studied, their ability to escape predators appeared to depend upon their size and, therefore, upon what their growth rate had been in the nursery lake. In neither case was it dependent upon survival through the egg and alvin stages. Furthermore, increasing the amount of spawning and rearing habitat may not be important for stocks that are depressed or endangered, because they often already have a super-abundance of it. Nevertheless, the enhancement of the quality of spawning and rearing habitat is generally a desirable goal, for increasing the quality (rather than just the quantity) of the spawning and rearing habitat may improve their survival through those life history stages and, thereby, improve their overall survival.

### **Effects of hydraulic dredging on the porosity of the stream-bed:**

Generally this activity involves the removal of sediment material from the stream-bed. The courser sediments are returned to the stream-bed in the more immediate vicinity, whereas, the fine components of the sediment become suspended in the wash water and are carried downstream. The finer the sediment the further it will be carried. However, it will eventually settle. Some will settle into the gravel of the stream-bed, some superficially and some more-or-less permanently, and the rest will often settle in a pool or other area that has reduced current.

The general effect is very similar to what happens when a coho salmon digs a redd: That is, it tends to clean the gravels of the silts and finer sediments and move them downstream.

During the next major peak-flow event both the fine sediments and the medium sized gravel will be carried further downstream. The finest particles will often be carried far downstream, sometimes even out of the system, to a lake or the ocean.

Thus, the effect of hydraulic dredging is to increase the downstream transport rate for fine and medium sized particles. This will tend to reduce the amount of these sediments and increase stream-bed porosity. The literature I have reviewed above shows, that for all salmonid species greater porosity results in better survival and better habitat for eggs and alevins.

Harvey and Leslie, in 1998, conjectured that dredging may also increase the scour depth, during peak flow events. That seems likely. However, although the eggs and alvins that are carried away when the bed is scoured probably have increased mortality due to that event, they do not necessarily all die. Some of them may be dispersed to other habitats, such as side-channels or pools isolated from the stream, that may give them as good or a better probability of survival than the original redd. In addition, the increased survival of those that are not scoured out, due to the increased porosity of the gravels, may more than compensate for the increased losses among those that are carried off.

One has to appreciate the very low survival rate of salmonids through their entire life cycle. A female lays from a several hundred to tens-of-thousands of eggs, depending on her size and species. Of these, on the average, only two survive to reproduce. They replace the male and female, who were their parents. So, were those few eggs that were destined to survive, in the gravel that was not scoured away or were they carried off, by chance, to some other good habitat? Considering that we know the full life cycle of very few stocks, I doubt that anyone knows the answer to that question. Nevertheless, survival rates for eggs and alvins in cleaned gravels versus uncleaned gravels have been examined and the conclusion was that cleaning the gravel of silt and fine particles increases survival: For example, Wilson and Sheridan (1974) found that the survival rate from egg to fry in uncleaned gravels was approximately 10 percent, whereas, survival in gravels that were cleaned were approximately 40 percent.

During the 1970s, various State, Federal, and International Agencies were interested in developing equipment to artificially clean stream gravel for spawning and rearing of salmonids. In 1978, Walter Mih wrote a review of those studies. Some of their methods involved mining gravels either from the stream-bed or elsewhere and screening it on land, before, introducing it into the stream (Gerke 1973, International Pacific Salmon Fisheries Commission (IPSFC) 1972, and Wilson 1975); while, others merely disturbed or tilled the stream-bed to suspend the fine sediments and allowed the current to carry the finer particles downstream (Gerke 1973, and Wilson 1975). The IPSFC (1975) tested excavating the stream-bed, screening the sediment to separate its fine and coarse components and, then, burying the fine sediments in the excavation beneath the coarser ones; they also tested using air-water jets to clean the gravels *in situ* (IPSFC 1972, Andrew 1974); the U.S. Forest Service developed an amphibious vehicle that used water jets to clean the gravel and a hydraulic suction system to remove the suspended fine particles, which were, then, projected out of the river system onto land (USFS 1964, Shields 1968); and so on... Most of these methods were effective but were also expensive and involved heavy equipment that was difficult to use under natural conditions and/or was subject to mechanical failure. Dr. Mih (1978), then, developed a mechanical device mounted on a small all-terrain vehicle that used water jets to clean the gravel *in situ* and a small portable hydraulic pump to draw off the suspended fine sediments and project them out of the system. That proved to be a much more practical method. Unfortunately, at about that same time, changes in salmon management associated with the Boldt Decision (U.S. v. Washington 384 F. Supp. 312 (W.D. Wash. 1974)) resulted in government agencies losing interest in cleaning spawning gravels. Subsequently, these developments seem to have been forgotten.

Nevertheless, the results of these studies can be applied to hydraulic dredging. The first result is, that dredging, as it is currently conducted, will clean the gravels; and the second one is, that if the suspended silts and fine sediments are not returned to the stream but are delivered onto land and the coarser gravels are used to refill the excavation, then, this would be almost the same as the best method that they developed.

My recommendations are, therefore, to recognize these beneficial side-effects of dredging, as it is currently conducted. These need to be considered as mitigating or partially mitigating for any deleterious impacts that dredging may have. However, the more important recommendation is, to recognize that, with some modifications to the dredging equipment and how it is used, dredging becomes an excellent method for restoring and enhancing salmon spawning and rearing habitat. The Department needs to consider and fully develop that potential.

My opinion is that that could best be done, not by specifying the mechanical modifications needed to achieve the delivery of the silts and fine sediments onto dry land, but by leaving that to the ingenuity of the public and by encouraging these changes in the dredging equipment and its use by relaxing restrictions on dredging for those permit-holders who have made them. Nevertheless, as these changes in equipment and use would not be reasonable in all locations where dredging is done, and dredging as it is currently done also has beneficial effects, these changes should not be required.

**Removal of Lead and Mercury:** The DSEIR recognizes that the process of dredging and processing captures and removes a high proportion of the mercury from the system. Dredgers also routinely capture and remove a substantial amount of lead from the system, much of it being lead fishing weights. There may be some minor short-term impacts from suspending these heavy metals that otherwise may be buried fairly deeply in the sediment but the DSEIR does not appear to give adequate credit for the clear long-term benefit of removing substantial amounts of these heavy metals from the stream-beds.

## **2. I am concerned that the proposed regulations may over-regulate.**

A flaw in the general approach taken in the DSEIR, is that it proposes that the California Department of Fish and Game (hereafter, referred to as the "Department") exercise a fairly close supervision of recreational gold dredging and that they draw into their hands decision-power over those activities, so that, if, a problem develops they can deal with it.

This approach can be found in most of the subsections of Chapter 4, except those that present introductory material. Specifically, in each of those subsections, a conclusion is reached that the issue discussed in the individual subsection either has or does not have a significant impact and is either avoidable or is not but, whatever the case may be, it is acceptable because the Department Staff will exercise a fairly close supervision and will hold the decision power to modify the regulations as needed in the event that a problem arises.

That is over-regulation.

It is, also, "slavery" in the Classical sense: That is, in the sense that Aristotle used the term. In particular, he said that a slave is person who is under the decision-power of another.

More recently, (c. 1662) John Locke described the opposite condition: He said that, "Freedom of man under government is to have a standing rule to live by, common to every one in that society, and made by the legislative power erected in it; at liberty to follow my own will on all things where the rule prescribes not; and not to be subject to the inconstant, uncertain, unknown, arbitrary will of another man."

These definitions of "slavery" and "freedom" remain relevant, today, because, they are the historical origins of these concepts. In particular, John Locke was the person most cited, after the *Bible*, by the framers of the *U.S. Constitution*, during the early period, when they were considering fundamental principles; and Aristotle's works, along with Cicero's book, "*On the Commonwealth*", were the principle sources that Thomas Aquinas used when he wrote *Summa Theologia*, which served as the Constitution of Medieval Europe. The US Constitution rests, upon Thomas Aquinas' work, with surprisingly few changes and those few changes were primarily due to Richard Hooker, Johannes Althusius and John Locke.

This historical perspective should lead us to the conclusion that, throughout history, Western man has strongly objected to, being placed under the decision-power of another individual. The preferable alternative is for there to be a fixed law created by the legitimate legislative authority.

To place this in the context of contemporary law, the due-process clauses of the fifth and fourteenth amendments of the *US Constitution* echo this same sentiment. The purpose of due-process is to protect against over-regulation. --- Due-process is a civil right and it is obviously very important, as it is the only one that is guaranteed twice in the *US Constitution*.

The importance of due-process, here, is that it provides guidance as to the approach that should be taken. That is, that all regulations must be rational, not arbitrary, and not invidious. (see, for example, *Robinson v. City of Seattle*, 119 Wash. 2D 34, 61, 830 P.2d 318, 334 (1992)). That means, that they must reasonably be expected to achieve their legitimate government purpose (that is, they must have valid scientific support or the best scientific support that is available); they must have a basis; and the regulation must not be cruel or out of proportion to what is necessary to prevent the evil or nuisance-like threat identified in the regulation's purpose. If the regulation violates due-process it is simply



invalid and unenforceable

The DSEIR clearly identifies the legitimate government purposes that these proposed regulations are intended to serve. These are to protect those species that the Department is required to protect and, also, water quality and various other objectives, ... The program they describe would undoubtedly achieve those purposes.

The problems are that some of the proposed regulations appear to be excessive or arbitrary: In particular, the point of this item is that the general approach taken in the DSEIR is to deprive the permit-holders of decision-power over their dredging activities and place them under the arbitrary decision-power of the Department's staff.

What should be done, instead, is to cause the legitimate legislative authority to form a fixed law or rule to deal with the issue. However, the Legislature is not above being irrational, arbitrary, and subject to political influence. In fact, their short-comings appear to be part of what led to the need for the new regulations and the DSEIR. Thus, I have doubts about the Legislature and reservations about non-elected officials wielding the legislative authority through a rule-making process but strongly object to individual departmental staff regulating without any fixed rule. Nevertheless, the guidance from the law is clear, as to what should be done. So, let us hope that, whoever forms these laws or rules, makes a sincere attempt to adhere to due process and creates fixed laws or rules that can be uniformly applied. In that case, the outcome shall probably work well enough.

### **3. The proposed regulations use a one-size-fits-all approach and do not employ local scientific knowledge where it is available. Consequently, they can be expected to not be reasonable for many specific locations.**

One of the limitations of the regulations presented in the DSEIR is that they do not utilize scientific studies for specific localities where they are available. Instead, the opening and closing dates are set over broad regions based on large-scale trends. Although, this may facilitate the ease of regulation and/or supervision, it can be expected to lead to the regulations being grossly unreasonable as applied at a specific locality, river, or section of one.

A large part of the problem, underlying this issue, is that the length of time the eggs or alvins are in the gravel is highly temperature dependent. However, I found that water temperatures in small streams in California are governed by the balance of strong forces (Crittenden 1977, 1978) and, therefore, often varied dramatically over relatively small distances within a stream, as well as among streams. Furthermore, temperature tolerances, preferred temperatures, and spawning dates vary among species and stocks and the fish, also, seek out habitats that have appropriate temperature regimes. Consequently, opening and closing dates that would protect the vulnerable stages of their life histories can be expected to vary substantially among localities.

Another factor that is specific to locations is that streams and rivers may have waterfalls, swift rapids, dams or other natural or man-made barriers that are impassable to upstream migrating salmon. Regulations aimed at protecting their habitat above such barriers or in other areas where they do not live are obviously inappropriate.

To resolve these problems, one possible approach is for the regulations to include a mechanism or process that would allow them to be altered for specific regions or localities, to better reflect the best scientific knowledge for the specific region or locality, as it becomes available.

- Tagart, J.V. 1984. Coho salmon survival from egg deposition to fry emergence, p 173-181 in J.M. Walton and D.B. Houston (eds.) Proceedings of the Olympic Wild Fish Conference, March 23-25, 1983. Fisheries Technology Program, Peninsula College, Port Angeles, WA.
- U.S. Forest Service Equipment Development Center. San Dimas CA 1964. Project file for riffle sifter.
- Vronskiy, B.B. 1972. Reproductive biology of the Kamchatka River chinook salmon (*O. tshawytscha*). J. Ichthyol. 12: 259-273.
- Washington Department of Wildlife 1987. Gold and Fish. 20. p. Wash. Dept. Fish Wildl., Olympia, Wash.
- Wickett, W.P. 1954. The oxygen supply to salmon eggs in spawning beds. J. Fish. Res. Bd. Can. 11: 933-953.
- Wilson, D.A. 1975. Salmon spawning habitat improvement study. State of Washington, Dept of Fisheries and National Marine Fisheries Service Project no. 1-93-D, 19pp.





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## Regarding Dredging, sluicing, and panning

Dredging, panning, and sluicing not only improve salmonid habitat but can also create new habitat.

Salmonid eggs and alevins (alevins are tiny newly hatched salmonids which still reside in the interstitial spaces among the gravel of the streambed) need clean gravels through; which interstitial water can flow, providing them with oxygen. Silts and fine sands reduce the porosity of the streambed, thereby, reducing the interstitial flow and the oxygen supply. It can also reduce the amount of interstitial space for alevins. Reduced porosity has been shown to be directly related to reduced survival of salmonid eggs and alevins.

If properly conducted (for example, according to the present guidelines in Washington State — WDW 1987) dredging, panning, and sluicing reduce the amount of fine sand and silt in the streambed and, thereby, improve its porosity. ~~These activities will, therefore, result in better interstitial flow, a better interstitial oxygen supply for eggs and alevins, and more interstitial space for alevins.~~ The net result is improved survival for salmonid eggs and alevins.

Thus, dredging, panning, and sluicing improve existing salmonid habitat and can also create new habitat. These activities should be encouraged.

## Habitat for salmonid eggs and alevins — the importance of streambed porosity:

**Pink Salmon:** As William R. Heard pointed out in his (1991) review "Pink salmon choose a fairly uniform spawning bed in both Asia and North America. Generally these spawning beds are situated on riffles with clean gravel or along the borders between pools and riffles in shallow water with moderate to fast currents. . . . pink salmon avoid spawning in quiet deep water, in pools, in areas with a slow current, or over heavily silted or mud-covered streambeds."

Pink salmon (*Oncorhynchus gorbuscha*) spawning sites may be characterized as being clean gravels. However these sites may also have a few cobbles, a mixture of sand, but relatively little silt (Semko 1954; Kobayashi 1968; Dvinin 1952; Smirnov 1975; and Hunter 1959).

The faster the current, the larger the particle which will be suspended and carried off by it. Hence, a strong current provides some guarantee that silts and

fine sands will not plug up the interstitial spaces. The more rapid flow is also turbulent. The eggs and alevins are provided with a good oxygen supply by the turbulent mixing of water into the interstices of the streambed.

The porosity of a streambed and the survival of eggs and alevins has been demonstrated to be directly related to the composition of the streambed, being lower where there are more fine sands and silt (McNeil and Ahnell 1964; Rukhlov 1969; Brannon 1965; Bams 1969).

**Chum Salmon:** In contrast, to pink salmon which preferentially select riffles, chum salmon (*Oncorhynchus keta*) tend to select sites of upwelling spring water (Kobayashi 1968). These sites often have a lower flow rate than is found at pink salmon sites (Bams 1982; Soin 1954; Sano and Nagasawa 1958). Chum salmon spawning sites may be found directly below a pool which is partially obstructed at its lower end by a gravel bar. The water infiltrates the gravel bar, travels through the bar as ground water, and reemerges into the water column below the bar.

Interstitial flow is as important for the survival of their eggs and alevins, as it is for the pink salmon. However, in this case the oxygen is carried into the groundwater by convection (that is by the net movement of water into and then out of the streambed) rather than by turbulent mixing. However, in some cases turbulent mixing may also be an important factor at chum spawning sites.

**Sockeye Salmon:** Sockeye salmon (*Oncorhynchus nerka*) spawn either in streams or in areas along lake shores which have underwater springs. There is also a case of beach spawning where turbulence provides the oxygen supply (Olsen 1968). Spring-fed and Beach spawning sites often have lower oxygen levels than stream sites and sockeye eggs have some ecological and physiological adaptations which improve their survival under those slightly reduced oxygen levels. (Smirnov 1950; Soin 1956, 1964). However, their oxygen supply (and, hence, substrate porosity) remain an important factor affecting their survival.

