Public Comment
Klamath River TMDL
Deadline: 7/21/10 by 12 noon

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JUL 16 2010
SWRCB EXECUTIVE

Katharine Carter
North Coast Regional Water Quality Control Board
5550 Skylane Blvd, Suite A
Santa Rosa, CA 95403

RE: Comments Klamath River Total Maximum Daily Loads and Action Plan Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments."

I am going to limit my comments on the Klamath River TMDL process to mining activities that will be adversely affected or eliminated by the TMDLs as written.

Water Board:
"The implementation plan proposes a **prohibition** on the discharge of excess sediment to address all sediment sources in the Klamath River basin not currently regulated through an existing permit or conditional waiver. The implementation plan also proposes a prohibition on the discharge of **waste** in and around known thermal refugia locations in the Klamath River in California to protect their function in mitigating adverse water quality conditions."

> **My Comment:** Regulations must be reasonable. Any regulation that is prohibitive is unreasonable. This paragraph also mentions "excess sediment". Material that is processed through a suction dredge produces no "excess" sediment or any other substance that was not already in the river. The dredge adds nothing.

Water Board: "Suction dredging activities and activities that alter the stream bank are identified as having the **potential** to cause direct impacts to the function of refugia through sediment discharge."

Comment:

Public Notice

US Army Corps of Engineers
Alaska District

Regulatory Branch (1145b)
Post Office Box 898
Anchorage, Alaska 99506-0898

Date: April 28, 2004

Identification No. SPN: 2004-06

In reply refer to above Identification Number

Clarification on Recreational Mining Definition in Alaska

Action: Effective immediately the Alaska District Corps of Engineers (Corps) restates the "Placer Mining Activities Having De Minimus Impacts" section of Special Public Notice (SPN) 94-10 signed 13 September 1994: "Recreational suction dredge mining using an intake nozzle size equal to or less than 4 inches and hand mining in waters of the United States would have de minimus effects on the aquatic environment, provided the State of Alaska Department of Fish and Game requirements for fish bearing waters are met. Therefore, the Corps will generally not regulate these activities, and no permit is required. However, the Alaska District Corps retains the discretion to require authorization on a case-by-case basis." The Alaska District finds this statement to be relevant today, and will continue to follow this guidance. No other section of SPN-94-10 is being restated by this SPN. The recent increase in the price of gold has generated renewed interest in recreational dredging in Alaska. This renewed interest and need for clarification has resulted in this public notification.

To regulate for potential for harm, where no harm has been shown to exist is unjustifiable and must be challenged. (U.S. Army Corps of Engineers)

Water Boards: Regional Water Board staff is addressing the impacts of suction dredging as a **precautionary** measure following the recommendation of fisheries biologists.

Comment: This precaution is unreasonable, arbitrary and capricious. It amounts to a private property "taking" by the agency on nothing more that supposition. Who are the biologists that made this recommendation?

The only fisheries biologists that were consulted by the agency were those that have written unfavorably regarding suction dredge mining. Much that these biologists said was nothing more than opinion, not science. Regulations must be based on the best available science, not opinion.

I have personally seen to it that the water boards have been the recipient of many peer reviewed studies that show that suction dredging has "de-minimus" or "inconsequential" effects on fisheries and aquatic environment, none were used.

State DFG regulations provide that no suction dredge mining be allowed during spawning periods.

The mining community has made these arguments and many others ad-nauseum. The various agencies simply disregard what they don't want to hear in favor of implementing their own pre-determined agenda.

Here is one example of their reasoning: "*Where threatened or endangered species exist, mangers would be prudent* ***to assume activities such as dredging are harmful unless proven otherwise).***"

They propose to take people's livelihood and property and prohibit them from making a living on mere assumption. You can't prove that something is **NOT** harmful. This is like trying to prove a negative, it cannot be done.

In 1866 the 39th Congress of the United States enacted a law that still stands today. It is commonly referred to as the Mineral Estate Grant of 1866. Its federal register designation is: HR 365.

One excerpt from this document states: "**That the mineral lands of the public domain, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and occupation by all citizens of the United States"**

This document makes mining claims "private property" in the truest sense. It grants the actual minerals and land to the claimant **and severs ownership from the Federal Government.**

Since the congress has declared that the mineral lands are free and open, and this is the supreme law of the land, it follows that no state or agency can prohibit what Congress has enacted.

The Supremacy Clause of the US constitution provides that no rule or regulation imposed by any state agency is valid if it conflicts with Federal Law.

The State Attorney General must be consulted by Water Boards. The question to ask counsel is: "Can Water Boards regulate mining on Federal Public Domain Lands"? For Water Boards staff to answer this question is unethical, it must be answered by the AG.

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Addendum

to Klamath River TMDL Draft Comments

The California Statehood Admission Act (Sec. 3) expressly provides; "...said State of California is admitted into the Union upon the express condition that the people of said State, through their legislature or otherwise, shall never interfere with the primary disposal of the public lands within its limits, and shall pass no law and do no act whereby the title of the United States to, and right to dispose of, the same shall be impaired or questioned...".

CA GOVERNMENT CODE
SECTION 110-127

110. The sovereignty and jurisdiction of this State extends to all places within its boundaries as established by the Constitution. The extent of such jurisdiction over places that have been or may be ceded to, purchased, or condemned by the United States is qualified by the terms of the cession or the laws under which the purchase or condemnation is made.

111. The jurisdiction of the State over certain lands designated in the following statutes is subject to the cession of jurisdiction granted the United States by such statutes:

(a) Statutes of 1854, Chapter 43, concerning Mare Island.

(b) Statutes of 1859, Chapter 305, concerning Lime Point Bluff.

(c) Statutes of 1861, Chapter 255, concerning land in the Counties of Marin, Mendocino, Humboldt, and Klamath.

(d) Statutes of 1867-8, Chapter 76, concerning the site of the United States Mint in San Francisco.

(e) Statutes of 1891, Chapter 106, concerning certain park and forest reservations.

(f) Statutes of 1906 (Extraordinary Session), Chapter 58, concerning land in San Diego County.

(g) Statutes of 1911, Chapter 675, concerning land in Riverside County.

(h) Statutes of 1919, Chapter 51, concerning Yosemite National Park, Sequoia National Park, and General Grant National Park.

(i) Statutes of 1927, Chapter 207, concerning Lassen Volcanic National Park.

(j) Statutes of 1933, Chapter 845, concerning land in Lassen County.

(k) Statutes of 1935, Chapter 328, concerning land particularly described therein.

(l) Statutes of 1935, Chapter 340, concerning land in Solano County, adjacent to Benicia Arsenal Reservation.

(m) Statutes of 1935, Chapter 580, concerning Benicia Arsenal Reservation, and adjacent land.

(n) Statutes of 1941, Chapter 308, concerning an easement for lighthouse purposes in Ventura County.

(o) Statutes of 1942 (Second Extraordinary Session), Chapter 3, concerning Treasure Island in San Francisco Bay.