**Coho Salmon:** Coho salmon (*Oncorhynchus kisutch*) mostly spawn in small streams in areas of gravel of 15 cm or less in diameter (Burner 1951). In some cases Burner found that the spawning sites contained mud, silt, or fine sand, but that this was removed in the nest-building activity. Chamberlain (1907) concluded that coho are the least selective of the salmon species about their spawning site — he found them spawning in almost every stream or river in a very broad range of sites from smoothly flowing to white water and from cobble to muddy. His conclusion was also supported by Foerster (1935) and Pritchard (1940).

However coho appear to prefer small streams (Gribanov 1948) and select a site at the head of a riffle where there is a good interstitial flow (Shapovalov and Taft 1954). The porosity of the streambed and the flowrate of the stream are also important factors affecting site selection (Briggs 1953; Gribanov 1948). Survival has been shown to be related to the porosity of the streambed (Tagart 1984).

**King Salmon:** King Salmon (*Oncorhynchus Tshawytscha*) show strong

selectivity for spawning areas with high interstitial flow rates (Vronskiy 1972; Russell et al. 1983). Mike Healey (1991) suggests that of all the salmon species, king salmon may be the most sensitive to reduced oxygen levels during the egg and alevin stages. Their sensitivity to the oxygen level was experimentally demonstrated by Silver et al. (1963). The strong relationship between survival and the percolation rate of oxygenated interstitial water was experimentally demonstrated by Shelton (1955) and demonstrated under field conditions by Gangmark and Broad (1955) and Gangmark and Bakkala (1960).

As Mike Healey (1991) points out, "There is no doubt that percolation is affected by siltation and that siltation in spawning beds causes high mortality (Shaw and Maga 1943; Wickett 1954; Shelton and Pollock 1966).

Caveats: Bear in mind that spawning habitat limitation may not be the mechanism limiting the abundance of any specific stock of salmon. There is an absence of support for the habitat limitation hypothesis, except in a few isolated cases. Nevertheless, the enhancement of habitat and the improvement of survival for eggs and alevins are generally desirable goals.

Also bear in mind that in areas which have no fish, restrictions on dredging, sluicing, or panning aren't needed. An example of such an area is the region of a watershed above an impassible barrier, whether it is a dam, waterfall, or rapid.

In areas which have fish, recreational mining activities should be restricted to times of the year such that eggs and alevins aren't buried under silt and fine sediment while they are still in the gravel. Such regulations are already in place in Washington State.

## **Effects of dredging, sluicing, and panning on the porosity of the streambed:**

Generally these activities involve the removal of sediment material from the streambed or, more often, from a gravel bar. The fine components of the sediment become suspended in the wash water and are carried downstream. The finer the sediment the further it will be carried. However, it will eventually settle, often in a quiet pool area.

What is involved here is the movement of the smaller particles out of a riffle area and into a pool area. Generally this will improve the streambed porosity in the riffle area. Recall that riffles are generally the preferred spawning habitat.

Medium sized particles may deposit in the riffle area. During the next major peak-flow event both the fine sediments and the medium sized particles will often be carried far downstream.



Thus, the effect of mining is to increase the downstream transport rate for fine and medium sediments. The consequence must be that the stream-system as a whole will have fewer of these sediments. This will result in greater streambed porosity. As the literature I have reviewed above shows, for all salmonid species greater porosity results in better survival and more available habitat for eggs and alevins.

In the case where the sediment is removed from a bar, rather than from the streambed, it is necessary to consider a longer time period — Stream courses aren't stationary but move within the confines of the streambanks. Fine sediments in gravel bars will be resuspended in the stream during these natural movements of the stream over the course of several years.

However, if the bars have been mined on a regular basis, their fine and medium particles will already have been removed before the river naturally resuspends them. Gravel bars which are free of silts and fine sand provide habitat. Although these bars may appear dry, there is often water and interstitial spaces below the surface, which can support alevins and redds (that is, nests of eggs) which were laid during high-water.

## **Recommendation:**

The conclusion is that the recreational mining activities of panning, sluicing, and dredging enhance salmonid habitat. These activities should be encouraged. They provide one of the most cost-effective enhancement techniques as they are a beneficial side-effect of private recreation.

## **Literature Cited:**

- Bams, R.A. 1969. Adaptations of sockeye salmon associated with incubation in stream gravels. p71-87 in T. G. Northcote (ed.) Symposium, on Salmon and Trout Streams. H.R. MacMillan Lectures in Fisheries. Institute of Fisheries, Univ. of BC., Vancouver B.C.
- Bams, R. A. 1982. Experimental incubation of chum salmon (*O. Keta*) in a Japanese style hatchery system. Can. Tech. Rep Fish. Aquat. Sci. 1101: 65 P-
- Brannon, E.L. 1965. The influence of physical factors on the development and weight of sockeye salmon embryos and alevins. Int. Pac. Salmon Comm. Prog. Rep. 12: 26 p.
- Briggs, J.C. 1953. The behavior and reproduction of salmonid fishes in a small coastal stream. Calif, Dep. Fish Game Bull 94: 62 p.
- Burner, C.J. 1951. Characteristics of spawning nests of Columbia River salmon. Fish. Bull. Fish Wildl. Serv. 61: 97-110.
- Chamberlain, F.M. 1907. Some observations on salmon and trout in Alaska. Rep. U.S. Bur. Fish. Doc. 627:112 p.
- Dvinin, P.A. 1952. The salmon of south Sakhalin. Izv. Tikhookean. Nauchno-Issled. Inst. Rybn. Khoz. Okeanogr. 37: 69-108. Translation from Russian by Fish Res. Bd. Can. Transl. Ser. 120.
- Foerster, R.E. 1935. Inter-specific cross-breeding of Pacific Salmon.

- Proc. Trans. R. Soc. Can. Ser 3 29(5):21-33.
- Gangmark, H.A. and R. G. Bakkala 1960. A comparative study of unstable and stable (artificial channel) spawning streams for incubating king salmon in Mill Creek. Calif. Fish Game Bull. 46: 151-164.
- Gangmark, H.A. and R.D. Broad 1955. Experimental hatchin of king salmon in Mill Creek, a tributary of the Sacramento River. Calif. Fish. Game Bull. 41:233-242.
- Gribanov, V.I. 1948. The coho salmon (*O. kisutch*) — a biological sketch. Izv, Tikhookean. Nauchno-Issled. Inst. Rybn. Khoz. Okeangr. 28: 43-101. Translated from Russian in Fish Res. Bd. Can. 25: 825-827.
- Healey, M.C 1991. Life History of Chinook Salmon (*O. tshawytscha*) pages 131-393 in C. Groot and L. Margolis *Pacific Salmon Life Histories* UBC Press Vancouver, BC 564 p.
- Heard, W.R. 1991. Life History of Pink Salmon (*Oncorhynchus gorbuscha*) pagers 119-230 in C.
- Groot and L. Margolis *Pacific Salmon Life Histories* UBC Press Vancouver, BC 564 p.
- Hunter, J.G. 1959. Survival and reproduction of pink and chum salmon in a coastal stream. J. Fish. Res. Bd. Can. 16: 835-886.
- Kobayashi, H. 1968. Some observations on the natural spawning grounds of pink and chum salmon in Hokkaido. Sci. Rep. Hokkaido Salmon Hatchery 22:7-13. In Japanese with an English summary.
- McNeil, W.J. and W.H. Ahnell 1964. Success of pink salmon spawning relative to size of spawning bed materials U.S. Fish and Wildlf. Serv. Spec. Sci. Rep. Fish. 469:15 p.
- Olsen, J.C. 1968. Physical environment and egg development in a mainland beach area and an island beach area of Illiamna Lake, p 169-197 in R.I. Burgner (ed.) Further studies of Alaska sockeye salmon. Univ. Wash. Publ. Fish. New Ser. 3.
- Pritchard, A. L. 1940. Studies on the age of the coho salmon (*O. kisutch*) and the spring salmon (*O. tshawytscha*) in British Columbia. Proc. Trans. R. Soc. Can. Ser. 3 34(5): 99-120.
- Rukhlov, F.N. 1969. Materials characterizing the texture of bottom material in the spawning grounds and redds of the pink salmon (*Oncorhynchus gorbuscha*) in the Sakhalin fish hatcheries in 1976. J. Ichthyol. 20: 110-118.
- Russell, L.R. K. R. Conlin, O.K. Johansen, and U. Orr 1983. Chinook salmon studies in the Nechako River: 1980, 1981, 1982. Can. MS. Rep. Fish. Aquat. Sci. 1728: 185 p.
- Sano, S. and A. Nagasawa 1958. Natural propogation of chum salmon, *O. keta*, in Memu River, Tokachi, Sci Rep. Hokkaido Salmon Hatchery Translated from Japanese in Fish Res. Bd. Can. Transl. Ser 198.
- Semko, R.S. 1954. The stocks of West Kamchatka salmon and their commercial utilization. Izv. Tikhookean. Nauchno-Issled. Inst. Rybn. Khoz. Okeangr. 421:3-109. Translated from Russian in Fish Res. Bd. Can. Transl. Ser 288.
- Shapovalov, L. and A.C. Taft 1954. The life histories of the steelhead rainbow trout (*Salmo gairdneri*) and the silver salmon (*O. kisutch*) wiht special reference to Waddell Creek, California, and recommendations regarding their management. Calif. Dep. Fish Game bull. 98: 375 p.
- Shaw, P.A. and J.A. Maga 1943. The effect of mining silt on yield of fry from

- salmon spawning beds. Calif. Fish Game 29: 29-41.
- Shelton, J.M. 1955. The hatching of chinook salmon eggs under simulated stream conditions. Prog. Fish-Cult. 17: 20-35.
- Shelton, J.M. and R. D. Pollock 1966. Siltation and egg survival in incubation channels. Trans. Am. Fish. Soc. 95: 183-187.
- Silver, S.J., C.E. Warren, and P Doudoroff 1963. Dissolved oxygen requirements of developing steelhead trout and chinook salmon embryos at different water velocities. Trans. Am. Fish. Soc. 92: 327-343.
- Smirnov, A.I. 1950. Importance of carotinoid pigmentation at the embryonic stages of cyprinids. Dokl. Akad. Nauk SSSR 73:609-612. (In Russian) 1956.
- Respiratory significance of the carotinoid pigments in the eggs of salmonids and other representatives of the Clupeiformes. Zool. Sh. 35: 1362-1369.
- Translated from Russian in Fish. Res. Mar. Ser. (Can.) Transl. Ser 4538.
- Smirnov, A. I. 1975. The biology, reproduction, and development of the Pacific salmon. Izdatel'stov Moskovskogo Universiteta, Moscow USSR.
- Translated from Russian: Fish. Res. Bd. Can. Transl. Ser. 3861.
- Soin, S.G. 1954. Pattern of development of summer chum, masu, and pink salmon. Tr. Soveshch. Ikhtiol. Kom. Akad. Nauk. SSSR 4: 144-155. Translated from Russian in Pacific Salmon: selected articles from Soviet periodicals, p42-54. Israel Program for Scientific Translations, Jerusalem 1961.
- Soin, S.G. 1964. Adaptational features in the development of fish in connection with different features of respiration. Vestn. Mosk. Univ. Ser VI Biol. Pochvoed 1964(6), in Russian.
- Tagart, J.V. 1984. Coho salmon survival from egg deposition to fry emergence, p 173-181 in J.M. Walton and D.B. Houston (eds.) Proceedings of the Olympic Wild Fish Conference, March 23-25, 1983. Fisheries Technology Program, Peninsula College, Port Angeles, WA.
- Vronskiy, B.B. 1972. Reproductive biology of the Kamchatka River chinook salmon (*O. tshawytscha*). J. Ichthyol. 12: 259-273.
- Washington Department of Wildlife 1987. Gold and Fish. 20. p. Wash. Dept. Fish Wildl., Olympia, Wash.
- Wickett, W.P. 1954. The oxygen supply to salmon eggs in spawning beds. J. Fish. Res. Bd. Can. 11: 933-953.

Sincerely  
Dr. Robert N. Crittenden  
March 2, 1996



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28 April 2011

**RE: Comments regarding SEIR and Proposed Regulations for suction dredge mining in California in Favor of Maintaining Current 1994**

Dear Sir:

Thank you for allowing us the opportunity to comment on the California Department of Fish & Game's (DFG) Suction Dredge Permitting Program Subsequent Environmental Impact Report (SEIR) and Proposed Regulations.

I, Claudia Wise, and Joseph Greene are retired U.S. EPA Scientists and invited members of the CDFG SEIR Public Advisory Committee. During the PAC meetings we presented two science based PowerPoint presentations to the committee "**Selenium Antagonism to Mercury, Does Methylmercury Cause Significant Harm to Fish or Human Health?**" and "**Turbidity and the Effect of Scale**".

Claudia Wise is a retired Physical Scientist previously employed at the U. S. Environmental Protection Agency, Corvallis Environmental Research Laboratory, Corvallis, OR. I have 29 years experience in chemical and biological instrumentation methods. I spent 8 years with the Western Fish Toxicology Station coauthoring journal articles dealing with bioaccumulation in Invertebrates and Fish exposed to chemical toxicants. I have contributed to many projects and coauthored numerous journal articles for the Watershed Ecology, Terrestrial, Ecotoxicology and Freshwater Branches where I researched toxicity in soil and the effects of toxicants on plant growth. At the time of my retirement, I was with the Watershed Ecology Stable Isotope Research Facility. I am a recipient of the United States Environmental Protection Agency Bronze Medal for Commendable Service.

Joseph Greene has over 30 years of national and international professional experience including consulting, research, and teaching for industry and government regulatory agencies. Activities included project management, contract administration, experimental design, preparation of research reports and technical documents, laboratory supervision, statistical analysis of data, computer simulation, development and application of biological methods, and performance of algal growth potential and aquatic and terrestrial toxicity tests.

Consulting experience included assessment of nutrient pollution in freshwater canals and rivers, assessment of heavy metals toxicity from mining activities and paint stripping, investigation of toxicity and bioaccumulation in soils at military facilities, evaluation of water soluble and soil toxicants at Superfund sites, and assessment of algal toxicity from textile dyes.

Research activities included establishment of an ecotoxicology laboratory, development of a biological-chemical-physical protocol for measuring potential toxicity of construction materials, development of internationally standardized test methods (aquatic algae, aquatic macroinvertebrate, terrestrial plant and terrestrial invertebrate), chairman of testing committees for ASTM and Standard Methods, platform chairman of several international symposiums, workshops, and congresses, and invited speaker to numerous national and international professional scientific meetings.

Teaching experience included a number of short courses and workshops on performance of algal growth potential and interpretation of results across the nation, a workshop on environmental analysis techniques in Europe, a workshop on complex problems with point and non-point sources of water contamination for the US Department of the Interior, and an environmental engineering graduate seminar on toxicity testing for environmental engineering applications.

Government agencies experience included project management, experimental design, hands-on research, data analysis, and report writing.

Since retirement both of us have participated, as a team, to defend the rights of small scale suction dredging using science to establish the "Less Than Significant effects of the practice. Joseph Greene primarily investigated biological effects and Claudia Wise investigated water quality effects. Post USEPA experience includes a Preliminary Klamath River Water Quality Survey examining surface water temperatures.

According to the DFG Suction Dredge Permitting Program SEIR NOA (SCH #2005-09-2070) regarding the Notice of Availability of a DSEIR for Suction Dredge Permitting Program (SCH#2009112005), "The Draft SEIR evaluates the potential environmental impacts of the proposed program and four alternatives:

No Program alternative....;

1994 Regulations alternative....;

Water Quality alternative (which would include additional program restrictions for water bodies listed as impaired pursuant to the Clean Water Act (CWA) section 303(d) for sediment and mercury); and,

Reduced intensity alternative (which would include greater restrictions on permit issuance and methods of operation to reduce the intensity of environmental effects).

It should be noted that the directive of the court was to identify any suction dredge issues that were detrimental to fish yet the CADFG paid the contractors to spend an inordinate amount of time evaluating situations that were never a part of the court order. If any of these additional findings were to be enforced they could keep small scale suction dredgers from plying their trade and earning income.

During the court proceedings, which ordered the development of this SEIR, the attorneys for the CDFG told the court that they had scientific information that small-scale suction dredging might be harmful to fish. It should be noted that during discovery by the agents of the miners the CDFG attorneys refused to provide the scientific evidence they claimed was in their possession. Therefore, under court order, CDFG is spending a large amount of tax dollars to find scientific data that dredging harmed fish....data the State claimed to have in its possession prior to the court ordering the SEIR study be performed. And yet, the contents of the SEIR illustrate that the effects of suction dredging on fish, in every instance, is "Less than Significant". The SEIR results also illustrate that the State never possessed any additional scientific evidence they claimed would prove small-scale suction dredging was detrimental, in any way, to fish or wildlife beyond the data already analyzed in the 1994 EIR. The public's money could certainly have been used more productively, in a cash strapped State, than having it used to try and destroy an economic sector of a State already in financial trouble. The basis for the entire SEIR process was founded upon a lie presented by the State's attorneys.