Creative Act of March 3, *1891 = establishes national forests nation wide*

(f) "Land held by the United States", as used in this section means: (1) lands acquired in fee by purchase or condemnation, (2) lands owned by the United States that are included in the military reservation by presidential proclamation or act of Congress, (3) leaseholds acquired by the United States over private lands or state-owned lands, and **(4) any other**

lands owned by the United States including, but not limited to, public domain lands that are held for a public purpose.

http://law.justia.com/california/codes/gov/110-127.html

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Oral Comments

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- **Water Boards needs an opinion from the Attorney General on this crucial question: Does the state water board have the authority to regulate <u>mining on the public domain lands?</u>**

- **Your draft TMDL is rife with unscientific fears of *<u>possible harm</u>* where none has been proven. You have provided no science t5o identify "thermal refugia".**

- **The majority of suction dredge holes create beneficial areas to rest in that are no different than most natural refugia in the Klamath River basin. Ideally Thermal refugia would be best, but on the Klamath thermal refugia is hard to come by.**

- **I question the need for adapting regulations to prevent suction dredging activity within 500 feet or more of many areas where no true thermal refugia are likely to exist.**

- **Both sides of the river cannot be thermal refugia.**

- **Water Boards has indicated in their presentation that claims and refugia do not overlap. They do overlap and your maps do not show it correctly**

- **Brett Harvey 1986 found that "during low flows in late summer, all eight fish in one riffle occupied a hole created by dredging.**

- **The whole thrust of your TMDL regarding Thermal Refugia assumes harm. No harm has been shown to exist, which leads one to question why Water Boards feels that they must regulate at all.**

- `"No additive effects were detected on the Yuba River from 40 active dredges on a 6.8 mile stretch". Harvey, B.C., K. McCleneghan, J.D. Linn, and C.L. Langley, 1982. Some physical and biological effects of suction dredge mining. Lab Report No. 82-3. California Department of Fish and Game. Sacramento, CA.

- Suction dredging is the Best Management Practice and should be allowed without restrictive unnecessary regulations.

- Water Boards has said in its presentation that there is not a "takings Issue" with respect to thermal refugia and claims. Prohibition is a taking; regulations must be reasonable and cannot be prohibitive.

- HR 365 severs land from the Public Domain Trust held by the Federal Government and conveys it to individuals upon "location". Once a claim is located, it becomes private property, as determined by courts. To forbid the use of this private property is a "taking".

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March 23, 2010

My association with problems of mining and surface water contamination began as early as 1974 in the Coeur d' Alene mining district relative to the Kellogg, ID Sunshine silver mine and smelter.

I am very familiar with suction dredge mining and other forms of gold mining. I have, over the past 15 years or more, observed and participated in suction dredge mining operations. My exposure to mining techniques have occurred on the Umpqua River, Calapooia River, Quartzville Creek, Stratton Creek and Carberry Creeks in Oregon, the Klamath River and Stanislaus Rivers in California, and Humbug Creek, San Domingo Wash, and others in Arizona.

Some 25 of my 30 years of government service have related to biological research. A lifetime of biological testing on toxicity and nutrient pollution in the aquatic environment provides a sound basis for appreciating the magnitude of impacts associated with the asserted environmental contaminants, and gives a quantitative perspective generally lacking in general biologists, which leaves them less able to ascertain which environmental effects are significant and which aren't.

The following are my preliminary comments on the Klamath River Total Maximum Daily Loads and Action Plan Addressing Comments on 4.2.4.2 Literature Review on Effects of Suction Dredging on Geomorphology and Aquatic Resources.

The literature review states, "This section provides a brief overview of the findings in the literature Regional Water Board staff relied upon to develop the Thermal Refugia Protection Policy." It goes on to use the anecdotal comments by two prominent fisheries biologists to support this document.

I would like to comment on statements attributed to Dr. Peter Moyle recently and in previous legal declarations that I believe are relevant to this issue.

Dr. Moyle has had an eminent career in fisheries sciences. He is well published and respected. However, I believe he is entirely out of his realm regarding factual information about suction dredging because of his continued use of published science not relevant to the actual operations of suction dredges. This is proven by his words. In a Lake County News article written November 17, 2009 by Elizabeth Larson Dr. Moyle was cited as follows: "Dr. Peter Moyle, professor of wildlife, fish and conservation biology at the University of California, Davis' Center for Watershed Sciences, ***has conducted studies on the practice and concluded that it has a negative impact***. "It is too soon to tell if the moratorium has had a positive impact on salmon populations and in fact this will always be hard to demonstrate because ***no one is studying the issue***," Moyle told Lake County News in an e-mail message. (my comment: So Dr. Moyle has studied the issue while stating, "no one is studying the issue???.)

In fact, Moyle (1982) stated, "Fish and invertebrates displayed considerable adaptability to dredging, probably because the streams naturally have substantial seasonal and annual fluctuations".

Moyle said the state's fisheries agencies, such as DFG, are "woefully short" of funds and manpower to do their jobs. "Also there are multiple factors affecting the fish populations so separating causes is difficult," he wrote. "But given the severely threatened nature of summer steelhead, spring Chinook salmon, and coho salmon populations **it is best to *assume* that dredging (and associated activity) is having a negative impact *unless it can be proven otherwise*.** As studies show, there are lots of reasons to *suspect* an impact is there," Moyle noted. "

I find this *guilty until proven innocent* attitude disturbing coming from a scientist. However, Dr. Moyle has been consistent in his position of denying the rights of suction dredgers to perform their mining operations while clearly stating that he has no scientific cause effect relationship that suction dredging has ever harmed a single fish.

In a legal declaration submitted in the case of the Karuk Tribe vs. the California Department of Fish and Game in the Superior Court of California Dr Moyle held to the same position as follows: "In his declaration, Dr. Moyle states, "I agree with the thrust of Harvey and Lisle (1998), that it should be *assumed* that dredging is harming declining species unless it can be proven otherwise".

I believe the weight of the available scientific literature establishes that this is **NOT** the case.

In April 2003 Dr. Peter B. Bayley, of the Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR published a final report titled "*Response of fish to cumulative effects of suction dredge and hydraulic mining in the Illinois sub-basin, Siskiyou National Forest, Oregon*". Dr. Bayley stated that, "Harvey and Lisle (1998) opine that "effects of dredging commonly appear to be minor and local", but stress that cumulative effects of several operations at larger scales have not been investigated. This is one reason this study has been undertaken. Because most suction dredge mining activity in the Rogue basin and the Siskiyou National Forest was concentrated in the Illinois River drainage, the study described here was limited to the drainage of that sub-basin." Dr. Bayley concluded, "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. Local information reveals that most suction dredge miners more or less adhere to guidelines that have recently been formalized by the Forest Service." Dr. Bayley's study and other works confirm that even when analyzed from a cumulative effects perspective, there is no reason to believe that suction dredge mining is deleterious to fish.

Dr. Moyle goes on to state, "**It should be ASSUMED there is harm, unless it can be proven otherwise. One reason for taking this conservative position is that _we simply do not know the effect of dredging on many species_**." He went on to further state that, "Even for salmonids, ***information on the effects of dredging***, with the exception of a few studies such as Harvey (1989), ***is largely anecdotal*** or in non-peer reviewed reports". Dr. Moyle continues with the statement, "In particular, coho salmon, spring-run Chinook salmon, and summer steelhead are particularly vulnerable to the immediate effects of dredging and have been reduced to low numbers in the Klamath Basin so need special protection". Dr. Moyle, in the honesty of his statement, has in fact said that there is no substantiating scientific evidence linking suction dredging to harming salmonids.

In science, anecdotal evidence has been defined as:

- "information that is **not** based on facts or careful study";
- "**non-scientific observations or studies**, which do not provide proof but may assist research efforts";
- "reports or observations of usually **unscientific observers**";

- "**casual observations** or indications rather than rigorous or scientific analysis"; and,
- "**information** passed along by word-of-mouth but **not documented scientifically**".

Researchers may use anecdotal evidence for suggesting new hypotheses, but **never** as supporting evidence.

This is mere opinion without scientific supporting data, for as previously described, Dr. Moyle has in substance acknowledged that **he does NOT have any documentation to support these assertions.**

Without going into greater detail Harvey and Lisle also spoke anecdotally when they stated, *"Effects of dredging commonly* ***appear to be minor and local,*** *but natural resource professionals* ***should expect*** *effects to vary widely among stream systems and reaches within systems."*

They have no data supporting anything other than, *"Effects of dredging commonly appear to be minor and local…"*. They have reported no science to support their anti-suction dredging concerns. As stated in your report Harvey and Lisle said, *"fisheries managers would be prudent to* ***suspect*** *that dredging is harmful"*. Further evidence that they have **no scientific evidence**, even after their years of fisheries research, that suction dredging is harmful to fish.

It is clear that the authors of this literature review have attempted to use the considerable scientific reputations of Moyle and Harvey in lieu of finding scientific research data that would support the anti-suction dredging bias/agenda they were attempting to document. They have not done so.

Furthermore, the California State Public Resources Code requires that, "Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and **expert opinion supported by *facts***.

Note: Authority cited: Section 21083, Public Resources Code; References: Sections 21080, 21082.2, 21168, and 21168.5, Public Resources Code; No Oil, Inc. v. City of Los Angeles (1974) 13 Cal.3d 68; Running Fence Corp. v. Superior Court (1975) 51 Cal.App.3d 400; Friends of B Street v. City of Hayward (1980) 106 Cal.App.3d 988. **"…argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly inaccurate or erroneous…is not substantial evidence."** PRC Section 21082.2

One of the most obvious off-site effects of dredging is occasional increased suspended sediment because background concentrations where and when dredging occurs are usually low. Lethal concentrations of suspended sediment are never produced by suction dredging because plumes are narrow and avoidable. When the fish are in the dredge plumes it is by choice while feeding.

Field measurements of changes in turbidity and suspended sediment below suction dredges indicate minor, localized effects. For example, turbidity was 0.5 NTU upstream, 20.5 NTU 4 m downstream, and 3.4 NTU 49 m downstream of an active dredge on Canyon Creek (Hassler et al. 1986). Suspended sediment concentrations at the same three locations were 0, 244 mg/L, and 11.5 mg/L, respectively.

On Butte Creek and the North Fork of the American River where ambient turbidities were <1 NTU, maximum turbidity 5 m downstream of active dredges reached 50 NTU but averaged only 5 NTU (Harvey 1986). One must remember sediment plumes below suction dredges are intermittent not continuous.

In Gold Creek, Montana, suspended sediment was 340 mg/L at the dredge outflow and 1.8 mg/L 31 m downstream of an active dredge (Thomas 1985).

Extrapolating results from studies exposing biota to chronic suspended sediments may overestimate the impacts of dredging because dredgers commonly operate for <5 hours/day.

An excellent illustration is the measured turbidity plume behind an 8-inch dredge operating in the 40-Mile River Alaska (Figure 1). Each of the 5 turbidity charts are measurements taken at different distances below the dredge and each is a turbidity assessment across the entire width of the river. The charts illustrate that the turbidity plume expands little in width from what it was just behind the dredge. Furthermore, the turbidity downstream of this 8-inch dredge had dropped down to 20 NTU just 66 feet downstream.

On the Fortymile River, 6- and 8-inch dredges 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" (Prussian et al., 1999), such as those used in the Klamath River system. These data call into question the arbitrary and excessive length of the 500 foot buffer zone.

Data such as this also clearly show that in an area of a refugia suction dredging need not be restricted on the opposite side of the river because the plumes do not spread across the river's width.

Production of suspended sediment is no doubt linked to the size and frequency of dredging operations. Such cumulative effects have been evaluated.

A moderate density of dredges in Butte Creek generated minor increases in sedimentation, and cumulative effects on benthic invertebrates or rainbow trout were not detected (Harvey, 1986). Harvey et al. (1982) reported "No additive effects were detected on the Yuba River from 40 active dredges on a 6.8 mile stretch. Harvey (1986) reported, "Six small dredges (<6 inch nozzle) on a 1.2 mile stretch had no additive effect". The Chugach National Forest, Alaska (Huber and Blanchet, 1992) found that, "The results from water quality sampling do not indicate any strong cumulative effects from multiple placer mining operations within the sampled drainages. Several suction dredges probably operated simultaneously on the same drainage,

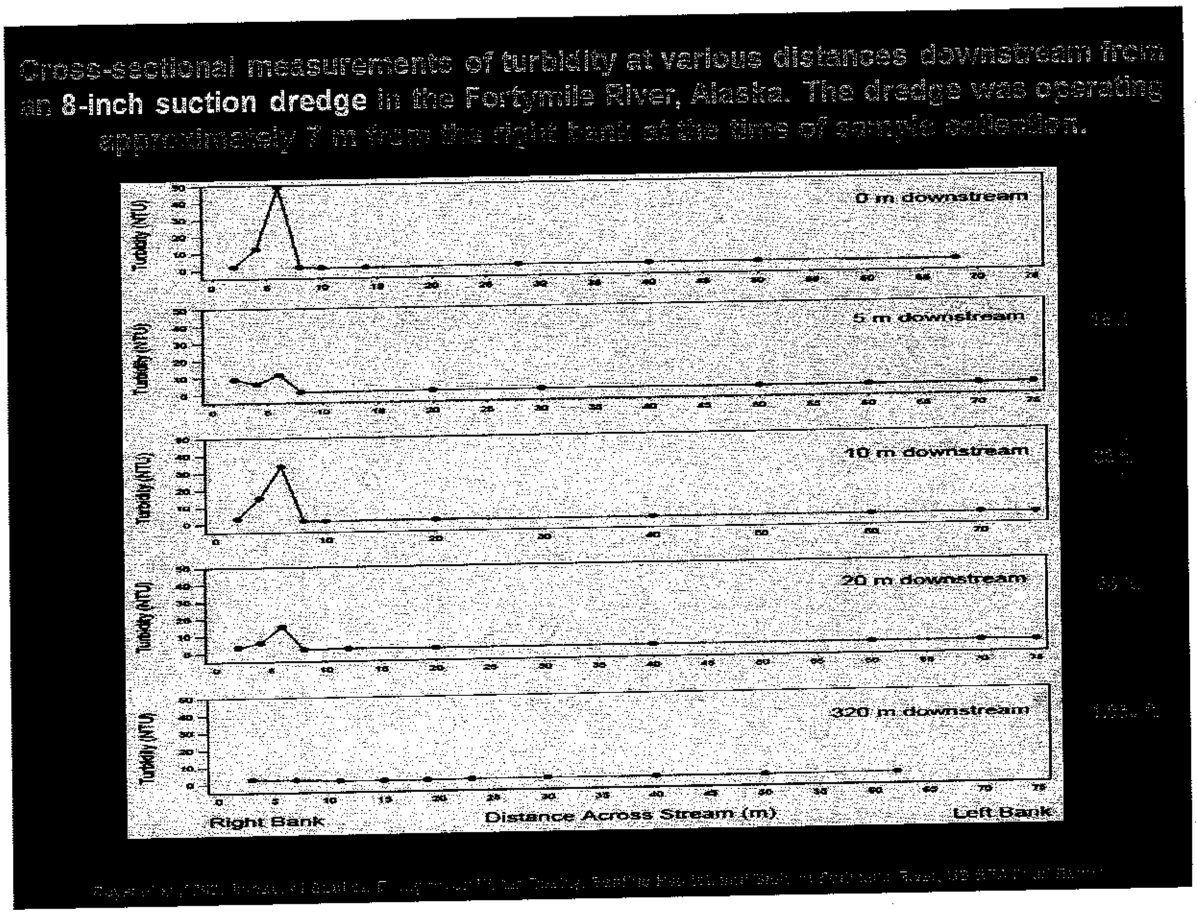


Figure 1

but did not affect water quality as evidenced by above and below water sample results. Furthermore, in the recreational mining area of Resurrection Creek, Alaska five and six dredges would be operating and not produce any water quality changes (Huber and Blanchet, 1992).