The conclusions for the effects of suction dredging on fish are as follows and are the same as those found in the 1994 EIR and support the positions that the miners have always argued:

\* ***Impact BIO-FISH-1: Direct Effects on Spawning Fish and their Habitat***

*Less than Significant*

\* ***Impact BIO-FISH-2: Direct Entrainment, Displacement or Burial of Eggs, Larvae***

***and Mollusks***

\* ***Impact BIO-FISH-3: Effects on Early Life Stage Development***

*Less than Significant*

\* ***Impact BIO-FISH-4: Direct Entrainment of Juvenile or Adult Fish in a Suction***

***Dredge*** *Less than Significant*



- \* *Impact BIO-FISH-5: Behavioral Effects on Juvenile or Adults*
- \* *Impact BIO-FISH-6: Effects on Movement/Migration*
- \* *Impact BIO-FISH-7: Effects on the Benthic Community/Prey Base*
- \* *Impact BIO-FISH-8: Creation and Alteration of Pools and other Thermal Refugia*

It is generally accepted that most of the pools made by small scale suction dredges last only until the following winter high water flows arrive. In the meantime they serve the fish as resting areas and safe locations from predation. The pools may or may not intersect cold ground water or hyporheic subsurface flows. This fact does not negate or makes the pools less beneficial to the survival of salmonids. The pools still serve as resting and protective locations between thermal refugia, that are generally located at the mouths of confluent streams that could be located some miles away.

We disagree with the Less Than Significant conclusion and would recommend that it be changed from Less than Significant to

Dredge holes 3 feet or deeper are considered adequate refugia for fish. Excavating pools could substantially increase their depth and increase cool groundwater inflow. This could reduce pool temperature (Harvey and Lisle 1998). If pools were excavated to a depth greater than three feet, salmonid pool habitat could be improved. In addition, if excavated pools reduce pool temperatures, they could provide important coldwater habitats for salmonids living in streams with elevated temperatures (SNF, 2001).

\* *Impact BIO-FISH-9: Destabilization/Removal of Instream Habitat Elements (e.g.,*

*Coarse Woody Debris, Boulders, Riffles)* (Less than Significant)

\* *Impact BIO-FISH-10: Destabilization of the Stream bank*

\* *Impact BIO-FISH-11: Effects on Habitat and Flow Rates Through Dewatering,*

*Damming or Diversions*

Since harm to fish is no longer the issue, according to the findings in the SEIR, we will address the issues that were identified as “significant and unavoidable”. They are:

*Impact WQ-4.*

*Impact WQ-5.*

*Impact CUM-8.*

(Less than Significant)

If these subject areas were important enough to investigate, and expend public funds, they should be analyzed in the proper light that peer-reviewed scientific analytical standards demands. It is stated in the notice of availability that “The analysis found that significant environmental effects **could** occur as a result of the proposed program (and several of the program alternatives), specifically in the areas of water quality, and toxicology, noise, and cultural resources. Although

CDFG does not have the jurisdictional authority to mitigate impacts to these resources, they were, nevertheless, identified as significant and unavoidable.”

In Chapter 4.2, WATER QUALITY AND TOXICOLOGY of the DSEIR the first issue of significant and unavoidable impact is “Impact WQ-4. Effects of Mercury Resuspension and

Discharge from Suction Dredging ( )”.

You have provided no direct dredging evidence to support this! You state, “Few dredge studies are available regarding how small scale suction dredging specifically affects mercury. However two important, high quality studies present results indicating less than significant effects.

A cumulative study using an 8 and 10-inch dredge (actually operating in a flowing river) commissioned by the USEPA (1999) produced values of dissolved mercury that were actually greater upstream of the dredge, suggesting that any effect of the dredge was likely within the range of natural variation. The operator reported observing deposits of liquid mercury within the sediments he was working. This is the most relevant piece of published scientific evidence, addressing dredging at intensity beyond that typically experienced in California, with real world interceptions of occasional mercury deposits. The draft fails entirely to explain how any other information undermines the conclusions of this study.

Humphrey (2005) demonstrated that at least 98% of the mercury was retained in the sluice box of the dredge. The fact remains that most suction dredgers do not find mercury hotspot’s. Most dredgers report seeing only occasional drops of mercury or amalgamated gold...if any. The highly infrequent nature of mercury interceptions confirms the lack of significance.

Humphreys (2005) and Marvin-DiPasquale (2009) made an attempt to quantify effects of small scale suction dredging on mercury. Their work has added bits of information to the database of known mercury hotspots. However, their work added very little information to the known effects that suction dredges may have on mercury in the “normal” environment. Later attempts to quantify the effects of dredging on mercury (Fleck 2011) were unsuccessful even when:

- \* They skewed the results by intentionally establishing a study directed at the worst case, most contaminated, location in the State of California; and,
- \* Attempted, using data from a non-dredge study, to draw statewide conclusions “calculating” the movement of greater quantities of mercury from one 8-inch dredge than is moved in an entire year by natural flood conditions.

According to Fleck (2011), “It is important to note that the results presented in this publication were not developed using a full-scale dredge operation.” As a matter of fact, other than for the 3 inch dredge portion of the study, no dredge was used!!! The procedure used does not allow for a scientifically acceptable or environmentally realistic calculation of results to be scaled-up quantitatively to reflect what would occur from the outflow of a “real” dredging operation. Fleck

further hedged, “The results of the test should be evaluated as valuable information regarding the proof of concept [of site remediation] rather than a quantitative evaluation of the effects of suction dredging on water and sediment in the South Yuba River.” (Fleck 2011).

The first significant failure of this project was not returning the funding to the California State agencies when it was determined USGS would not be allow the use of small-scale suction dredges in the river to perform the suction dredge study. Following that decision the main scope of the project was manipulated to provide pre-conceived answers to the questions the State agencies were seeking. These actions have the appearance that the only goal of forcing these data was to provide grounds for the State agencies to control the waters of California by closing areas or placing strict requirements in areas used by suction gold dredgers. All of this would be based on non-peer reviewed grey literature science like the Humphrey (2005) and Fleck (2011) studies. A legitimate scientifically designed study would have a hypothesis that would have been formulated to find the best information based on data, from actual small-scale suction dredge operations. Fleck (2011), makes it clear when he states, “the scope of the study was modified to accommodate concerns by the State Water Resources Control Board and California Regional Water Quality Control Board, Central Valley Region”. These concerns could have been laid to rest simply by moving the test site to a more natural segment of the river system rather than staying in the chosen location of a site known to contain the greatest concentration of mercury in California

Fleck (2011, page 5) stated, “The revised project scope replaced the planned full-scale suction-dredge test with study elements 2 and 3, which focused on a more complete assessment of sediment composition and Hg contamination and speciation as a function of grain size, as well as current and historical sources of contamination at the SYR-HC confluence site. The information generated in this study could have been valuable in determining the potential for Hg transport due to dredge activities through simulation (emphases added) calculations.”

Fleck (2011) further described his concern for human health stating that, “Ultimately, the importance of the results of this study relate to whether the Hg in the sediment has a negative effect. Potential for a negative effect is closely related to the transport of sediment into the water column where it may become a threat to local users or be transported downstream.” Presenting these concerns does not make them true without adding a study element regarding the bioavailability of released mercury, in the presence of naturally occurring selenium, to cause harm. Therefore, we remain without an answer to the question of what negative effects may be generated from any of the sources of mercury contamination on exposed organisms.

The Fleck (2011) study does further disservice to legitimate science by presenting information calculated on data not collected during the study. He stated, “Unfortunately, the rate at which sediment was moved during the dredge test was not quantified during this study, therefore this evaluation is based on qualitative observation only.” Flow rates from a dredge are site specific and cannot be substituted for industry flow rates that are used to sell dredges. Knowing this, Fleck (2011) concludes “These estimates are, like the previous analysis, dependent on numerous assumptions and estimates and thus possess a high degree of uncertainty.”



On the very same project, when a three inch dredge was used, the researchers found no significant level of mercury flowing out of the sluice box. Results of the three inch dredge study are listed below:

- \* Concentrations of particulate total mercury increased in a similar manner as total suspended solids, with concentrations during the suction dredging two times the pre-dredging concentration and three to four times the concentration of the samples collected the following day.
- \* Concentrations of filtered total mercury in the South Yuba River during the dredge test were similar to those in the field blanks (i.e., field control samples).
- \* Dredging appeared to have *no major effect* on particulate methylmercury concentrations in the South Yuba River during the dredge operations.

Results from this three inch dredge study are the closest data presented in this report that reflect the effects of an honest dredge study. However, these results are of insufficient quality or sample quantity to allow for a conclusion that particulate total mercury will float indefinitely ~~down a waterway as Fleck's (2011) conclusion suggests~~. In fact, there are peer-reviewed journal articles that provide the necessary data to show this is not the case.

USEPA commissioned a study on the impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska (Royer, 1999). The results showed that although total copper increased approximately 5-fold and zinc approximately 9-fold at the transect immediately downstream of the dredge, relative to the concentrations measured upstream of the dredge, both metals concentrations declined to near upstream values by 80 m downstream of the dredge.

It was suggested the pattern observed for total copper and zinc concentration is similar to that for turbidity and total filterable solids. The metals were in particulate form, or associated with other sediment particles. The results yielded a similar effect to what Fleck (2011) found regarding particulate total mercury in the South Yuba Humbug creek confluence. However, the Alaskan data provided a totally different outcome than Fleck leads us to believe resulted from his study that did not use a suction dredge to develop the data.

The Fortymile River suction dredge study, using 8 inch and 10 inch suction dredges, measured the distance the metals associated with the sediment particles moved in the water column before settling back to the bottom of the river. The sediment particles did not float indefinitely as Fleck leads us to believe. Zinc at  $7.10 \text{ g/cm}^3$  and copper at  $8.92 \text{ g/cm}^3$  have significantly lower densities than mercury at  $13.55 \text{ g/cm}^3$ . Zinc and copper average slightly more than half the weight of mercury. Yet those elements only floated 80 meters. The only reasonable inference, absent real data to the contrary, is that Hg, which has almost twice the weight of copper or zinc, would, as gravity dictates; sink to the river bottom in a shorter or, at least, no greater distance downstream.

What value is there to the public interest when a federal agency, such as USGS, forms the hypothesis of a worst case scenario regarding small-scale suction dredging based on a study performed without using a suction dredge? A project where no suction dredge measurements

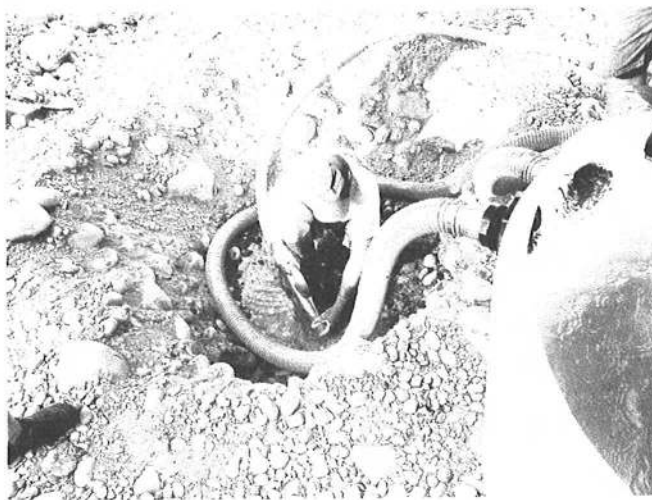
were taken will never be a substitute for honest factual data. No one should be allowed to force results from an ill conceived project on the citizens of California as scientific truth.

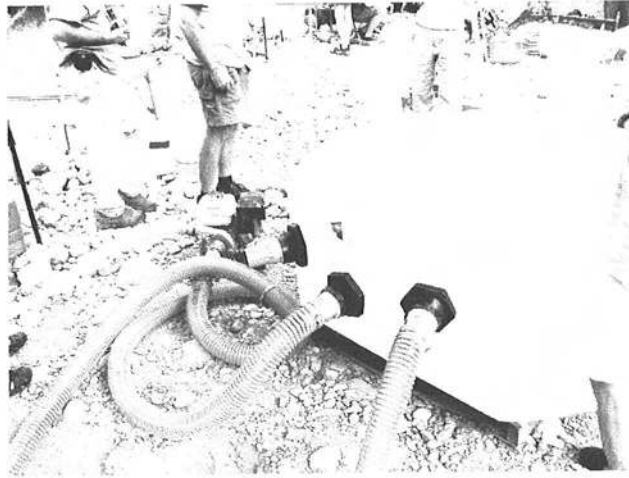
In the California Department of Fish and Game, February 28, 2011 proposed suction dredge regulations the definition of a suction dredge is as follows:

Suction dredging. For purposes of Section 228 and 228.5, the use of vacuum or suction dredge equipment (i.e. suction dredging) is defined as the use of a motorized suction system to vacuum material from the bottom of a river, stream or lake and to return all or some portion of that material to the same river, stream or lake for the extraction of minerals. A person is suction dredging as defined when all of the following components are operating together:

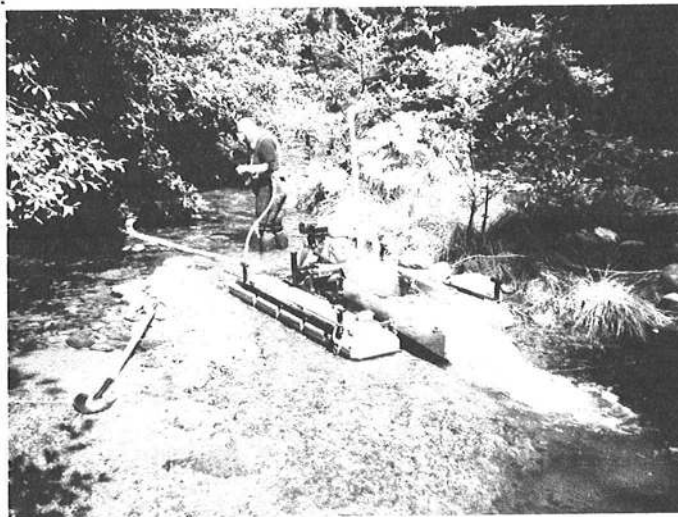
- A) A vacuum hose operating through the venturi effect which vacuums sediment from the river, stream or lake; and,
- B) A motorized pump; and,
- C) A sluice box.

Below are photographs of the Fleck (2011) mercury hotspot suction dredge and the one hole from which the sample was collected. This single tub of water is what is being used in the SEIR to define mercury contamination from all suction dredges working the waters of California.



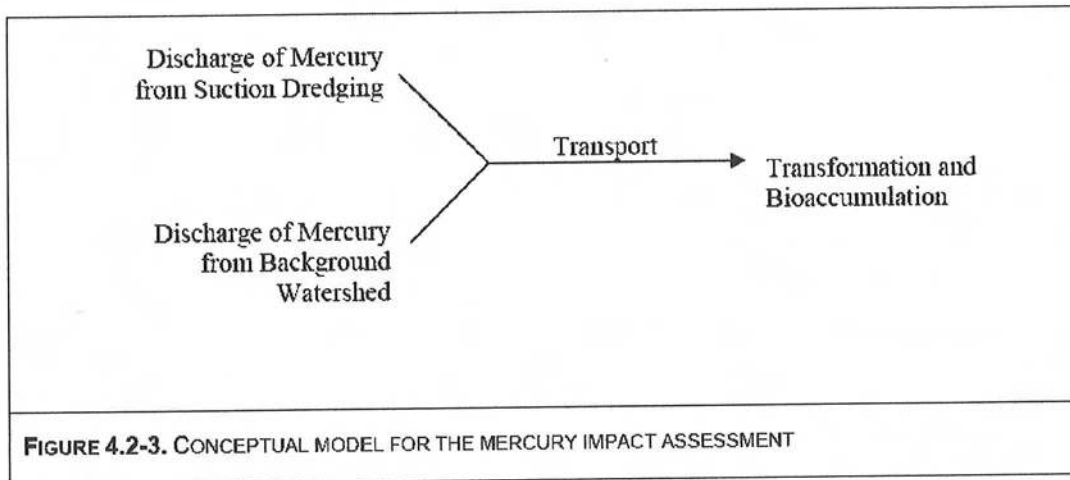


And for those unfamiliar with suction dredging the following photograph will reveal that the dredge floats on the water and is intended to vacuum the overburden from the river or creek bottom. The vacuumed material, (i.e., clay, sand, rocks,) pass through a sluice box that captures the heavy materials (i.e., gold, lead, platinum, mercury) while returning the other materials back to the receiving water.