Behavioral responses of fish, in stream and rivers, to noises and vibrations generated by dredging appears insignificant. Sculpin close to active dredges appear to behave normally (B. Harvey, personal observation), and juvenile salmonids have been observed feeding on entrained organisms at dredge outfalls (Thomas 1985; Hassler et al. 1986). Spring-run Chinook and summer-run steelhead adults held within 50 m of active dredges in Canyon Creek, California, (Hassler et al. 1986). Salmon have been in dredge holes while dredging was underway.

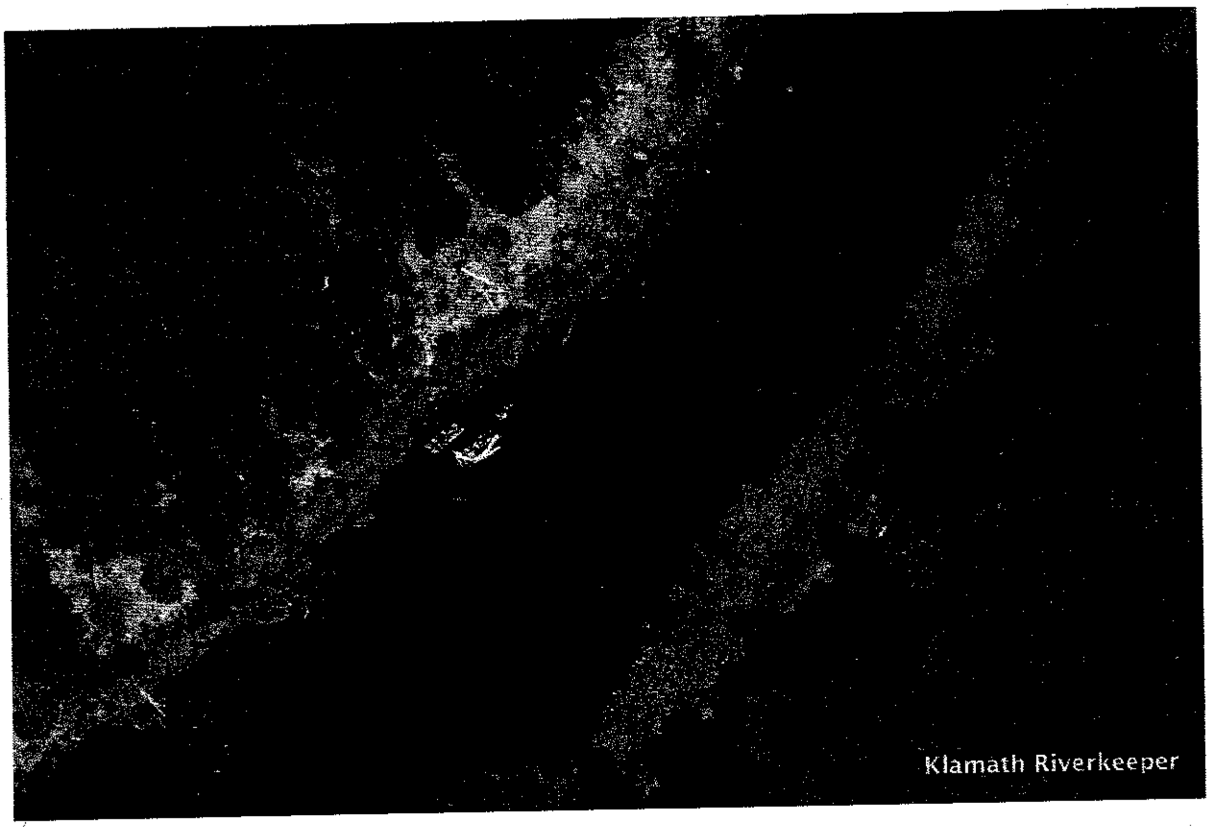
Harvey and Lisle (1998) wrote, "In general, benthic invertebrates (Mackay 1992), hyporheic invertebrates (Boulton et al. 1991), and periphyton (e.g., Stevenson 1991; Stevenson and Peterson 1991) all rapidly recolonize small patches of new or disturbed substrate in streams. Abundance and general taxonomic composition of benthic invertebrates can be restored on dredge tailings four to six weeks after dredging (Griffith and Andrews 1981; Thomas 1985; Harvey 1986).

In the three studies cited above, dredging disturbed only a minor proportion of available habitat for benthic invertebrates. Recovery of benthic invertebrate communities after even large-scale disturbances (e.g., Minshall et al. 1983) suggests that both the total number of individuals and species diversity could recover even in areas of widespread dredging.

This response would not be complete without a discussion of the effects of scale of small-scale gold suction dredging. The aerial photograph (Figure 2) shows a 6- and 5-inch dredge that had been working side by side on the Klamath River, CA. The disturbed area can be seen as a brown area below the dredges. A dredge is typically 8-feet long, so one can estimate the area of the disturbed material. A narrow plume of material can also be seen tapering off below the brown upstream patch. This photograph is an actual example of the effect of scale of suction dredging. The impact is local, small in size, and temporary as can be seen by the wide expanse of undisturbed area seen in this photograph (Figure 2).

Expanding on this information, a report from the Siskiyou National Forest answered the question, "How much material is moved by annual mining suction dredge activities and how much does this figure compare with the natural movement of such materials by surface erosion and mass movement?" The movement rate by suction dredge mining would equal *about 0.7% of natural rates* (Cooley, 1995). Furthermore, the total acreage of all analyzed claims related to the total acres of watershed is about *0.2 percent*. The percentage of land area within riparian zones on the Siskiyou National Forest occupied by mining claims is estimated to be *only 0.1 percent* (SNF, 2001).

The area or length of river or streambed worked by a single suction dredger, as compared to total river length, is relatively small compared to the total available area (CDFG, 1997). The inescapable conclusion is that Small-scale gold suction dredging temporarily affects a very small area in the environment relative to the entire area in which all dredges operate.



In 2004, after the close of dredge season, a survey was taken of the dredge holes left behind in the Salmon River, CA (Cyr, 2004). Measured dredge holes covered a total length of 1,066 ft. The entire 79 miles of the Salmon River covers a length of 417,120 linear feet. Therefore, suction dredge holes disturbed only 0.26% of the area, calculated on a linear basis. The length of the dredge holes is actually <0.26% because the data does not allow for calculation of area disturbed vs. linear area disturbed. The total dredge hole area of the Salmon River is less than that calculated because the dredge holes did not extend to both margins of the river.

Refugia has been defined, in the literature, as any hole in a river bottom that is 3 feet or deeper. This study identified 27 potential refugia created by suction dredging. All of the suction dredge holes disturbed <0.26% of the river bottom. Twenty seven of the 53 holes dredged, or 51%, have the potential of improved habitat for the survival of species in the Salmon River.

Excavations from dredging operations can result in temporarily formed pools or deepen existing pools which may improve fish habitat. Deep scour may intersect subsurface flow creating pockets of cool water during summer which can provide important habitat for fish (Nielsen et al.,. 1994). It has been further reported that, "During times of low flow in a river or stream, increased water depth can provide a refuge from predation by birds and mammals (Harvey and Stewart, 1991)". Pools created by abandoned dredger sites can provide holding and resting areas for juvenile and adult salmonids (Stern, 1988).

There is just no evidence that refugia buffers should be re-defined as an area greater than 500 feet above and below a confluent stream where a lower water temperature environment exists. This distance may, in fact be too large of a buffer, especially downstream of the refugia. Furthermore, locations at most confluent streams are not thermal refugia. Even when confluent streams release very cold water into the receiving stream their flow volumes are so low in the summer time that they do not influence the temperatures in the receiving water. The extent of the buffers and the lack of scientific data to support their need bring into question the reasonableness of the condition that have been suggested to be imposed.

I have appended legal testimony regarding refugia and water temperatures in the Klamath River and its tributaries at the end of this letter.

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REFERENCES

Boulton, A. J., S. E. Stibbe, N. B. Grimm, and S. G. Fisher. 1991. *Invertebrate recolonization of small patches of defaunated hyporheic sediments in a Sonoran Desert stream.* Freshwater Biol. 26:267-277.

CDFG, 1997. *Draft Environmental Impact Report: Adoption of Amended Regulations for Suction Dredge Mining.* State of California, The Resource Agency, Department of Fish and Game

Cooley, M.F. 1995. *Forest Service yardage Estimate.* U.S. Department of Agriculture, U.S. Forest Service, Siskiyou National Forest, Grants Pass, OR.

Cyr, L. 2005, *Interoffice Memorandum to Jerry Boberg,* Fish and Watershed Program Manager, Six Rivers National Forest.

Griffith, J. S., and D. A. Andrews. 1981. *Effects of a small suction dredge on fishes and aquatic invertebrates in Idaho streams.* N. Am. J. Fish. Manage. 1:21-28.

Harvey, B.C., K., McCleneghan, J.D. Linn, and C.L. Langley, 1982. *Some physical and biological effects of suction dredge mining.* Lab Report No. 82-3. California Department of Fish and Game. Sacramento, CA

Harvey, B.C. 1986. *Effects of suction gold dredging on fish and invertebrates in two California streams.* North American Journal of Fisheries Management 6:401-409.

Harvey, B. C. and T. E. Lisle. 1998. *Effects of Suction Dredging on Streams: a Review and an Evaluation Strategy.* Fisheries, Vol. 23, No. 8

Hassler, T J., W. L. Somer, and G. R. Stern. 1986. *Impacts of suction dredge mining on anadromous fish, invertebrates, and habitat in Canyon Creek, California.* California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA.

Huber and Blanchet, 1992. *Water quality cumulative effects of placer mining on the Chugach National Forest, Kenai Peninsula, 1988-1990.* Chugach National Forest, U.S. Forest Service, Alaska Region, U.S. Department of Agriculture.

Lewis, R., 1962. *Results of Gold Suction Dredge Investigation,* Memorandum of September 17. California Dept. of Fish and Game, Sacramento, Ca.

Mackay, R. J. 1992. *Colonization by lotic macroinvertebrates: a review of processes and patterns.* Can. J. Fish. Aquat. Sci. 49:617-628.

Minshall, G. W., D. A. Andrews, and C. Y Manuel-Faler. 1983. *Application of island biogeographic theory to streams: macroinvertebrate recolonization of the Teton River, Idaho.* Pages 279-297 in J. R. Barnes and G. W. Minshall, eds. Stream ecology: application and testing of general ecological theory. Plenum Press, New York.

Moyle, P. B., J. J. Smith, R. A. Daniels, and D. M. Baltz. 1982. A Review. Pp. 255-256. In P. B. Moyle (Editor), *Distribution and Ecology of Stream Fishes of the Sacramento-San Joaquin Drainage System, California.* Publications in Zoology 115, University of California Press, Berkeley, California.

Nielsen, J. L., T. E. Lisle, and V Ozaki. 1994. *Thermally stratified pools and their use by steelhead in northern California streams.* Trans. Am. Fish. Soc. 123:613-626.

SNF, 2001. *Siskiyou National Forest, Draft Environmental Impact Statement: Suction Dredging Activities.* U.S. Department of Agriculture, U.S. Forest Service, Siskiyou National Forest, Medford, OR.

Stern, G. R. 1988. *Effects of suction dredge mining on anadromous salmonid habitat in Canyon Creek, Trinity County, California.* M.S. Thesis, Humboldt State University, Arcata, California, 80 pp.

Stevenson, R. J. 1991. *Benthic algal community dynamics in a stream during and after a spate.* J. N. Am. Benthol. Soc. 9:277-288.

Stevenson, R. J., and C. G. Peterson. 1991. *Emigration and immigration can be important determinants of benthic diatom assemblages in streams.* Freshwater Biol. 26:279-294.

Thomas, V. G. 1985. *Experimentally Determined Impacts of a Small, Suction Gold Dredge on a Montana Stream.* North American Journal of Fisheries Management Volume 5, Issue 3b (July 1985) 480-488.

Prussian, A. M., T. V. Royer, and G. W. Minshall. 1999. *Impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska,* Final Report, U.S. EPA, Region 10, Seattle, WA.

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SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA
UNLIMITED CIVIL JURISDICTION

KARUK TRIBE OF CALIFORNIA and LEAF HILLMAN,
Plaintiffs,
v.
CALIFORNIA DEPARTMENT OF FISH AND GAME and RYAN BRODDRICK,
Director, California Department of Fish and Game,
Defendants.

Case No. RG05 211597
SECOND DECLARATION OF JOSEPH C. GREENE
Date: January 26, 2006
Time: 9:00 a.m.
Judge: Honorable Bonnie Sabraw
Place: Department 512
Filing Date: January 10, 2005
Trial Date:

Joseph C. Greene, being duly sworn, deposes and says:

1. I am a research biologist. I am informed that a previous declaration setting forth my qualifications and opinions concerning the general impacts of suction dredge mining has previously been filed with this Court as Exhibit 3 to the Declaration of Neysa Fligor, so I will not repeat that testimony here.

2. I have reviewed the Proposed Stipulated Judgment through which the Department of Fish and Game proposes to change suction dredge mining regulations concerning, among other areas, the Klamath River and its tributaries. During the month of August 2005 my colleague Claudia J. Wise and I were working on the Klamath River and its tributaries, performing a preliminary investigation to determine if areas of the river were thermally stratified. In particular, we examined the question how rapidly cooler water from tributaries entering the Klamath River mixed with the warmer Klamath River water. 3. Water temperature is important for the survival of salmonids

(salmon and steelhead), because salmonids generally cannot survive extended exposure to water temperatures above 20°C, and will generally seek refuge in cooler areas when river temperatures rise to this level.

3. Among other things, the Proposed Stipulated Judgment identifies certain "thermal refugia" consisting of "the confluence of" certain tributaries of the Klamath River, and states that suction dredge mining shall be prohibited "five hundred feet up and downstream on the main stem from the confluence".