It states in the SEIR that “The effects of Hg contamination from historic mining activities in California are being extensively studied and there is substantial literature regarding Hg fate and transport. However, there are very few published studies specifically addressing the effects of suction dredging on Hg fate and transport processes. Since the time the literature review (Appendix D) was prepared, *USGS scientists and Hg experts provided CDFG with preliminary results of their recent research in the Yuba River* “

. *This new information and data from USGS was used in formulating the approach to this assessment of the Program.*” The statement is followed by the following diagram.



The statement highlighted in red is factually false and is grounds for dismissing any results from this model. We have no criticism of the modeling approach itself as that is outside of our area of expertise. However, anyone that has worked in science and with modelers understands that the quality of the results is predicated upon the quality and accuracy of the input. There is a term for a model that has used bad or questionable data. It is “garbage in, garbage out”. This comment does not reflect on the individual providing the model but, only on the quality of information he is provided. If you were to look at the diagram of the conceptual model it is very clear the element “Discharge of mercury from suction dredging”, as defined by the above description from the USGS, is entirely dishonest. Furthermore, we must point out that there is not a control sample from the test site itself. Our understanding is that just one hole was flooded and sucked out using a closed circuit device repeatedly recirculating the water (not a dredge) and historical chemistry for the Yuba River was used as the control data. Not scientifically acceptable!

To prove our point we have only to go back to the statement, “*USGS scientists and Hg experts provided CDFG with preliminary results of their recent research in the Yuba River which is specifically focused on assessing the potential discharge of elemental Hg and Hg enriched suspended sediment from suction dredging activities.*” This statement is false. The California State Water Board denied the researchers the right to use an eight-inch suction dredge in the river as the study had planned to do. Therefore, Dave McCracken, the mining consultant, was asked to determine where he believed might be the most contaminated sites for sampling. He did so. A hole was hand dug out on a gravel bar down to the water table. A closed circuit system was then used to suck the fluid and streambed material from the hole into a large container. The same water was circulated from the hole, into the container and back into the hole, over and over again for about an hour. (A second hole was also hand dug from bedrock outside of the active river (having been exposed to oxygen for potentially many years) just downstream from the most contaminated site.

It was these holes and test procedures that resulted in the measured concentration of the mercury being called dredge discharge. From this description it is clear a real suction dredge was not used to provide the results in the study and the materials did not represent the typical river overburden that had been undergoing natural cleaning from years of flushing winter floods. In fact it is stated that, “discharge of Hg from suction dredging was based primarily on field



characterization of Hg contaminated sediments (Fleck et al., 2011). Background watershed mercury loading estimates were utilized to compare to suction dredge discharge estimates (Alpers, et al., in prep). There you have it in their words. Study results were based on contaminated sediments outside the river, or from highly-re-circulated water not representative of ordinary dredging in the river and “background watershed mercury loading estimates were utilized” for the control, rather than precise comparative measures in this area known to have atypically high mercury contamination..

Furthermore, the entire discussion in the draft is written as mercury were a highly toxic, irreversible toxin that everyone should be deathly afraid of. This view is totally biased and slanted. It was bad enough to create a model based only on possibility of worst case factors influencing bioaccumulation, but worse still to not incorporate bioavailability considerations of Hg toxicity into the models assessment management evaluation. We do not see any discussion to the vast collection of published peer reviewed articles that support selenium’s antagonism to mercury and the resultant detoxification. This data should also be included in any discussion or model which is attempting to fairly represent any toxic effects to fish, wildlife, aquatic organisms and the environment in general

*Examiner Columnist Ron Arnold wrote* “Where does a regulatory agency run by political appointees find scientists willing to claim their subjective opinion is science? The FWS gets most of its science from U.S. Geological Survey biologists working in a closed loop: FWS gets science from USGS, USGS gets funded by FWS - which assures predetermined outcomes and no dissent. Interesting money trail, so where's Congress and the media?” We believe the information reflected in the Fleck, et al (2011) report should be viewed with this same skepticism. The dredge output conclusions calculated by re-circulating water through a hand dug hole, in the most highly mercury contaminated area known to the State of California, is the poorest excuse for science we have observed in our combined 60+ years of scientific research.

Intentionally seeking out and targeting site samples from areas containing known extreme levels of mercury contamination, rather than applying a scientific approach of random sampling, and using these data to draw conclusions that affect a whole State’s suction dredge industry is unacceptable. Even worse, the study observations were extrapolated to represent a real stream environment where, it is claimed, mercury would float indefinitely. While panning gold concentrates miners frequently see gold floating on the water until the surface tension is broken. But, overburden and oxygenated water flowing off the end of a sluice box submerges and mixes below the water surface. This turbulent action breaks the surface tension and the dense materials settle out in a short distance.

January 2010, EPA reported that “since suction dredge mining creates turbidity in the stream it is likely this action increases oxygenation of the waters and therefore, methylation of inorganic mercury would be less likely to occur in these habitats.” No quantitative evidence is presented concerning the degree of oxygenation, or whether it has any appreciable effect on general, downstream levels relevant to methylation processes. Determinations of significance require more than theorizing as to possible effects.

As one would expect the results of the USGS study (Fleck 2011) using the 3-inch dredge showed only a slight increase in particulate total mercury present in the water column immediately downstream of the suction dredge. Data indicating that an increase of particulate total mercury does not equate to an increased concentration or change in speciation to the more toxic form methylmercury.

It is important in dealing with science to occasionally step back and ask yourself ‘So what?’ It’s necessary as a scientist to not try to push the data and your resulting conclusion into a pre-conceived notion of what your initial theory was. The push to smear suction dredging with the presented information raises the question of whether we are dealing with scientists or activists working for the USGS. Let me quickly show you what a dredge study should look like.

In the following illustration, from the Fortymile River study in Alaska, you can see the dredge location in the river. There are two control sampling sites upstream of the dredge and several transects with multiple sites crossing the entire river. That is a true example of scientists performing high quality, subject specific research.

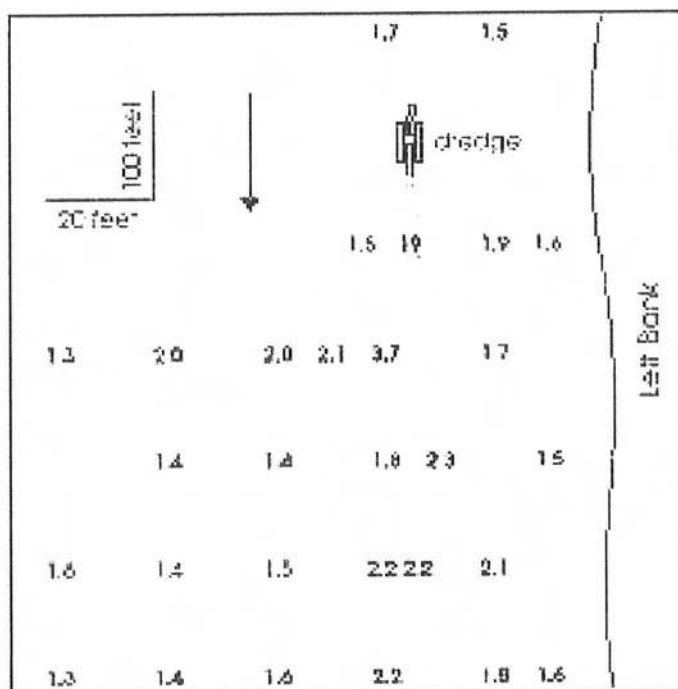


Figure 2. Results of turbidity survey behind an operating 10-inch suction dredge (site #1 on fig. 1). All numbers shown are in NTU, or nephelometric turbidity units, the standard unit of turbidity. The right bank of the river is off the edge of the figure. The approximate shape of the plume is shown in gray. Note that the figure is exaggerated 5x horizontally, so the plume is actually much narrower than it appears in the figure. To comply with State regulations, dredges may not increase the turbidity of the river by more than 5 NTU, 500 feet behind the dredge.

In the presentation to the CDFG PAC Claudia shared numerous peer-reviewed journal articles that prove selenium’s chemical antagonism to mercury, and other mercury species such as methylmercury, cause no significant harm to fish or human health. These published peer reviewed articles leave no doubt that toxicity from mercury contamination in historic mining basins is [Low to Moderate](#).



There is no doubt that methylmercury may cause harm under the right circumstances. An example of this occurred in Minimata, Japan where inhabitants were exposed to 27 tons of mercury waste dumped in the bay but, with no corresponding shift in selenium levels. However, there has been a large body of (peer reviewed) evidence published that demonstrates that supplemental dietary selenium moderates or counteracts mercury toxicity. Mercury exposures that might otherwise produce toxic effects are counteracted by selenium, particularly when the Se:Hg molar ratios approach or exceed 1.” Selenium has a high affinity to bind with mercury thereby blocking it from binding to other substances, such as brain tissue. The bond formed is irreversible. “All higher animal life forms require selenium-dependent enzymes to protect their brains against oxidative damage (Peterson 2009)”. As early as 1967 Parizeik found that high exposures Se and Hg can each be individually toxic, but evidence supports the observations that co-occurring Se and Hg antagonistically reduce each other’s toxic effects.

In 1978, scientists from Sweden were reporting that “mercury is accompanied by selenium in all investigated species of mammals, birds, and fish,” adding that it “seems likely that selenium will exert its protective action against mercury toxicity in the marine environment” (Beijer 1978). Building onto the list of species known to be protected by selenium’s bond with mercury and the toxic effects of methylmercury, a group of Greenland scientists in 2000, published the results of mercury and selenium tests performed on the muscles and organs of healthy fish, shellfish, birds, seals, whales, and polar bears. They found that, “selenium was present in a substantial surplus compared to mercury in all animal groups and tissues” (Dietz 2000)

Not only ocean species but freshwater species are found to also be protected. Researchers at Laurentian University in Ontario, Canada reported that selenium deposits, from metal smelters into lake water, greatly decreased the absorption of mercury by microorganisms, insects, and small fish. Suggesting a strong antagonistic effect of selenium on mercury assimilation (Yu-Wei 2001). Peterson’s group (2009) collected 468 fish representing 40 species from 130 sites across 12 western states. Samples were analyzed for whole body selenium and mercury concentrations. The fish samples were evaluated relative to a wildlife protective mercury threshold of 0.1 ug Hg/g wet weight, and the current tissue based methylmercury water quality criteria for the protection of humans of 0.3 ug Hg/g wet weight and presumed protective against mercury toxicity where the Se:Hg molar ratios are greater than 1. The study included data from samples collected in California which, in all cases, contained proportions of mercury to selenium that were adequate to protect fish, wildlife and human health. Results showed 97.5% of the freshwater fish in the survey had sufficient selenium to protect them and their consumers against mercury toxicity. The California results were 100% protective.

Ralston’s research (2005) supports Peterson’s (2009) findings stating that “Mercury toxicity only occurs in populations exposed to foods containing disproportionate quantities of mercury relative to selenium.” Also supporting this finding inadvertently, the California Office of Environmental Health Hazard Assessment website has no evidence of any one in California that has died from mercury poisoning from eating sports fish... despite mercury warnings they have issued.



“Methylmercury exposure to wildlife, and to humans through fish consumption, has driven the concern for aquatic mercury toxicity. However, the methylmercury present in fish tissue might not be as toxic as has been feared. Recent structural analysis determined that fish tissue methylmercury most closely resembles methylmercury cysteine (MeHg[Cys]) (*or chemically related species*) which contains linear two-coordinate mercury with methyl and cysteine sulfur donors. MeHg[Cys] is far less toxic to organisms than the methylmercury chloride (MeHgCl) that is commonly used in mercury toxicity studies.” (Harris 2003).

The best science suggests that the tiny amounts of mercury in fish aren't harmful at all. A recent twelve-year study conducted in the Seychelles Islands (in the Indian Ocean) found *no negative health effects* from dietary exposure to mercury through heavy fish consumption. On average, people in the Seychelles Islands eat between 12 and 14 fish meals every week, and the mercury levels measured from the island natives are approximately ten times higher than those measured in the United States. Yet none of the studied Seychelles natives suffered any ill effects from mercury in fish, and they received the significant health benefits of fish consumption

Forty years of research illustrates the conclusion, from hundreds of journal articles, that demonstrate mercury is not a threat to the environment or human health if the molar ratio of selenium:mercury meets the defined criteria. In California there are adequate supplies of selenium to support the criteria. Results of these studies support the fact that methylmercury is not deleterious to fish and wildlife or aquatic organisms.

We disagree with the Significant and unavoidable conclusion, because of the lack of factual scientific basis that would support this conclusion. We would recommend that it be changed from Significant and unavoidable to \_\_\_\_\_ until the full body of science is evaluated.

### ***Impact CUM-7. Cumulative Impacts of Mercury Resuspension and Discharge from Suction***

#### ***Dredging***

Cumulative Impacts are no different in this regard as Impact WQ-4. The many factors associated with bioavailability such as total hardness, dissolved organic carbon, pH, alkalinity, sulfate reducing bacteria, anaerobic conditions, etc. need to be present for methylation and bioaccumulation in the food chain. Even if the conditions for methylation are met, if selenium to mercury has, at least, a 1:1 molar ratio all the mercury will bind with selenium creating an irreversible bond cancelling any potential toxic effects of mercury. Furthermore, since this

opinion appears to rely heavily on the purported “scientific” results provided by the USGS dredge study they are totally worthless and should not be used for the aforementioned reasons.

We disagree with the Significant and unavoidable conclusion, because of the lack of factual scientific basis that would support this conclusion. We would recommend that it be changed from Significant and unavoidable to \_\_\_\_\_ until the full body of science is studied.

Sincerely,

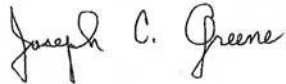
Claudia J, Wise



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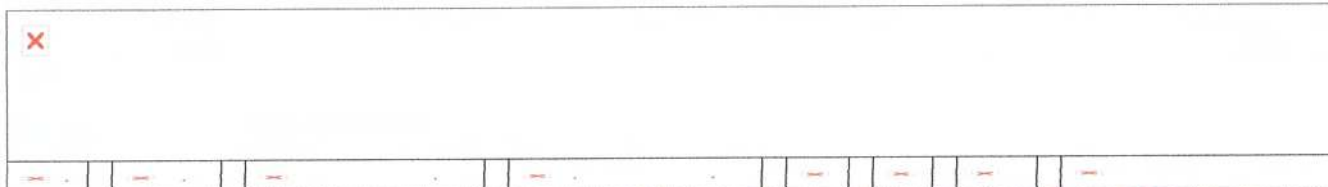
## REFERENCES

- Alpers, C.N.; M.P. Hunerlach; M.C. Marvin-DiPasquale; R.C. Antweiler; B.K. Lasorsa; J.F. DeWild; and N.P. Snyder. 2006. *Geochemical data for mercury, methylmercury, and other constituents in sediments from Englebright Lake, California, 2002*. USGS Data Series 151, 95p.
- Beijer, K., A. Jernelov (1978). "Ecological aspects of mercury--selenium interactions in the marine environment." *Environ Health Perspect* 25:43-5.
- Curtis, J.A.; L.E. Flint; C.N. Alpers; S.A. Wright; and N.P. Snyder. 2006. *Use of sediment rating curves and optical backscatter data to characterize sediment transport in the upper Yuba River Watershed, California, 200103*. USGS Scientific Investigations Report 2005-5246, 74 p.
- Dietz, R. , F. Riget and E. W. Born. *An assessment of selenium to mercury in Greenland marine animals*. The Science of The Total Environment. Volume 245, Issues 1-3, 17 January 2000, Pages 15-24
- Fleck, J.A., Alpers, C.N., Marvin-DiPasquale, M., Hothem, R.L., Wright, S.A., Ellett, K., Beaulieu, E., Agee, J.L., Kakouros, E., Kieu, L.H., Eberl, D.D., Blum, A.E., and May, J.T., 2011, *The effects of sediment and mercury mobilization in the South Yuba River and Humbug Creek Confluence Area,, Nevada County, California: Concentrations, speciation, and environmental fate—Part 1: Field characterization*: U.S. Geological Survey Open-File Report, 2010-1325A, 104 p.
- Harris HH, Pickering IJ, George GN. 2003. *The chemical form of mercury in fish*. *Science* 301:1203.
- Humphreys, R. 2005. *Mercury Losses and Recovery, During a Suction Dredge Test in the South Fork of the American River*. In House Report, California Water Board.
- Marvin-DiPasquale, M. , et.al., 2009. Presented at the 19th Annual Meeting of the Northern California Regional Chapter of the Society of Environmental Potential impact of disturbance events on mercury associated with hydraulic mining sediments.
- Nishigak, S. and Harada, M. 1975. *Methylmercury and selenium in umbilical cords of inhabitants of the Minamata area*. *Nature* 258, 324 - 325
- Parizek et al. "The protective effect of small amounts of selenite in sublimate intoxication." *Experientia*. 1967 Feb 15;23(2):142-3.
- Peterson, S. A. et al, 2009, *How Might Selenium Moderate the Toxic Effects of Mercury in Stream Fish of the Western U.S.?*, *Environmental Science and Technology*., 3919–3925
- Ralston, N. *Physiological and Environmental Importance of Mercury-Selenium Interactions*. United States Environmental Protection Agency National Forum on Contaminants in Fish. September 19, 2005.
- Royer, T. V., A. M. Prussian and G. W. Minshall. 1999. Impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River and Resurrection Creek, Alaska. Final Report. For the U. S. Environmental Protection Agency, Region 10, Seattle, WA. 72pp.

- SUSUMU NISHIGAKI\* & MASAZUMI HARADA. 1975. *Methylmercury and selenium in umbilical cords of inhabitants of the Minamata area*. *Nature* 258, 324 - 325
- US EPA, 2010, *Biological Evaluation for Small Placer Miners in Idaho National Pollutant Discharge Elimination System (NPDES) General Permit*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.
- Yu-Wei Chen, N. Belzile and J. Gunn. *Antagonistic effect of selenium on mercury assimilation by fish populations near Sudbury metal smelters?* *Limnology and Oceanography*. 2001;46(7):1814-1818.



Exhibit - 3



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## Mercury Effects, Sources, and Control Measures

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September 1996

RMP Contribution #20

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### Introduction

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Mercury is but one of the toxic heavy metals that contaminates much of the waters and sediments of the San Francisco Estuary. It has been found throughout the Estuary at elevated concentrations in water, sediment, and biota. It accumulates in tissues and is magnified in higher orders of the food web. The form of mercury that typically bioaccumulates in fish is monomethyl mercury, which can constitute 85% of the total tissue mercury. The balance is the soluble, ionic form of mercury,  $Hg^{+2}$  which is commonly found in fish gut lining. However, in edible muscle tissue (fillet), the

<a href="#"><u>Influences Upon Mercury Pollution</u></a>	portion normally consumed, virtually all of the incorporated mercury is in the monomethyl form. Fish at the top of the food web can harbor mercury concentrations in their tissues over one million times the mercury concentration in the water in which they swim.
<a href="#"><u>Mercury's Health Effects</u></a>	Bivalves appear to accumulate mercury in a manner different from fish.
<a href="#"><u>Data Trends in the RMP</u></a>	Mercury in these organisms accumulates principally as $Hg^{+2}$ and only 15-20% of the total mercury is methyl mercury. Consequently, a doubling of the most toxic form of mercury, monomethyl mercury, can occur in bivalves without producing a statistically significant change in concentration of total tissue mercury
<a href="#"><u>Potential Control Measures</u></a>	
<a href="#"><u>Source Control</u></a>	Partly as a result of the tremendous increase in mercury production and use in this century, and partly as a result of the many soluble species of mercury, mercury contamination is now virtually world-wide in extent and widespread in our environment. It travels easily through different environmental media, including the atmosphere, in a variety of chemical forms and is toxic to humans and biota in extremely low concentrations. In water environments, conjugation with particles dominates the movement and fate of mercury (PTI, 1994; Schoellhamer, 1996). In addition to experiencing the general, industrially-related, global increase in mercury distribution over the last century, California is unique in also being the site of massive bulk contamination by the element. The California Coast Range contains one of the world's great geologic deposits of mercury. This mercury was mined intensively during the late 1800s and early 1900s, largely to supply Gold Rush era gold mining in the Sierra Nevada, where the mercury was used in the gold extraction process. A legacy of leaking Coast Range mercury mines and lost Sierra Nevada quicksilver now provides a significant, additional, ongoing burden of mercury to the Delta and Bay from both sides of the state.
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## Mercury Sources

Mercury, which occurs as a result of both natural and anthropogenic sources in our environment, continually cycles in the marine environment of the Estuary. The cycle involves different forms and species of mercury as a result of both chemical and biological reactions in aerobic and anoxic microenvironments. Until several years ago, estimates of the natural background level of mercury were unrealistically high due to erroneous data, giving the impression that anthropogenic contributions to the global mercury flux were less than they truly are (Fitzgerald and Clarkson, 1991). The generation of erroneous data arose because of a lack of appreciation for the ease of cross-contamination and the lack of sufficiently sensitive instrumentation to measure mercury in soil, water, and air. A schematic of the cycle is shown in [Figure 1](#).



The bulk of the mercury is normally present as  $\text{Hg}^{+2}$  in the early stages of deposition, but over time it is probably converted by inorganic chemical reactions to the more insoluble cinnabar ( $\text{HgS}$ ). In California, cinnabar is the primary form of the Coast Range mercury deposits. The mercury used in gold mining in the Sierra Nevada was refined liquid quicksilver (elemental mercury,  $\text{Hg}^0$ ), though this elemental mercury likely experienced various transformations once back in the environment. The concentration and rate of formation of  $\text{HgCH}_3$  (methyl mercury) in anaerobic sediment and water is thought to be proportionate to the amount of  $\text{HgS}$ , not the amount of total mercury. There are other factors which influence these reactions including pH, temperature, oxygen/redox level, salinity, toxicity, rate of sediment deposition, rate of pore water transvection, rate of mercury deposition, species of mercury deposited ( $\text{Hg}^+$  or  $\text{Hg}^{+2}$ ), and the rate of  $\text{HgCH}_3$  removal by bioaccumulation.

On a world wide scale, volcanic deposits and mining sources are geographically localized but, in California, they are of great importance. Most additional mercury sources are part of a widespread, global cycle. The release, deposition, and movement of mercury through these global pools has been catalogued, as shown in [Table 1](#).

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### Natural Sources

Mercury occurs naturally in the environment and thus has a background concentration independent of man's releases. Mercury can occur naturally in a variety of valence states and conjugations, such as  $\text{Hg}^0$  (elemental mercury),  $\text{Hg}^{+2}$  (dissolved in rainwater, or as the ore cinnabar,  $\text{HgS}$ ), and as an organometal such as methyl mercury ( $\text{CH}_3\text{Hg}$  and  $(\text{CH}_3)_2\text{Hg}$ ). Moreover, through natural chemical and biological reactions, mercury changes form among these species, becoming alternately more or less soluble in water, more or less toxic, and more or less biologically available.

As with any site on the globe, there is natural mercury contamination in San Francisco Bay. The recent spate of forest fires in Northern California alone undoubtedly contributed some mercury to this environment. Clearly, in California there is an ongoing load of some magnitude associated with the general export of mercury from natural cinnabar deposits, in addition to mining-related point sources. It is difficult to determine just what proportion of mercury in the Bay Area is from natural sources because what is natural varies greatly from one part of the world to the next. Because of airborne mercury pathways, there is no part of the globe today untouched by the world-wide increase in both use and release of mercury by man in this century. Current and proposed research at the University of California at Davis, seeks to differentiate and quantify the generalized global atmospheric contribution of mercury in California, as compared to regional and point sources. One tool in this work is the study of the historic

record of mercury deposition, as preserved in lake and estuarine sediment cores from relatively pristine locations such as Lake Tahoe and from contaminated sites in the Valley, Coast Range, and Bay-Delta. The importance, in this region, of localized bulk contamination mercury sources, over and above general deposition from the global cycle, is apparent in elevated mercury levels in tributaries to the Estuary. Concentrations in inflowing rivers often greatly exceed those seen in comparable rivers in regions without local mercury sources.

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### Volcanic

Mercury is initially released into the biosphere through volcanic activity. Mercury is present in the earth's crust at a concentration of 0.5 ppm. Mercury typically forms the sulfide (HgS) because of the prevalence of sulfides in volcanic gases. In this fashion it is found naturally in deposits as the red sulfide ore, cinnabar. It is commercially mined as this form. Volcanic sources emit an estimated global total of 60,000 kg of mercury per year.

### Forest fires

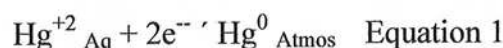
Biomass, particularly trees and brush, accumulate and harbor a substantial fraction of the biosphere's mercury. When forest fires heat these fuels to temperatures well above the boiling point of mercury (357°C), the mercury may be released to the atmosphere as either  $\text{Hg}^{+2}$  or the decomposed  $\text{Hg}^0$ . The  $\text{Hg}^0$  released may be oxidized in the atmosphere over time to  $\text{Hg}^{+2}$  which is also quite soluble in water and so dissolves in the moisture in the air when released in this fashion.

Forest fires and rain are responsible for the transport and deposition of mercury over much of the world's surface, regardless of its source.

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### Oceanic releases

Mercury is also a component of seawater and is released naturally through the evaporation of elemental mercury from the ocean's surface. Both elemental and ionic mercury are soluble in water, although elemental mercury to a much smaller degree. As less soluble elemental mercury evaporates, the equilibrium reaction is pulled towards more elemental mercury, which then releases more elemental mercury from the ocean's surface. The equilibrium reaction between ionic and elemental mercury is shown below in Equation 1:





Ionic mercury can form from the oxidation of elemental mercury or from the demethylation of monomethyl mercury.

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### Anthropogenic Sources

Mercury is used in a broad array of more than 2,000 manufacturing industries and products (Kurita, 1987). These include barometers, thermometers, hydrometers, pyrometers, mercury arc lamps, switches, fluorescent lamps, mercury boilers, mercury salts, mirrors, catalysts for the oxidation of organic compounds, gold and silver extraction from ores, rectifiers, cathodes in electrolysis/electroanalysis, and in the generation of chlorine and caustic paper processing, batteries, dental amalgams, as a laboratory reagent, lubricants, caulks and coatings, in pharmaceuticals as a slimicide, in dyes, wood preservatives, floor wax, furniture polish, fabric softeners, and chlorine bleach (Volland, 1991). Individual industries use different forms of mercury as well, as shown in [Table 2](#).

The United States produced about 3,435 tons of mercury in 1986 and imported another 6.5 tons. It is estimated that the US exported about 32.5 tons of mercury that year, yielding a net domestic annual use of about 3,409 tons of mercury (HSD, 1991). Of this use, 50% to 56% was used in the electrical industry, 12% to 25% was used in chloralkali plants to generate chlorine and caustic soda, 10% to 12% was used in paint manufacturing, and about 3% was used in the preparation of dental amalgams (Sills, 1992).

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### Mining

In addition to the generalized global and local industrial sources of mercury described above, the watershed of the San Francisco Estuary contains a tremendous amount of mining-related, bulk mercury contamination. Historically, mercury was mined intensively in the Coast range and transported across the Central Valley for use in Sierra Nevada placer gold mining operations. Virtually all of the quicksilver used in these operations was ultimately lost into Sierran watersheds. It has been estimated that, in river drainages of the Mother Lode region alone, approximately 7,600 tons of refined quicksilver was inadvertently deposited in conjunction with Gold Rush era mining (CVRWQCB, 1987). Additional mercury was used throughout the gold mining belt of the northwestern and central Sierra Nevada. The majority of Coast Range mercury mines which supplied this practice have since been abandoned and remain unreclaimed. As a result of these two activities, bulk mercury contamination exists today on both sides of the Valley.

Larry Walker and Associates (1995) measured mercury concentrations and loads at index stations on the Sacramento, Feather and Yuba Rivers. A particular focus was placed on the Yuba River, upstream and downstream

of Englebright Reservoir, to investigate the effects of foothill reservoirs on downstream mercury transport. In related work, Slotton et al. (1995a) have since 1993, evaluated the local bioavailability of mercury in all major river tributaries throughout the northwestern Sierra Nevada. The water quality data indicate that a significant amount of Gold Rush era mercury still exists in sediment in the upper Yuba watershed and that this is being transported down into Englebright reservoir, where it is largely trapped. Bioavailability studies confirm that the reservoir acts as an interceptor of not only inorganic, sediment-based mercury, but of bioavailable methyl mercury as well. Despite the fact that elevated levels of mercury are found in the heavily mined upstream tributaries and, particularly, within Englebright Reservoir itself, the aquatic biota below the impoundment consistently demonstrate significantly reduced concentrations of mercury, as compared to above the reservoir. The bioindicator organisms used in this work represent time-integrated measures of in-stream mercury bioavailability and indicate that the reservoir acts to consistently intercept bioavailable mercury that would otherwise be available for downstream transport, ultimately to the Bay/Delta system. The assumption is that mercury cycling in other Sierra watersheds is similar to that observed in the Yuba. However as a cautionary note, the United States Geological Survey (USGS) observed high concentrations of mercury associated with particulate matter in high flows downstream of Englebright Reservoir last winter. The USGS believe the mercury was deposited in the streambed before construction of the dam and is only now being eroded away (Joseph Domagalski, personal communication). Therefore, much, but clearly not all, of the mercury remaining in the Sierras from historic gold mining may be unavailable for downstream transport and biomagnification in the Estuary. In the few high mercury rivers without dams, particularly the Consumnes, direct transport of historic gold mining mercury into the Estuary remains unimpeded.

Recent work suggests that the Coast Range, rather than the Sierra Nevada, may be a dominant source of mercury to Central Valley Rivers and the Estuary. The Larry Walker and Associates Sacramento River mercury mass balance work indicated that the export of mercury from northwestern Sierra Nevada rivers was considerably less than that contributed by drainages in the north central and northwestern portions of the state, possibly largely due to trapping of mercury by foothill reservoirs. At the confluence of the Feather and Sacramento Rivers at Verona, the upstream Sacramento River was, somewhat surprisingly, found to contribute 75-80% of the total mercury load at that river mile.

Another mercury mass load export study was undertaken by the Central Valley Regional Board in the southwestern part of the Sacramento River watershed during 1995. The spring of 1995 was wet, and water from the Sacramento Valley entered the Estuary through both the Sacramento River and Yolo Bypass. Highly elevated concentrations of mercury were repeatedly observed in the Bypass. The source of a significant portion of the mercury was traced to Cache Creek, which drains Clear Lake and which is estimated to have exported about a thousand kilograms of mercury to the Estuary in 1995. The drainage is known to be enriched in mercury and has several large abandoned mercury mines. Long-term sediment

mercury mass balance work by the Slotton research team on just one small tributary, Davis Creek, has documented mobile, in-stream loads of approximately 200 kg of mercury in single wet seasons (Reuter et al., 1996). For perspective, a single gram of mercury has been found to be sufficient to contaminate the typical midwestern lake (Watras et al., 1994). The majority of mine-related mercury from the Davis Creek sub-drainage is currently intercepted by the dam at Davis Creek Reservoir, though mercury from other similar mercury mine regions remains available for downstream transport. Follow-up studies by the Central Valley Regional Water Quality Control Board and Slotton et al. are underway to determine (1) whether the source(s) of the mercury are localized to mines and (2) to determine the spatial trends in in situ bioavailability of mercury throughout the watershed.

Also in 1995, a comprehensive synoptic study was undertaken in the small Marsh Creek watershed of Contra Costa County (Slotton et al., 1996). This research was conducted during a period of steady high flow, immediately following a series of large storms, to identify and quantify mercury sources and local aquatic bioavailability. All significant tributaries were sampled. The small drainage was found to export 10-20 grams of mercury per day, with greater amounts during actual storm events. Mass balance calculations indicated that about 95% of the entire watershed's mercury load originated from the Mount Diablo mining area; about 93% of this was from a relatively small patch of exposed mine tailings. A generalized source of mercury from the elevated-mercury natural terrain was not indicated by the data, despite the fact that the great majority of the watershed's flow and suspended solids load emanated from non-mining regions. Most of the mercury exported from the mine workings was found to initially leave the site in dissolved form, highly mobile and potentially more easily methylated by bacteria than cinnabar particles. Bioaccumulation studies indicated that aquatic organisms immediately below the mine tailings had the highest tissue concentrations in the watershed. Even small invertebrates contained up to 60 times the 0.5 ppm health guideline concentration of mercury for edible fish. Body burdens fell with increasing distance from the mining area, but were significantly elevated above upstream, control levels for the 10 miles downstream to Marsh Creek Reservoir, where they were also significantly elevated.