4. I have attached two tables showing the locations and the water temperatures that we measured. Each table is supported by a Chart which assists in visualizing the data. Figure 1 shows that during this study the mainstream Klamath River ranged in temperature from a low of 22.44°C, immediately downstream from Iron Gate Dam, to a high of 26.69°C upstream of Indian Creek.. All of the measurements taken in the mainstream Klamath River during this survey exceeded the 20°C upper incipient lethal temperature for salmonids.

5. The confluent streams to the Klamath River, listed in Table 2, ranged in temperature from 15.34°C in Mill Creek to 22.57°C in Elk Creek (measured Aug. 9, 2005). Obviously, tributaries above 20°C cannot serve as thermal refugia for salmonids.

6. Generally speaking, it appeared during this preliminary survey that refugia were small in size when not altogether absent. To illustrate this numbers 1 through 4 were placed on Figure 2. Sites 1 and 2 are up-and-downstream from Elk Creek (measured Aug. 6, 2005). Sites 3 and 4 are similar locations up-and-downstream of Elk Creek (measured Aug. 9, 2005). The temperatures shown here illustrate that there was little or no area within the Klamath River at the confluence of Elk Creek that could be defined as temperature refugia for salmonids or other species of fish. Furthermore, all measurements made in the mainstream Klamath River demonstrated that the system was nowhere thermally stratified and the temperatures were statistically the same from top to bottom.

7. The streams upstream of Elk Creek, shown in Chart 2, were numbered and illustrated because these locations would not normally be determined to be refugia. The study shows that some very nice low-temperature streams were flowing into the mainstem Klamath River but, their volumes were so low as to not have any important impact on the Klamath River temperatures.

8. While sampling at Tom Martin Creek we were approached by staff of the Karuk tribe that were also measuring water quality of the river system. They were using a YSI multiparameter meter for instantaneous water quality

measurements. It so happened that we were also using a YSI multiparameter meter, although ours was a more-advanced model (model 556) that had just come into production. The young man operating the meter, after inquiring about what we were doing, told us we should contact Mr Toz Soto, his boss, because the Tribe had a lot of Klamath River water quality data. Mr. Brinker also told us the Karuk Tribe has considered using suction dredges to improve (deepen) refugia. At that point Mr. Brinker's associate signaled for him to keep quiet and called him away. I did not contact Mr. Soto. I believe that the Karuk Tribe does have extensive water quality analysis records. For example, I have in my possession reports on water quality prepared by the Karuk Tribe dated as early as May 1995 and February 1997.

9. It is my understanding that the suction dredge miners seeking to intervene in this action seek, among other things, to have any changes to the suction dredge mining regulations developed through the normal, public process during which interested parties are given an opportunity to present data such as that presented above. While the data my colleague and I collected were preliminary, the information was taken by the highest-quality methods available today. Such data, together with the information summarized in my previous declaration, suggest that the regulations set forth in the Proposed Stipulated Judgment would not be supported by a full examination of the available information. Our data raises the reasonable question as to why modified regulations would prevent suction dredging activity within 500 feet of many areas where no refugias are likely to exist; and, for example, the question of why dredging season should be eliminated altogether in Elk Creek. If an ordinary rulemaking process were utilized to modify suction dredge regulations, all of the available information could be gathered from all interested parties and used to create reasonable regulations that afford fish the required protection, rather than basing regulations on the position of one of many interested parties, thereby avoiding regulatory burdens on the general public that serve no useful purpose.

10. A common misconception concerning suction dredging is that the material pumped from the bottom of the riverbed passes though a pump, and biological organisms may be impacted by pump impeller blades. In fact, suction dredge pumps operate with an impeller pumping water from a source other than the river bottom, and passing such water through a narrowing area which, through the "venturi effect" creates a vacuum that sucks water from the river bottom without passing it through the impeller. This design is necessary to avoid damage to the pump impeller from sand and gravel that would otherwise strike the impeller, and has the additional benefit of preventing damage to biological organisms.

11. In recent years, the design of suction dredges has also changed from the older, "crash box" design which caused the material and materials sucked from the river bottom to strike the sides of a box, to a new design in which the suction tube simply widens out, lowering velocities and causing the heavier material to drop out. The newer design, now in widespread use, will also create less impact upon any biological organism passing through the suction tube.

12. A public process pursuant to CEQA to consider changes to the suction dredge mining regulations would take newer information into account concerning the design and operation of suction dredges and fashion regulations more closely tailored to the actual impacts and river conditions.

I swear under penalty of perjury that these statements are true and correct to the best of my knowledge.

Dated: January 9, 2006

Figure 1. Klamath River Temperature Measurements

KLAMATH RIVER Site Description	Date	Temp. °C
Downstream from bridge below Iron Gate Dam	08/17/05	22.44
At Trees of Heaven Campground	08/13/05	24.15
Upstream from Beaver Creek	08/13/05	23.20
From the Cherry Flats bridge	08/11/05	24.50
From the bridge upstream from Horse Creek.	08/11/05	24.66
Upstream of the Kinsman Creek confluence	08/07/05	25.58
Downstream of the Kinsman Creek confluence	08/07/05	25.70
Upstream of the Tom Martin Creek confluence	08/11/05	23.88
In the large quiet water eddy directly off of Tom Martin Creek	08/11/05	23.09
2.3 meters from shore at the Mill Creek confluence	08/11/05	23.29
6.0 meters from shore at the Mill Creek confluence	08/11/05	23.20
Downstream of confluence the Mill Creek confluence	08/11/05	23.32
Schutt's Gulch #1 upstream surface water	08/08/05	25.03
Schutt's Gulch #1 upstream on streambed	08/08/05	25.02
Schutt's Gulch #1 on bottom of Dredge Hole	08/08/05	25.07
Schutt's Gulch #2 upstream surface water	08/08/05	25.17
Schutt's Gulch #2 upstream on streambed	08/08/05	25.13
Schutt's Gulch #2 on bottom of dredge	08/08/05	25.19
Schutt's Gulch #3 upstream surface water	08/08/05	25.21
Schutt's Gulch #3 upstream on streambed	08/08/05	25.22
Schutt's Gulch #3 on bottom of dredge hole	08/08/05	25.22
Near Seattle Creek upstream from dredge hole	08/07/05	25.37
Near Seattle Creek upstream from dredge hole	08/07/05	25.38
Near Seattle Creek halfway down shoreside sidewall of dredge hole	08/07/05	25.42
Near Seattle Creek on the bottom of dredge hole	08/07/05	25.44
Upstream from Indian Creek	08/09/05	26.69
Downstream from the confluence with Indian Creek	08/06/05	23.67
Downstream from the confluence with Indian Creek	08/09/05	23.08
At K-19 just upstream from the dredge hole.	08/13/05	23.13
At K-19, 10 m from upstream edge of dredge hole	08/13/05	23.21
Upstream from Elk Creek	08/06/05	24.68
Surface water collected directly off of confluence with Elk Creek	08/06/05	24.90
Directly off of the Elk Creek confluence. About 1m below surface.	08/06/05	24.61
Surface water downstream from Elk Creek confluence.	08/06/05	24.27
Surface water upstream from Elk Creek	08/09/05	26.15
Klamath River surface water (Measured 17 meters into the river and 6.5 meters downstream from the confluence).	08/09/05	26.02
Klamath River bottom water (Measured 17 meters into the river and 6.5 meters downstream from the confluence, and about 0.3 meters off above the bottom).	08/09/05	25.72
In the Klamath River/Elk Creek mixing zone	08/09/05	25.85
Upstream from Clear Creek.	08/12/05	23.97