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### Coal-Fired Power Plants

Coal is known to contain mercury as a result of testing done upon the flue gas emitted from power plant stacks. The quantity released by burning coal is estimated to be on the order of 3,000 tons per year globally, about the same amount released through all industrial processes (Joensuu, 1971). The concentration of mercury in coal varies from as low as 70 ng/g up to 22,800 ng/g (ppb). During the burning of coal, mercury is initially decomposed to elemental mercury and then, as the flue gas cools and exits the plant, the majority of the mercury is quickly oxidized, probably catalytically due to

the presence of other metals in the gas, to its water-soluble, ionic form,  $\text{Hg}^{+2}$ .

### Gasoline and Oil Combustion

Crude petroleum is known to contain small but measurable amounts of mercury. A study performed on the mass of metals in crude oils from 32 different sources stored in the nation's Strategic Petroleum Reserves (SPR) in salt domes in Oklahoma has determined that the average amount of mercury in petroleum is 0.41 ppm (Shur and Stepp, 1993). The standard deviation for this average was a rather large (0.90 ppm) with one crude oil (Arabian) containing 5.2 ppm mercury. Another study of metals performed on petroleum found a range of mercury concentration from 0.03 to 0.1 ppm (Speight, 1991). Both of these studies were performed using older mercury analysis methods with method detection limits of approximately 0.11 ppm. However, these studies also indicate minimum mercury concentrations in crude oil.

Approximately 16 to 18 million barrels (672 to 756 million gallons) of crude oil are consumed daily in the United States. At an average concentration of 0.41 ppm mercury and an average density for crude oil of 6.9 lbs per gallon, the minimum total amount of mercury vaporized daily is therefore 1,901 lbs. This value represents an annual discharge of 347 tons of mercury nationwide, assuming that all of the oil is combusted. Certainly the greatest proportion of the petroleum used in the United States is burned in vehicles. It is unclear whether the mercury present in crude oil is vaporized during the refining process or whether it remains in the refined petroleum. Because of the very large volumes of oil consumed, even a small concentration of mercury clearly represents a major source of atmospheric deposition of mercury. More work with the more sensitive analytical methods developed in the past few years should be performed to confirm these numbers.

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### Smelting

The smelting of ores to yield pure metals is thought to release some mercury into the atmosphere. Most metal ores are thought to have higher concentrations of mercury than coal, although the volumes of ore that are smelted each year pale in comparison with the volume of coal burned for power generation.

### Chlor-Alkali Plants

Elemental mercury is employed as the electrode in the electrochemical production of chlorine gas and caustic soda (sodium hydroxide). Near most paper and pulp facilities which employ this technology to bleach the paper



product white, the sediment is contaminated with high concentrations of mercury.

#### Mildew Suppression, Laundry facilities

An infrequent and historical point source of mercury contamination has been the use of mercury compounds for mildew suppression by laundry facilities, which have a chronic problem with moisture and bacterial growth (Sills, 1992). This contamination source type should no longer be a problem. The use of mercury as a fungicide in interior latex paints has been similarly banned by the US EPA.

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#### Sewage Treatment

Sewage treatment represents the focal point of today's urban industrial, commercial, and domestic liquid waste streams. The secondary treatment of sewage involves dewatering, which necessarily concentrates the solids and all non-volatile contaminants, but does little to treat or remove inorganic dissolved contaminants. Mercury is commonly found in urban sewage through point source discharges from dental offices and industrial manufacturing processes such as battery fabrication. As the sewage is dewatered and the solids concentrated, mercury can be either sequestered by the organic humus of sludge or, if the sludge is caked and dried, can be released to the atmosphere in the drying process.

If the sludge has been dried, the fate of the sludge itself then dictates the extent of mercury contamination. Commonly, the dried product is incinerated or spread upon tree farms as a fertilizer and organic material. Sewage sludge incineration probably accounts for no more than 3,000 kg/y in mercury emissions (EPA, 1990). The distribution of sludge in this fashion also spreads concentrated mercury over a large area where it is either taken up in the biomass or contributes to surface water runoff and consequently downstream contamination.

Difficulties can arise when dissolved inorganic contaminants are not removed from treated waste water prior to its reintroduction to receiving sewage. In Michigan's upper peninsula, the sediments and fish of 900-acre Deer Lake near Ishpeming were found in 1981 to be severely contaminated with mercury as a result of releases from the Ishpeming waste water treatment plant and combined storm sewer overflows (Sills, 1992). The upstream discharge that contaminated the sewage releases was from the laboratories of an iron ore mining company.

#### Mercury dumping from naval vessels

The US Navy has surfaced as a major source of near-shore marine mercury pollution because of the use of mercury as ballast in its subsurface vessel fleet. During inter-ship ballast transfer operations, elemental mercury is

occasionally spilled into marine waters, resulting in contamination of both sediment and water. This could be a significant point source of mercury directly within the Estuary.

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## Influences upon Mercury Pollution

### pH

The pH of inland surface waters has been found to dramatically affect the amount of mercury taken up by biota (Gilmour and Henry, 1991). Specifically, mercury in fish tissue is present predominantly as methyl mercury, so changes in the biogeochemistry of this compound of mercury may account for any increase in bioaccumulation. It has been determined that inorganic mercury binds to organic matter more strongly as the pH declines (Schindler et al., 1980), thus decreasing mercury's solubility. Conversely, in sediments a lower pH may increase the solubility of HgS (Ramal et al., 1995). Alkalinity and pH affect the biogeochemistry of mercury in numerous ways, including the binding capacity of the various species, the rate of methyl mercury production, and even the uptake efficiency of methyl mercury by aquatic organisms (Cope et al., 1990; Slotton 1991). The most important result of these combined effects is that methyl mercury is produced, transported, and accumulated by aquatic organisms significantly more efficiently at low alkalinity and pH; i.e., conditions to the acidic side of neutrality ( $< \text{pH } 7$ ) (Winfrey and Rudd, 1990). Because of this, many thousands of lakes in north central and north eastern United States, central and eastern Canada, and northern Europe can and do, develop mercury accumulations in edible fish well above health guidelines, from global atmospheric deposition alone and with no local point sources. In California, the naturally moderate to high alkalinity of surface waters maintains the pH at levels typically well above acidic conditions. This is very fortunate, in light of the bulk mercury contamination that supplements global loads in many parts of the Estuary watershed. Under prevailing conditions of high alkalinity and above neutral pH, even grossly contaminated water bodies such as Clear Lake frequently do not demonstrate edible fish mercury levels dramatically higher than those from relatively unpolluted, but acidic, waters. With hypothetical lower levels of alkalinity and pH, surface waters with bulk mercury contamination (i.e., much of the San Francisco Estuary watershed) could be expected to develop fish mercury accumulations far above those seen today.

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### Salinity

Salinity has been statistically linked to dissolved mercury concentrations in an inverse relationship, suggesting that local runoff may be an important source of dissolved mercury in the South Bay. As runoff increases and salinity decreases, the concentration of dissolved mercury increased (SFEI, 1993). Increasing salinity has also been associated with a decline in the rate

of mercury methylation and in equilibrium methyl mercury concentrations (Compeau and Bartha, 1984).

#### Sulfate concentration

The microbial methylation of mercury is thought to proceed through the metabolic action of sulfur-reducing bacteria (SRB) in anoxic environments (Gilmour and Henry, 1991). The concentration of sulfate in marine waters is approximately 28 mM, which is considerably higher than freshwater sulfur concentrations. In freshwater systems, it is clear that an increase in sulfur concentration increases sediment sulfate-reduction rates (Rudd et al., 1986). However, there appears to be a window of sulfate concentration that promotes the highest mercury methylation rate. Optimum mercury methylation by SRB in sediments is at 200-500 mM. Above this range, the formation of sulfide appears to inhibit methylation. At the same time, the presence of other sulfide-forming metals, such as iron, may affect the equilibrium between sulfate and sulfide in the pore water of the system.

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#### Percent Fines

In aquatic sediments, mercury and other heavy metal contamination is most strongly correlated with the proportion of fine particles. This is particularly the case when the heavy metal load entering the system is largely in a very diffuse, molecular form, such as in atmospheric deposition, mine leakage or dissolved metals, and direct introduction to the environment of liquid or vaporized elemental mercury. Fine sediment particles contain a disproportionate amount of surface area and adsorption sites, and thus tend to accumulate far greater concentrations of diffuse heavy metals than do larger sediment particles such as sand and gravel. In local research at a Sierra Nevada foothill reservoir, bottom sediment concentrations of mercury, as well as copper, zinc, and cadmium, were found to increase exponentially at average sediment grain sizes of less than 24 micrometers (Slotton et al., 1994; Slotton and Reuter, 1995). In addition to largely determining the concentration of mercury in the sediments, sediment particle size also affects the diffusion of oxygen, minerals, and ions which therefore affects bacterial activity and the production of methyl mercury.

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#### Aerobic and Anaerobic Microenvironments

Each transformation of mercury from one valence state or one species to another takes place in specific microenvironmental compartments (Figure 1). At the aerobic/anaerobic boundary in sediment, which is the limiting depth for oxygen penetration into the sediment, there is a redox potential discontinuity (RPD). In the oxygen-rich environment of the upper sediment, the electrochemical potential is oxidizing, thus favoring oxygen metabolism and the ionized (soluble) states of metals (e.g.,  $\text{Hg}^{+2}$ ). Conversely, the oxygen-poor lower sediment exhibits a reducing

electrochemical potential that favors sulfur metabolism by sulfur reducing bacteria (SRBs). Two products of microbial sulfur metabolism are HgS (which is highly insoluble) and CH<sub>3</sub>Hg (which is the form of mercury most commonly found in tissue), when mercury is present in the sediment.

Where the water itself becomes anaerobic, methyl mercury production can increase dramatically and transfer rapidly and efficiently into the aquatic food web. Research at Davis Creek Reservoir in the Berryessa/Clear Lake historic mercury mining district found that the seasonally anoxic bottom waters of the reservoir provided a large annual pulse of methyl mercury to the reservoir food chain (Slotton 1991; Slotton et al. 1995a). Piscivorous largemouth bass in this system accumulated fillet mercury at concentration up to 10 times the 0.5 ppm health guideline.

Both the proportions of total and dissolved mercury concentrations in the water and their absolute values can change due to shifts in the electrochemical potential of the sediment and/or water. Hydrological impacts such as the deposition of abnormally high volumes of silt, scouring, growth of algae or other oxygen-scavenging flora can dramatically alter mercury biogeochemistry and, consequently, the production, transformation, and concentration of the different mercury species.

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### Mercury's Health Effects

As mercury cycles through various forms and media, its bioavailability and toxicity change through both biological and chemical reactions. Because mercury is found throughout the environment, everyone is exposed to low levels of mercury. Dental amalgams are themselves about half mercury and it is known that mercury in the breath of persons with mercury amalgam fillings is higher than those without. However, the health effects of dental amalgams is unknown. Mercury emanating from amalgams is, at least initially, entirely in inorganic forms, which are not readily accumulated by the body as compared to methyl mercury. Other principal means of human mercury exposure are through the use of skin care products and, particularly, through the consumption of methyl mercury contaminated fish. The three pathways of exposure are then inhalation, absorption, and ingestion.

The principal target of long-term exposure to low levels of metallic and organic mercury is the nervous system. The principal target of long-term exposure to low levels of inorganic mercury appears to be the kidneys (USDHHS, 1992). Short-term exposure to higher levels of any form of mercury can result in damage to the brain, kidneys, and fetuses. Mercury has not been found to be carcinogenic. However, there are significant differences in the toxicity of the major forms of mercury. Mercury has



been found to have a deleterious effect upon a wide range of systems including the respiratory, cardiovascular, hematologic, immune, and reproductive systems.

The bioaccumulation of mercury in various forms contributes in large measure to its toxicity. [Table 3](#) lists concentrations that have been documented in a typical freshwater lake food web.

The common markers for human mercury exposure are blood, hair, and urine mercury concentrations. The mean total mercury levels in whole blood and urine of the general human population are approximately 8 µg/L and 4 µg/L, respectively (WHO, 1990). This background level of mercury can vary considerably, however, with the incidence of dental mercury amalgams and the consumption of fish. Individuals whose diet consists of large amounts of fish can have blood methyl mercury levels as high as 200 µg/L with a daily intake of 200 µg of mercury.

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#### Data Trends in the Regional Monitoring Program

One of the apparently striking conclusions that can be drawn from the data is the lack of bioaccumulation of mercury in the bivalves transplanted for periods of 90 to 100 days to various locations in the Bay for any of the three years of the RMP. Bivalves generally do not accumulate dramatically elevated mercury concentrations, and the mercury they do contain (primarily inorganic mercury) is transferred to consumers far less efficiently than is methyl mercury. The food chain pathway of methyl mercury through larger, piscivorous fish is typically of primary importance in consumption-related toxicity to higher order consumers, including humans. In recent research at EPA mercury Superfund site Clear Lake California, sedentary, wild *Corbicula* clams collected from numerous sites around the lake demonstrated consistently low mercury levels and only very small variations in concentration, even across sediment inorganic mercury concentrations that varied by over two orders of magnitude (D.G. Slotton, unpublished data). The pathways of methyl mercury through larger, piscivorous fish appear to be of prime importance in consumption-related toxicity to higher order consumers, including humans. Mercury bioaccumulation in larger piscivorous fish has resulted in tissue concentrations 105 times higher than concentrations in adjacent water (PTI 1994). No piscivorous fish or any organism at the higher end of the food chain has been studied by the RMP for trace metal bioaccumulation. However, as part of the Bay Protection and Toxic Cleanup Program, a fish contamination study was conducted for the San Francisco Estuary (Taberski et al., 1992), and findings revealed tissue concentrations above levels of human health concern in several fish species analyzed.

There has been an appreciable correlation between sediment mercury concentrations and the percentage of fines in the sediment for each of the

three years. The greatest proportion of most metals, including mercury (Reimers and Krenkel, 1974), in marine environments is associated with particulates and specifically with the small size fractions of sediment (Schoellhamer, 1996). Local freshwater sediment research at Camanche Reservoir reported similar findings (Slotton et al., 1994, Slotton and Reuter, 1995).

It has been estimated that there is an optimum sulfate concentration for the methylation of mercury by SRB in sediments. Below 200-500 mM sulfate, mercury methylation (a by-product of metabolic sulfate reduction) is suboptimal and above this concentration, sulfide formation would inhibit methylation. This range is below the concentration of sulfate in marine waters, which are also highly buffered compared to freshwaters. In any marine environment, there is still a question as to whether sediment mercury is the source of methyl mercury that can be bioaccumulated, in part because it is probable that the reactions controlling the methylation of mercury in sediment and water are different (Gilmour and Henry, 1991). In marine waters, vigorous sulfide formation probably inhibits the methylation of mercury.

Dissolved  $\text{Hg}^{+2}$  concentrations appear to be controlled by chelation reactions rather than by dissolution in aerobic waters, while precipitation may control mercury solubility in anaerobic sediments (Nelson and Campbell, 1991).

In some years, variations in mercury concentrations in sediment were correlated with total organic carbon (TOC) and redox potential (Eh), and in some years they were not. As a result, there do not appear to be seasonal correlations with variations in mercury concentrations. Redox conditions can clearly alter the proportion of soluble to insoluble mercury, and so ultimately may alter the amounts of total mercury that *lay in the sediment. It is likely, however, that variations in TOC and redox conditions are variables that are impacted by Bay influences other than those which impact mercury concentrations.*

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### Potential Control Measures

Control of anthropogenic sources of mercury pollution involves both point source and area source control. Point source control is often wielded through mechanical or chemical means, while area control is often executed by administrative means. It is always true that it is easier to recover mercury at the source, where it is more concentrated, than it is to recover it after it has dispersed in different forms and species throughout the environment. The continuous cycling of mercury through its many different forms also dramatically complicates the job of devising effective technologies to remove mercury from the environment.

## Source Control

Investigators of point sources of mercury pollution have been very effective in isolating sources in the environment. Extremely sensitive analytical instrumentation is now available to monitor total mercury emissions or to analyze mercury's different forms down to the picogram level.

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## Remediation of Abandoned Mines

As a result of the Coast Range mercury deposits, soils in several locations throughout the San Francisco Estuary watershed are naturally high in mercury, and a great number of abandoned mines exist that, to this day, release substantial amounts of mercury into surface waters as rain falls onto mine tailings. When high sulfur ore is exposed to the combination of water and oxygen, sulfuric acid is produced. The resulting acidic drainage from man-made tailings piles and mine workings dissolves mercury and transports the dissolved metal, as well as mercury-bearing particles, into creek channels. Ongoing research in the Marsh Creek watershed has found the source of downstream mercury to be highly localized to upstream mine tailings, as opposed to a generalized, regional source (Slotton et al., 1996). This work has identified potentially effective control and remediation strategies, and has developed site-specific biological and chemical markers which will be used to guide future remediation efforts and quantify their effectiveness. On a larger areal scale, the Cache Creek project is currently underway to evaluate potential mercury control strategies in that important drainage. Both of these projects may serve as models for control and remediation of abandoned mines throughout the San Francisco Estuary watershed.

In contrast, the gold-mining mercury in the Sierra Nevada has been found to be largely dispersed and unsuitable for point-source cleanup approaches (Slotton et al., 1995b). However, a considerable amount of mercury is extracted from Sierran rivers in the course of ongoing placer gold mining. A buy-back program is currently being developed by the Central Valley Regional Water Quality Control Board to encourage the collection and removal of this mercury.

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## Waste Stream Capture

Dental offices contribute a fair portion of municipal mercury waste. Mercury constitutes almost 50% of the material in dental amalgam tooth fillings. When this material is removed or when a new amalgam is fitted, some particulate-associated mercury is invariably released into waste water. Entrapment of this particulate mercury waste stream could appreciably reduce the mass of mercury entering municipal waste water.



It is estimated that each dentist in the US uses an average over 1 kg of amalgam annually (Goering et al., 1992). It is not yet clear whether the highly bound, inorganic mercury of dental amalgams is appreciably available for methylation and incorporation into the food web. Indeed, a very important future area of research involves the determination of the short and long term dissolution and methylation potential of all the major inorganic forms of mercury, including cinnabar, elemental mercury (quicksilver), and dental amalgams.

A good deal of the anthropogenic mercury released world-wide is dissolved in waste water streams. In many industries that use large amounts of mercury, dissolved mercury is routinely captured from waste streams through a variety of technologies utilizing either the ionic nature of most dissolved mercury or the unique and consistent size of dissolved mercury ions. The installation of such traps and filters can be a very effective measure at preventing mercury releases from low volume emitters particularly, because the capacity of such systems can be engineered to require regular but infrequent changeouts.

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### Flue Gas Scrubbing

Scrubbers are added as air emission control devices to a variety of incinerators to remove toxic or hazardous compounds, most commonly the sulfates. Mercury is present in some concentration in virtually all incineration processes. Commonly, the emitted gas is scrubbed by an aqueous counter-current to both cool the gas and to solubilize compounds in the gas. Other common scrubbing technologies are scrubber/fabric filters, lime injection directly into the combustion chamber, and electrostatic precipitators. At the high temperatures used in most incinerators (or in any process with a temperature greater than 900° C), all forms of mercury are decomposed to reduced elemental mercury,  $Hg^0$ . As the temperature of flue gas quickly drops,  $Hg^0$  is oxidized to soluble  $Hg^{+2}$  (probably in part due to the catalytic contributions of other trace metals in the gas) and thus most mercury scrubbed from incinerator gas will dissolve in the cooling water and be transported to the settling ponds.

If flue gas is not scrubbed, mercury can be conveyed both far (as elemental mercury by the wind) and near (as  $Hg^{+2}$  dissolved in atmospheric moisture and deposited as rain). In municipal waste incineration, most mercury is released as the volatile mercuric chloride,  $HgCl_2$  (Braun and Gerig, 1991).

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### Area Control

The mercury that evaporates from dental amalgams and is inhaled can have a surprisingly large impact upon the human bodypüds mercury



burden, particularly for inorganic mercury (Goering et al., 1992). However, in many parts of the US and the world, ingestion of fish and other seafood contaminated with methyl mercury is an additional and often dominant source of mercury exposure. Administrative controls to limit the exposure of humans to mercury include warning limits on the amount of fish consumed in a given period.

When sediments are determined to be contaminated with mercury, capping is often a useful measure to limit exposure to the environment. Capping naturally produces an anoxic environment in the underlayment which, over time, can promote the formation of insoluble HgS if sufficient amounts of sulfate are present. Capping also eliminates the potentially harmful effects associated with some forms of dredging to remove contaminated sediments. Dredging can mix sediments with relatively high concentrations of mercury where it can disperse into the water column, aerate sediments and thus promote transformation of mercury to oxidized, soluble Hg<sup>+2</sup>, and result in the frequently more onerous issue of remediating or disposing of highly contaminated dredge spoils on-land.

Some forms of dredging have been deliberately engineered to minimize the hazards outlined above. The watertight clamshell is one, and vacuum suction dredging is another. These technologies seek to recover only contaminated sediment without mixing with the water column and without further contaminating clean, underlying sediment.

Finally, mercury-contaminated soil and sediment can be washed with any of a variety of surfactants, solvents, or redox reagents to concentrate and/or chemically alter the mercury. The mercury can either be recovered as the element or condensed as the vapor to prevent merely exchanging a problem in one medium for one in another.

In the Estuary, mercury contamination is probably far too widespread for direct/physical areal control measures to be effective or economically feasible. However, significant opportunities may exist for effective point source remediation of important mercury discharges, which would otherwise continue to be transported into the Estuary.

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## References

Braun, H. and A. Gerig. 1991. Mercury Emission Monitoring on Municipal Waste Combustion, Second International Conference on Municipal Waste Combustion, Tampa, FL.

- Compeau, G.C. and R. Bartha. 1984. Sulfate-reducing bacteria: Principal methylators of mercury in anoxic estuarine sediment, *Appl. Environ. Microbiol.*, vol. 48, pp. 1203-7.
- Cope, W.G., J.G. Wiener, and R.G. Rada. 1990. Mercury accumulation in yellow perch in Wisconsin seepage lakes: Relation to lake characteristics. *Environ. Toxicol. Chem.* 9(7):931-940.
- CVRWQCB. 1987. Regional Mercury Assessment. Central Valley Regional Water Quality Control Board. March, 1987.
- EPA (Environmental Protection Agency). 1990. *Federal Register*, 55 (218), 47210-47283.
- Fitzgerald, W.F. 1986. Cycling of mercury between the atmosphere and oceans. In *The Role of Air-Sea Exchange in Geochemical Cycling* (P. Buat-Menard, Ed.), NATO Advanced Science Institutes Series, Reidel Publishing Co., Dordrecht, The Netherlands, pp. 363-408.
- Fitzgerald, W.F. and T.W. Clarkson. 1991. Mercury and monomethyl mercury: Present and future concerns. *Environ. Health Persp.* 96:159-166.
- Gill, G.A., and W.F. Fitzgerald. 1987. Mercury in surface waters of the open ocean. *Global Biogeochem. Cycles* 1:199-212.
- Gilmour, C.C. and E.A. Henry. 1991. Mercury methylation in aquatic systems affected by acid deposition, *Environmental Pollution*, Vol. 71, 131-169.
- Goering, P.L., W.D. Galloway, T.W. Clarkson, F.L. Lorscheider, M. Berlin, and A.S. Rowland. 1992. Toxicity assessment of mercury vapor from dental amalgams, *Fundam. Appl. Toxicol.*, Vol. 19, pp 319-329.
- Joensuu, O.I. 1971. Fossil fuels as a source of mercury pollution, *Science*, 172: pp 1027-8.
- Kim, J.P., and W.F. Fitzgerald. 1986. Sea-air partitioning of mercury in the equatorial pacific ocean. *Science* 231:1131-1133.
- Kurita, H. 1987. Mercury Contamination in Deer Lake Ecosystem, Master thesis. Michigan State University, Department of Fisheries and Wildlife.
- Nelson, W.O. and P.G.C. Campbell. 1991. The effects of acidification on the geochemistry of Al, Cd, Pb, and Hg in freshwater environments: A literature review, *Environ. Pollution*, Vol 71, pp. 2-4.
- Nriagu, J.O. and J.M. Pacyna. 1988. Quantitative assessment of worldwide contamination of air, water, and soils by trace metals. *Nature* 333:134-139.

PTI Environmental Services News. 1994. Mercury: The case for site-specific aquatic criteria, PTI Environmental Services News, March.

Ramal, P.S., J.W.M. Rudd, and R.E. Hecky. 1995. Methods for measuring specific rates of mercury methylation and degradation and their use in determining factors controlling net rates of mercury methylation, *Appl. Environ. Microbiol.*, vol. 51, pp. 110-114.

Reimers, R.S. and P.A. Krenkel. 1974. Kinetics of mercury adsorption and desorption in sediments, *J. Wat. Poll. Control Fed.*, vol 46, p. 352-365.

Reuter, J.E., D.G. Slotton, S.M. Ayers, and C.R. Goldman. 1996. Evaluation of McLaughlin Gold Mine Project in Yolo County as Related to Surface

Waters in the Davis Creek Watershed<sup>2</sup> July 1, 1995- June 30, 1996. Report for Yolo County. 213 pp. (Similar reports from 1987-1995).

Rudd, J.W.M., C. A. Kelly, V. St. Louis, R.H. Hesslein, A. Furutani, and M.H. Holoka. 1986. Microbial consumption of nitric and sulfuric acids in acidified north temperate lakes, *Limnol. Oceanogr.*, vol. 31, pp. 1267-80.

Schoellhamer, D.H. 1996. Time series of trace element concentrations calculated from time series of suspended solids concentrations and RMP water samples: Summary and Conclusions. In 1995 Annual Report, San Francisco Estuary Regional Monitoring Program for Trace Substances. San Francisco Estuary, Richmond, CA.

Schindler, D.W., R.H. Hesslein, R. Wagemann, and W.S. Broeker. 1980. Effects of acidification on mobilization of heavy metals and radionuclides from the sediment of a freshwater lake, *Can. J. Fish. Aquat. Sci.*, vol. 37, pp. 373-7.

SFEI. 1993 Annual Report, San Francisco Estuary Regional Monitoring Program for Trace Substances. San Francisco Estuary, Richmond, CA.

SFEI. 1994 Annual Report, San Francisco Estuary Regional Monitoring Program for Trace Substances. San Francisco Estuary, Richmond, CA.

Shur, J.Y. and A.K. Stepp, Quarterly Technical Report, July 1,- September 30, 1993. Strategic Petroleum Reserve Supporting Research. National Institute for Petroleum and Energy Research (Nov. 1993).

Sills, R.D., 1992. Mercury in Michigan's Environment: Causes and Extent of the Problem. Michigan Dept. of Natural Resources.

Slemr, F., W. Seiler, and G. Schuster. 1981. Latitudinal distribution of mercury over the atlantic ocean. *J. Geophys. Res.* 86:1159-1166.

Slotton, D.G. 1991. Mercury bioaccumulation in a newly impounded Northern California reservoir. Doctoral dissertation, University of California, Davis. 363 pp.

Slotton, D.G., J.E. Reuter, C.R. Goldman, R. Jepson, and W. Lick. 1994. Camanche Reservoir Bottom Sediment Study: Heavy metal distribution and resuspension characteristics. Final Report for the California State Water Resources Control Board, June 1994. 206 pp., plus appendices.

Slotton, D.G. and J.E. Reuter. 1995. Considerations of heavy metal bioavailability in intact and resuspended sediments of Camanche Reservoir, California, USA. *Marine and Freshwater Research*, 46:257-265.

Slotton, D.G., J.E. Reuter, and C.R. Goldman. 1995(a). Mercury uptake patterns of biota in a seasonally anoxic northern California reservoir. *Water, Air, and Soil Pollution*, 80:841-850.

Slotton, D.G., S.M. Ayers, J.E. Reuter, and C.R. Goldman. 1995(b). Gold mining impacts on food chain mercury in northwestern Sierra Nevada streams. Technical Completion Report for the University of California Water Resources Center, Project W-816, August 1995, 46 pp.

Slotton, D.G., S.M. Ayers, and J.E. Reuter. 1996. Marsh Creek Watershed 1995 Mercury Assessment Project, Final Report. Conducted for Contra Costa County, California. 66 pp.

Speight, James G. 1991. *The Chemistry and Technology of Petroleum*. (New York: Marcel Dekker, Inc.), 77.

Taberski, K.M. Carlin, and J. Lacy. 1992. San Francisco Bay pilot regional monitoring program 1991-1992. Summary progress report. SF Bay

Regional Water Quality Control Board, Oakland, CA.

USDHHS (US Dept of Health and Human Services). Draft-- Toxicological Profile for Mercury, Agency for Toxic Substances and Disease Registry, p. 2 (October 1992)

Volland, C.S. 1991. Mercury Emissions from Municipal Solid Waste Combustion. Presentation at the 84th Annual Air and Waste Management Association Meeting and Exhibition, Vancouver, BC, 91-35.1

Watras, C.J. et al. 1994. In *Mercury Pollution: Integration and Synthesis* (C.J. Watras and J. Huckabee, eds.). Lewis Pub., Boca Raton FL, 153-180.



Watson, W.D. 1979. Economic considerations in controlling mercury pollution. In *The Biogeochemistry of Mercury in the Environment* (J. O. Nriagu, Ed.), Elsevier-North Holland, Amsterdam, pp. 42-77.

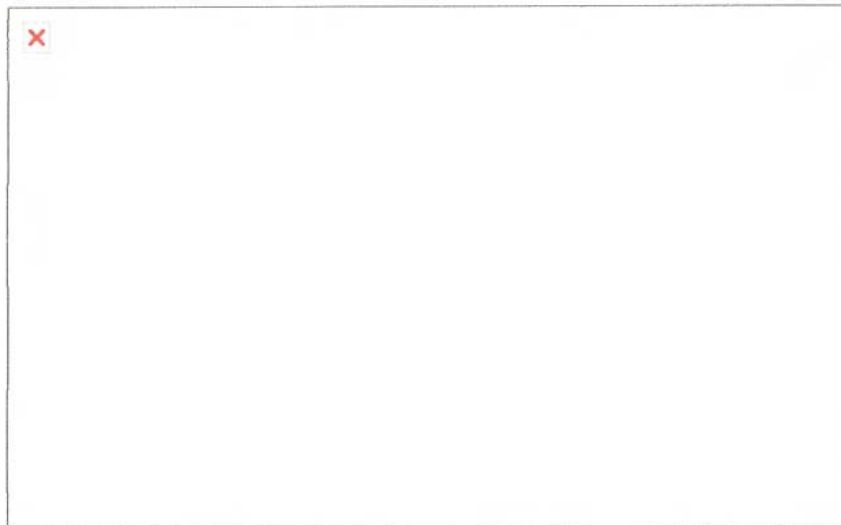
WHO (World Health Organization). 1990. *Methyl Mercury*, International Program on Chemical Safety, vol. 101, Geneva, Switzerland.

Winfrey, M.R. and J.W.M. Rudd. 1990. Environmental factors affecting the formation of methyl mercury in low pH lakes. *Environ. Toxicol. Chem.* 9(7):853-869.