Table 2. Klamath River and Tributaries Temperature Measurements		
KLAMATH RIVER Site Description	**Date**	**Temp. °C**
Klamath River upstream of the Tom Martin Creek confluence	08/11/05	23.88
Tom Martin Creek (measured along Hwy 96)	08/11/05	16.04
In the large quiet water eddy directly off of Tom Martin Creek	08/11/05	23.09
Mill Creek (from the culvert on Hwy 96)	08/11/05	16.51
Mill Creek (at its confluence with Klamath River)	08/11/05	15.34
2.3 meters from shore at the Mill Creek confluence	08/11/05	23.29
6.0 meters from shore at the Mill Creek confluence	08/11/05	23.20
Downstream of confluence the Mill Creek confluence	08/11/05	23.32
Klamath River upstream from Indian Creek	08/09/05	26.69
Indian Creek	08/09/05	20.68
Klamath River downstream from the confluence with Indian Creek	08/09/05	23.08
Klamath River downstream from the confluence with Indian Creek	08/06/05	23.67
Klamath River upstream from Elk Creek	08/06/05	24.68
Elk Creek (sample taken in Elk Creek, 180 feet upstream from Klamath River)	08/06/05	19.30
Elk Creek (In Elk Creek at the confluence with the Klamath River)	08/06/05	19.43
Klamath River surface water collected directly off of confluence with Elk Creek	08/06/05	24.90
Klamath River directly off of the Elk Creek confluence. About 1m below surface.	08/06/05	24.61
Klamath River surface water downstream, about 3 meters, from Elk Creek confluence and about 2 meters offshore.	08/06/05	24.27
Klamath River surface water upstream from Elk Creek	08/09/05	26.15
Elk Creek (sample taken in Elk Creek, 180 feet upstream from Klamath River)	08/09/05	22.57
Klamath River surface water (Measured 17 meters into the river and 6.5 meters downstream from the confluence).	08/09/05	26.02
Klamath River bottom water (Measured 17 meters into the river and 6.5 meters downstream from the confluence, and about 0.3 meters off above the bottom).	08/09/05	25.72
In the Klamath River/Elk Creek mixing zone about 3 meters directly off of Elk Creek	08/09/05	25.85

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SUPERIOR COURT OF CALIFORNIA COUNTY OF ALAMEDA UNLIMITED CIVIL JURISDICTION

KARUK TRIBE OF CALIFORNIA and LEAF HILLMAN, Plaintiffs, v. CALIFORNIA DEPARTMENT OF FISH AND GAME and RYAN BRODDRICK, Director, California Department of Fish and Game, Defendants.	Case No. RG05 211597 **THIRD DECLARATION OF JOSEPH C. GREENE** Date: January 26, 2006 Time: 9:00 a.m. Judge: Honorable Bonnie Sabraw Place: Department 512 Filing Date: January 10, 2005 Trial Date:

Joseph C. Greene, being duly sworn, deposes and says:
(I have included only the testimony relative to river temperature)

14. I stated in my declaration "...All of the measurements taken in the mainstream Klamath River during this survey exceeded the 20°C upper incipient lethal temperature for salmonids. ...The confluent streams to the Klamath River, listed in Table 2, ranged in temperature from 15.34°C in Mill Creek to 22.57°C in Elk Creek (measured Aug. 9, 2005). Obviously, tributaries above 20°C cannot serve as thermal refugia for salmonids." Soto states, "His conclusion is that the temperature readings at the confluence of tributaries with the mainstem of the river were higher that the level (he says 20 degrees Centigrade) that could accommodate salmonids on the days of his measurements that month. This conclusion is not supported by any fisheries research of which I am aware."

15. In fact, the supporting research is voluminous. In particular,

- The *optimal pre-spawning broodstock survival, maturation and spawning temperature range for salmonids* is **6.1°C – 17.8°C** (50°F – 64°F) (Coutant, 1977; Piper et al. 1982, Raleigh et al. 1986).

- For *chronic exposure, inferred range of incipient sublethal elevated water temperature for broodstock, increased infertility, and embryonic development abnormalities* is in the range of **15°C - 17.2°C** (59°F – 63°F) (Marine, 1992).

- I referred, conservatively, to the *chronic exposure, incipient range of upper lethal water temperatures for pre-spawning adult Chinook salmon* which was primarily derived from observations of captive broodstock. That range is **17.2°C - 20.0°C** (63°F – 68°F) (Berman, 1990; Bouck et al., 1977; Hinze et al., 1956; Rice, 1960).

- The *temperature ranges for increased pathogenicity of many of the important salmonid disease organisms with potential for impairing reproduction in Chinook salmon.* The temperature range defined for these effects are **13.3°C – 27.2°C** (56°F – 81°F) (Becker and Fujihara, 1978; Fryer and Pilcher, 1974; Post, 1987).

- Lastly research has defined *the range of highest elevated temperatures observed to be transiently passed through during migrations or tolerated for short-term by adult Chinook salmon* are **25°C to 27°C** (77°F – 81°F).

16. The point of my testimony was that although the salmonids may survive for a time in waters with temperatures greater than 20°C, they are in harms way because sublethal reproductive effects may be occurring at water temperatures as low as 17°C. I did not intend, at any time, to suggest that salmonids would not prefer such waters if they were cooler than surrounding areas and they had no better choices. Nor did I intend to suggest that salmonids would not survive at all at these temperatures. I never stated, as Mr. Soto implies (page 8, lines 23-24) that 20°C was a lethal temperature to the resident fish.

17. Mr. Soto lists a large number of data sources in paragraph 8 of his Declaration. He states, "All of the above studies were made available to and reviewed by the parties conducting the settlement negotiations in this case. In many cases (*i.e.*, other than the www.krisweb.com materials), they have not been made available to the public and the scientific community, and I am informed that the attorney representing the California Department of Fish and Game has refused to make them available to The New 49'ers and Mr. Koons.

I certify under penalty of perjury under the laws of California that the foregoing is true and correct.

Executed on January 24, 2006

6/12/07 Workshop
Suction Dredge
Deadline: 6/22/07 Noon

State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, California 95812-0100
Fax: 916-341-5620
email: commentletters@waterboards.ca.gov

June 21, 2007

Subject: **SUCTION DREDGE MINING**

Dear Board Members,

The discussion of mercury, during your recent June 12 workshop, was brought to my attention and I have been asked to comment. Specifically, there was concern expressed regarding a paper published from your Board's Water Quality Division (Humphreys, 2005). This paper discussed mercury losses and recovery during small-scale suction dredging.

The Water Board has spent a lot of time and money on mercury remediation projects with limited success. In 2001 EPA, Region 9 located in San Francisco, California did collect mercury from miners very effectively. Collections of mercury are currently happening in Oregon and Washington through the states respective Division's of Ecology and with even greater success at miner's rallies.

The suction dredge community could provide the State with a source of help that is willing to do what they do best. Prospect for GOLD! In the event that they run across a hot spot of mercury miners would be willing to hand it over to a collection facility if such a facility existed. The idea you mentioned in your Board's Water Quality Division report (Humphreys, 2005) of paying the miner's for their efforts would help facilitate this plan.