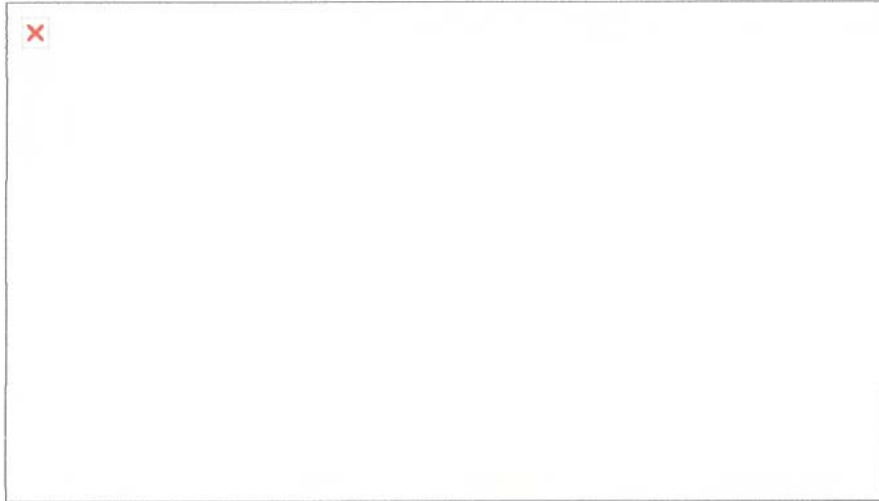
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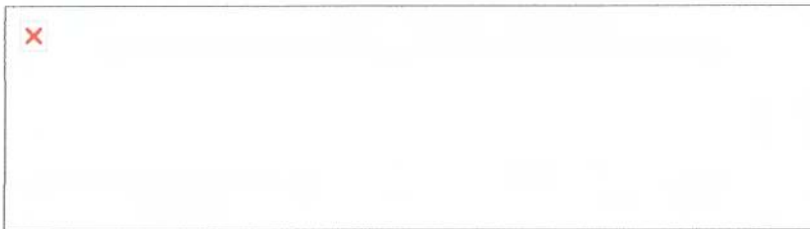
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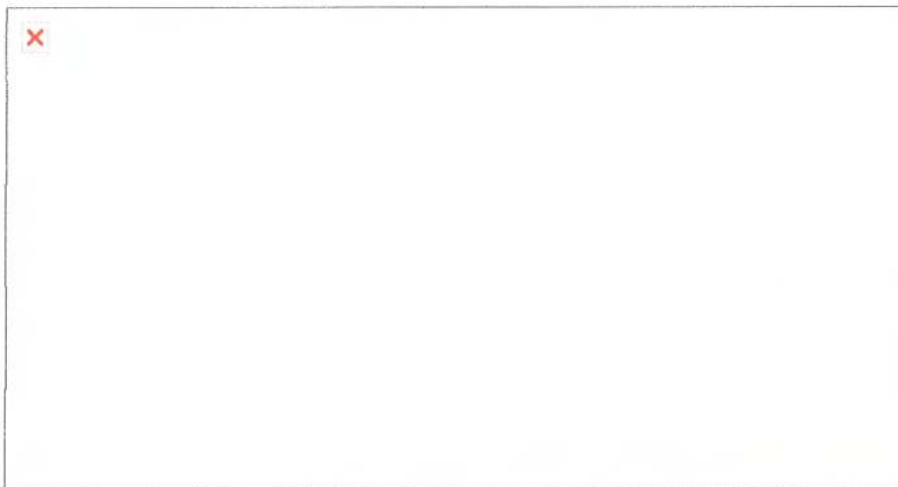
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Exhibit - 4

## COUNTY OF EL DORADO

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(530) 622-3645 Fax

**SUZANNE ALLEN DE SANCHEZ**  
Clerk of the Board



## BOARD OF SUPERVISORS

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District V

May 3, 2011

California Department of Fish and Game  
Attn: Mark Stopher, Environmental Program Manager  
601 Locust Street  
Redding, CA 96001

Re: Suction Dredging Draft Subsequent Environmental Impact Report

Dear Mr. Stopher:

El Dorado County has a rich history of gold mining and has provided a viable and prosperous vocation for hundreds of thousands of miners, producing tens of millions of ounces of gold since its discovery in 1848. With the passage of SB 670 in August 2009 all suction dredging operations ceased in the State of California, further depressing the local economy. Equally concerning, is the California Department of Fish and Game (DFG) and their proposed rules and regulations with the recent release of the Draft Subsequent Environmental Impact Report (DSEIR) on suction dredging. The proposed rules and regulations will adversely affect thousands of jobs and diminish the value of the mineral estate of thousands of private property owners who hold title to land in California.

Clearly ignored in the DSEIR is the macroscopic effect of naturally occurring processes to our rivers and streams versus the microscopic effect of the few thousand miners who extract gold from these waterways (SNF Cooley 1995). It is well documented that the dredging industry has little effect on our waterways. In fact, while producing a culturally important and significant benefit to our economy, they contribute significantly to the cleaning of waste and toxic metals from the bottom of the river beds cost free to the taxpayers; which is an important fact to be considered.

One of the newly proposed regulations would prohibit dredging within three feet of the wetted edge of a stream and would impact mining on nearly every private or public small stream in California. This proposal affects a "Takings" of the only economically viable means to extract gold (suction dredging) from the mineral estate on private gold bearing properties containing a small stream. There is nothing in the DSEIR to substantiate the need for the addition of this rule and is a violation of our Constitution and property rights.

More specific to El Dorado County, the new regulations prohibit dredging in Weber Creek and Rock Creek, which have continually produced significant amounts of gold on private property and federal mining claims.



California Department of Fish and Game  
May 3, 2011  
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The complete prohibition of small-scale mining on these historically productive streams is not acceptable or scientifically substantiated in the DSEIR.

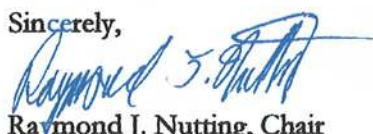
Another issue of great concern to those in El Dorado County is the proposed rule changes affecting mining on the Cosumnes River Watershed. Changes to seasonal restrictions already in place since 1994, should not be imposed without irrefutable, science based, peer-review studies supporting such changes. These proposed changes negatively impact the economic viability of many small-scale mining businesses on private property as well as Federal Mining Claims. The regulation, which only allows work between September 1 through January 31 annually, is effectively a complete prohibition of mining on affected streams. Mining becomes progressively more difficult due to extreme low water flows that occur by early fall, on the streams zoned E, that render equipment virtually inoperative. As well, rapidly cooling seasonal temperatures make it physically impossible to work in a wet environment while in the upper reaches of the Cosumnes River i.e.; Camp Creek and Middle Fork Cosumnes near Pi Pi Valley. Also, valuable equipment and lives will be put in peril by the ever-present threat of flash floods which occur often in the fall at these higher elevation streams. This questionable, proposed new zoning, which imposes a fall and winter "season of operation", is not acceptable, justified or practical. This unwarranted rule change is downright hazardous to physical lives as well as the economic well-being of the productive miners in El Dorado County.

Until the passage of SB 670, hundreds of ounces of gold were mined annually by professional dredgers from the South Fork American River (River) in El Dorado County. In 1994, DFG reduced the dredging from "Year Round" to a June 1 through October 15 annual season despite the repeated requests to provide a justifiable reason for this closure. There is a misconception that suction dredging has a negative effect on the aquatic life in the River, but this has never been proven. In fact, the uneven spiked releases from Chili Bar Dam between 250 Cubic Feet per Second (CFS) and 4,000 CFS results in a fluctuation on the River, and creates a severely compromised biological zone of over four feet in elevation, which has a severe negative affect on the aquatic and riparian life. Given this fact and the knowledge there are hundreds of thousands of additional recreational users, it is without merit that the dredging community be held responsible for negative effects to our River corridor and its habitats. Unless the DFG and the new DSEIR can produce objective, fact based reasons for seasonal or nozzle size restrictions of suction dredging on this environmentally compromised river, we recommend professional and recreational miners be allowed to resume their valuable work year round. Unjustified, arbitrary regulations are not acceptable.

As it stands, the DFG's currently proposed new rules and regulations appear to ignore scientific facts and documented independent peer reviewed studies that have been recognized and noted in the present and past EIR processes. The El Dorado County Board of Supervisors requests that all conclusions be objective and accurate and not based on conjecture, but reflect the actual scientific facts and peer reviewed studies.

Thank you for your consideration.

Sincerely,



Raymond J. Nutting, Chair  
El Dorado County Board of Supervisors

Exhibit 5

# SIERRA COUNTY

Board of Supervisors  
P.O. Drawer D  
Downieville, California 95936  
Telephone (530) 289-3295  
Fax (530) 289-2830



3 May 2011

Mr. Mark Stopher  
Environmental Program Manager  
California Department of Fish and Game  
601 Locust Sheet  
Redding, CA 96001

**Subject: Draft Subsequent Environmental Impact Report**

Dear Mr. Stopher:

The Sierra County Board of Supervisors has completed its review of the proposed "Draft Subsequent Environmental Impact Report (SEIR) for the Suction Dredge Permitting Program" in California. This review included two (2) publicly noticed Board of Supervisor meetings and one (1) publicly noticed town hall meeting within the community of Downieville.

First and foremost, the Board of Supervisors expresses its deepest concerns over the public outreach program and effort undertaken by the Department of Fish and Game to understand the impacts of the December 2006 court order; the impacts of implementing the ban on suction dredging brought about in SB 670 effective August 6, 2009; and, the impacts that will be caused by implementation of the proposed suction dredge rules that serve to amend the 1994 regulations and impose further restrictions on suction dredging operations. The public meetings conducted by the Department of Fish and Game were held in urban regions which are far-removed from the counties and communities that will receive the burden and impacts of the proposed regulations. Rather than Fresno or Sacramento, conducting a public meeting in Downieville or Quincy, located in the heart of the motherlode and possessing a deep and rich cultural history based in the gold mining industry, would have produced a more accurate and realistic understanding of the impacts that the proposed regulations will have on the population and economy of the region.

The Board of Supervisors offers the following comments with respect to the draft subsequent environmental impact report:

1. We find the dredging seasons proposed for most Sierra County waterways as draconian and lacking scientific rationale. The approach proposed in the regulations fails to provide specific scientific evidence that resulted in the seasonal classification of streams in Sierra County, and this broad-brushed approach appears

to be based on a general "species restriction" that implements a one-size-fits-all approach. This fails on its face to take into consideration the specific habitats, local environmental conditions, and other factors. The SEIR provides only superficial evidence and fails to provide the scientific evidence and the burden of proof to support the proposed classification of streams. The premise is flawed at best. As just one example, several streams are classified by elevation, void of any scientific data or findings of yellow legged frog existence and the resultant dredging season is proposed as September 1 through January 31. Now consider the high elevations, extreme weather conditions, access restrictions, and the time of year and you have the perfect recipe for a de facto closing of most of the tributaries involved.

2. We question the need for capping the number of statewide permits at 4,000. This is an arbitrary number and the document fails to show a legitimate justification for such a limit. This decision is not based on scientific findings and is an arbitrary and capricious decision. We would also suggest that such a limit could effectively impact this industry by allowing non-mining interests to purchase and hold permits with no intent of ever dredging. This arbitrary limit appears to be in direct contradiction to the rights afforded under federal law for mineral discovery and development. The number of permits issued in the 1980's and 1990's was over 10,000 from information we have obtained and this severely reduced number is arbitrary at best and creates significant social and economic impacts to the County and region.
3. We question the need for many of the specific restrictions otherwise placed on the dredges and operations themselves (four inch intake nozzles, three foot dredging rules, screen size restrictions, winching permits, gas cans). In each instance, we question the overall need and science behind the decisions made. As just one example, the 3/32 inch screen on intakes is unreasonable and there is no evidence presented in the SEIR of proximate cause that suction dredging has ever entrained fish or aquatic life and the diameter of the hole would constantly clog with debris rendering the small suction dredge inefficient and inoperable.
4. The Forest Service-Pacific Southwest Region under the signature of the Regional Forester by letter dated December 4, 2009 to the Department of Fish and Game responded to a "request for comment" issued by the Department on October 26, 2009 (Notice of Preparation) and expressed opinions as to the impacts of suction dredging on the Tahoe National Forest. With all due respect to the Regional Forester, we strongly challenge the information he has provided concluding that State Highway 49 in Sierra County has reached "full parking capacity". There is no evidence to support this conclusion and for the Department to rely upon this "opinion" is inappropriate. The National Forest is currently engaged in a corridor management analysis and NEPA document to manage corridor occupancy but to suggest "full capacity" has been reached is inaccurate. The Tahoe National Forest is an agency that no longer has staff assigned on a daily basis within western Sierra County and the information they provided only highlights their misunderstanding of reality in western Sierra County. Further, the suggestion is also made that the campsite use by dredging interests causes an impact to recreational camping. This is categorically false as campsites used by dredging interests are authorized under



individual permit issued by the Tahoe National Forest for locations outside of recognized campgrounds. These dredgers are prohibited from occupying a campsite in an organized campground for more than 14 days and by virtue of the Forest Service permit are therefore authorized to camp. There is no impact to recreation from these individual campsites authorized by the Forest Service otherwise, why would the agency issue them in the first place?

5. The SEIR fails to identify that the Department or its consultants have ever conducted or participated in the conducting/monitoring of dredging operations to understand and quantify the potential impacts of dredging. This creates a significant credibility issue for any stated findings or conclusions.
6. The proposed "three foot rule" prohibits dredging three feet from either bank of a stream and for those jurisdictions that possess numerous small streams that have historically been allowed to be dredged, this new rule is a de facto closure of all small streams less than six (6) feet across. There is no scientific data to support this regulation and in the absence of such data, the conclusion and proposed regulation is arbitrary.
7. The SEIR fails to provide any accurate understanding of impacts to the County social and economic structure. Dredging is not simply a recreational pursuit. While recreational mining is a viable recreational pursuit similar to rafting, off-highway and over-the-snow access, fishing, and so forth, it is also a very viable component of the County economy. Dredging is a livelihood in Sierra County and a sole source of income for many individuals and families. It is a valid resource industry that not only represents the culture and heritage of the gold country region but is a significant economic indicator in the County. In Sierra County alone, there are over 1500 mining claims on the unsecured property assessment roll valued at 9.6 million dollars and contributing a significant property tax payment to the County. This condition coupled with the commerce created by these claims (local purchases, fuel purchases, food and restaurant use, purchases of supplies, perishables, and other needs, medical attention, school children attending schools, home owners and/or renters, volunteer firemen, and so many other interactions) provides that the use is a significant socio-economic contributor to a community and an economy that has experienced a downturn in the wake of a decimated timber industry, and is trying to survive. The potential loss or reduction in recording fees, in transient occupancy tax, in mineral claim sales and development, on taxable property, and in local commerce is not accurately stated nor shown anywhere in the SEIR. The SEIR should show this economic contribution to the local economy. It fails to recognize this condition and belittles the significance of the economic contribution that suction dredging provides to the State of California, to the County of Sierra, and to the local economy.
8. Site visits directed under the Fish and Game Code require the interaction of Departmental Game Wardens for routine, follow-up, and enforcement visits to a dredging site. We have a very fundamental concern that the expectation for existing wardens to increase their respective activities as a result of the regulations outlined in the SEIR to include multiple site visits to a dredging site is both unrealistic and far exceeds the resources of the limited number of Wardens in the field today. The County embraces a process that is administered through site visits from Departmental Game Wardens as this assures flexibility, adaptability, and



**recognition of a wide range of local conditions adapted to a wide range of dredging practices; but to legislate the proposed set of regulations as a one-size-fits-all process and to remove the flexibility and interpretation that a Warden can make in the field is self-defeating.**

**Sierra County is a County of 3,200 persons, one of just three California Counties that has lost population as counted in the recent 2010 census. When one takes a look at the overall environment health of the County and human impact on that environment, it is one of those rare special places in California that has had minimal impact by human behavior. With a great decrease in what was Sierra County's traditional economies of logging and mining over the last thirty years, our local economy struggles just to survive with the limited tourism industry that remains along with an agricultural economy on its eastern side.**

**There is little doubt to this Board that all human behavior has some impact on the environment. When we look at that minimal interaction within the boundaries of Sierra County, your proposed restrictions to what was once a surviving industry (both professional and recreational), is frustrating to say the least. While Sierra County and her businesses will immeasurably be harmed by the implementation of these proposed restrictions (as it has been by the outright ban of dredging for the last 18 months), one need not look far to be frustrated by far bigger impacts to the environment, impacts that are left in place and left unchecked by California's over-reaching environmental protection laws. Whether it be a four lane transcontinental highway bisecting the Sierra, or any number of multi-story concrete dams harnessing public waterways and blocking the natural spawning fisheries, those impacts remain unchecked while a reactionary public policy "plays" with the relatively minor impacts of minimal suction dredging in one of California's most rural regions.**

**We would seek to have the Department look at the activity of suction dredging not in a perfect world, but the real world in which all Californians live. Using the standards that you propose for suction dredging, both for those wishing either to make a living from it or just wishing to enjoy the activity as a recreational hobby, we would be curious to know just how many other daily pursuits of Californians would be curtailed ....interstate highways, transcontinental aircraft, or the daily commute of the masses in the greater Los Angeles, San Diego, and San Francisco bay area.**

**Sincerely,**

**SIERRA COUNTY  
BOARD OF SUPERVISORS**

A handwritten signature in black ink, appearing to read "LEE ADAMS", with a checkmark at the end.

**LEE ADAMS  
CHAIRMAN OF THE BOARD**