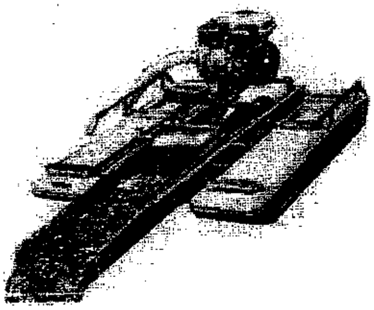
In reviewing your comments regarding possible problems associated with collecting mercury via suction dredging methods, I believe you are right to look to the suction dredge community for help locating hotspots and removing mercury from the river systems. The data provided in the report by Humphreys (2005) did not demonstrate any clear conclusions that would prohibit the State from allowing this activity. On the contrary, in the discussion of results it was stated that a suction dredge in the American River was able to collect **98 percent** of the measured mercury processed through the dredge. The results would have been much closer to 100 percent if the investigators had been using a dredge with the modern jet flare design. Even 98 percent is a huge plus for the environment and it would be irresponsible to not allow mercury to be removed from the rivers and streams whenever it is found.

DESIGN OF NEW SMALL-SCALE SUCTION GOLD DREDGES

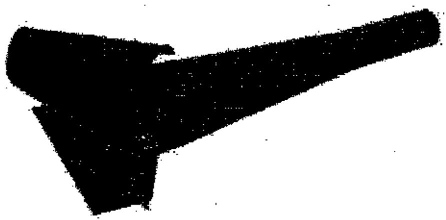
Before delving into the publication itself I would like to discuss new dredge technology that was overlooked in the planning of this study. The dredge style used in this study

has, at the head of the sluice, a "crash box". In the photograph below it is the black box to the right of the yellow engine (Ralph, 2003). I must also point out that this photograph does not illustrate normal operation of a dredge. Look at the wave of water in the sluice box. Running any dredge, using this water velocity, will surely wash the gold out of the sluice along with all the other bottom material.

Crashbox technology was replaced on the market 15 or more years ago. A jet flare now replaces the crashbox. An example of a modern Keene dredge using jet flare technology is illustrated below. You will notice that the crashbox has been removed (Keene, 2007a).



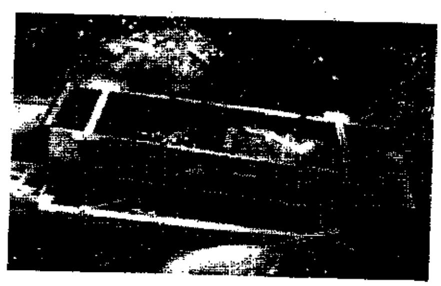
It has been replaced with a Jet flare (Keene, 2007b). The theory behind jet flare technology is that the water velocity drops off as the water and dredged materials leave



the 4-inch tube and enter the flared area that about 4-times the area of the intake. Therefore, it is unlikely that any flouring of elemental mercury would occur during the operation of the suction dredge.

In addition to using an obsolete dredge design, there was no discussion of the field crew's knowledge of proper operation of a suction dredge. These machines are not designed to start the engine, push the motor to maximum power (maximum suction) and begin mining. An experienced operator will check the water flow over the riffles in the sluice box to determine if the velocity is too high. If that is the case the operator will reduce the engine speed to adjust the water flow to a more acceptable velocity. Dredge motors are never run at maximum speed. It reduces engine life and in every case would put too much material and water through the sluice box.

The author of the site from which I borrowed the picture of the dredge with a crashbox was aware that it was operating poorly. So he removed the crash box and added a jet flare. Operation of the jet flare, on the same sluice box shown in the first illustration, is illustrated below (Ralph, 2003).



COMMENTS ON THE "MERCURY LOSSES AND RECOVERY" STAFF REPORT

In Humphreys report (2005), the author expressed concern for the loss of a small portion (2%) of the mercury from the back end of the sluice box. In the conclusions it was stated that the amount lost constituted a concentration more than ten times higher than that needed to classify it as hazardous waste. Yet 98 percent of the mercury was now secured and the process did not add any mercury to the system that was not already present. The small fraction lost, because of its density, would relocated back onto the river floor buried in the sediment close to were it was removed while dredging.

Mercury is continuously moved every winter in high storm events. Since the cessation of hydraulic mining, accumulated sediment from hydraulic placer mining has been transported to the Sacramento–San Joaquin Delta and San Francisco Bay by sustained remobilization (James, 1991). Providing a program to collect mercury from miners would aid the Water Board's mission of reducing mercury contamination in the deltas and bays where mercury methylation is a large concern.

Mercury can become floured. Alpers (2005) described this as, "gravel and cobbles that entered the sluice at high velocity caused the mercury to flour, or break into tiny particles. Flouring was aggravated by agitation, exposure of mercury to air, and other chemical reactions". In this case he was referring to a hydraulic mining sluice that contained materials that were roaring down a mountainside and fed by giant water cannons (monitors) that were used to breakup the gold bearing deposits.

(Alpers, 2005)

In the test described by Humphreys (2005) a small portion of floured mercury was collected in the sediments as they escaped the sluice box. This mercury whether floured before it entered the sluice box or not would still be in elemental form. No less toxic then the other 98 percent you are suggesting should be left in place. Aside from grossly polluted environments, mercury is normally a problem only where the rate of natural formation of methyl mercury from inorganic mercury is greater than the reverse reaction. Methyl mercury is the only form of mercury that accumulates appreciably in macroinvertebrates and fish. Environments that are known to favor the production of methyl mercury include certain types of wetlands, dilute low-pH lakes in the Northeast and North central United States, parts of the Florida Everglades, newly flooded reservoirs, and coastal wetlands, particularly along the Gulf of Mexico, Atlantic Ocean, and San Francisco Bay (USGS 2000).

If not collected the mercury is guaranteed to end up farther down stream, and eventually in the delta or the bay, where methylation is a real environmental problem.

It would be a highly irresponsible management practice to leave a large portion of mercury in the rivers and streams because of unrealistic concerns for the lesser amount moving only a short distance away from an operating dredge. Most likely the movement of fine mercury would extend no farther than 50-feet off the end of the sluice box. That would relate to the distance a turbidity plume might extend downstream from a small-scale suction dredge. However, if the mercury was left in place the next storm event would move it downstream closer to, and eventually into, the bay and delta.

It is unclear from reading the report whether, or not, the floured mercury was already present in the river sediments. If one were to study the picture in the report that showed the results of panning materials from a nearby creek it does appear that was the case. Because the study was conducted in a seriously contaminated area if is impossible to determine what portion of flouring of mercury, if any, was caused by the crash box design of the suction dredge in use. If indeed the crash box caused the flouring then using a jet fare type suction dredge would eliminate the problem.

Reducing the amount of floured mercury, if it is in fact occurring, would be an easily eliminated problem by operating a modern jet flare style suction. The jet flare which is widely in use today, in the suction dredge mining community, is the best equipment available for collecting fine gold and because of this design and the density of mercury it would be extremely effective in collecting mercury particles with little disturbance that would result in further breaking the mercury particles down.

It is most important to reduce the total amount of mercury in the streams and rivers and its transported downstream into the bays and deltas. This is defined as a part of TMDL goals.

We know for certain that mercury is transported downstream throughout the winter season during high water events. Therefore, anytime there is the possibility for the removal of mercury by miners it should be undertaken and supported.

I hope the comments I have provided will be helpful in your efforts regarding suction dredge mining and water quality. I thank you for this opportunity to submit this data.

Respectfully,

Claudia M Wise

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