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, CA 95812-0010

Dear Sirs: My name is Gary Gailbreath. I have been a recreational dredger for nearly forty years, I have used dredges from two through five inches and have had the opportunity to observe first hand the impact of suction dredging. upon water quality. My personal observation is when any visual impact can be seen that the impact is small and localized. This observation has been similarly reflected by studies and published reports on this subject. I oppose any changes in the present regulations and procedures, and urge you to renew the statewide water quality exemption for suction dredging. If at some future time qualified studies show significant impacts from dredging the affected communities should work toward a reasoned approach recognizing sound science and the needs of all users.

I offer comments on issues that I believe are of concern,

Magnitude of Problem

In 1997, the California Department of Fish and Game described typical dredging activities as follows "An individual suction dredge operation affects a relatively small portion of a stream or river. A recreational suction dredger (representing 90-percent of all dredgers) may spend a total of four to eight hours per day in the water dredging an area of one to 10 square meters. The remaining time is spent working on equipment and processing dredged material. 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." For this discussion I will assume that the average time the dredge is operating and moving material is five hours. Thus, in a 24-hour period dredging might have the chance of negative impact less than 25 percent of the time. In addition, movement of material is not constant. Dredgers will avoid overburden wherever they can focusing rather on cracks and crevices which are more likely to have trapped gold. A reasonable estimate of activity which might cause turbidity increases is 2.5 hours per day or less than 13 percent of the time in any given day.

The next question might be how much of the watershed is affected. From the Oregon Siskiyou National Forest Dredge Study, Chapter 4, Environmental Consequences, "The average claim size is 20 acres. The total acreage of all analyzed claims related to the total acres of watershed is about ***0.2 percent***. The average stream width reflected in the analysis is about 20 feet or less and the average mining claim is 1320 feet in length. 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). I am not aware of any other studies addressing this question and assume that the 0.1 percent is a reasonable number to apply across all watersheds.

A follow up question might be how much material is moved during five hours of active dredging. A report from the U.S. Forest Service, Siskiyou National Forest (Cooley, 1995) answered the frequently asked 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 answer was that suction dredges moved a total of 2,413 cubic yards for the season. Cooley (1995) used the most conservative values and

estimated that the Siskiyou National Forest would move 331,000 cubic yards of material each year from natural causes. Compared to the 2413 (in-stream) cubic yards relocate by suction mining operations, the movement rate by suction dredge mining would equal about *0.7% of natural rates*. While these numbers would not be expected to be uniform throughout all drainages I do not believe they would differ by orders of magnitude.

A third question is if a single operating suction dredge does not pose a problem would the operation of multiple dredges would produce a cumulative effect that could cause harm to aquatic organisms. In answer, I cite, "No additive effects were detected on the Yuba River from 40 active dredges on a 6.8 mile (11 km) stretch. The area most impacted was from the dredge to about 98 feet (30 meters) downstream, for most turbidity and settelable solids (Harvey, B.C., K. McCleneghan, J.D. Linn, and C.L. Langley, 1982). In another study, "Six small dredges (<6 inch dredge nozzle) on a 1.2 mile (2 km) stretch had no additive effect (Harvey, B.C., 1986). Water quality was typically temporally and spatially restricted to the time and immediate vicinity of the dredge (North, P.A., 1993).

A report on the water quality cumulative effects of placer mining on the Chugach National Forest, Alaska 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, but did not affect water quality as evidenced by above and below water sample results. In the recreational mining area of Resurrection Creek, five and six dredges would be operating and not produce any water quality changes (Huber and Blanchet, 1992)."

The California Department of Fish and Game stated in its Draft Environmental Impact Report that "Department regulations do not currently limit dredger densities but the activity itself is somewhat self-regulating. Suction dredge operators must space themselves apart from each other to avoid working in the turbidity plume of the next operator working upstream. Suction Dredging requires relatively clear water to successfully harvest gold " (CDFG, 1997). This condition is well understood by dredgers and is referred to as being "smoked out."

Water quality

I will address water quality concerns in the following categories, turbidity, increased water temperature and heavy metal/ pollutants

Turbidity

A report on the water quality cumulative effects of placer mining on the Chugach National Forest, Alaska found:

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Thomas (1985), using a dredge with a 2.5-inch diameter nozzle on Gold Creek, Montana, found that suspended sediment levels returned to ambient levels 100 feet below the dredge. Gold Creek is a relatively undisturbed third order stream with flows of 14 cubic feet per second. A turbidity tail from a 5-inch (12.7 cm) dredge on Clear Creek, California was observable for only

200 feet downstream. Water velocity at the site was about 1 foot per second (Lewis, 1962).

Turbidity below a 2.5 inch suction dredge in two Idaho streams was nearly undetectable even though fine sediment, less than 0.5 mm in diameter, made up 13 to 18 percent, by weight, of substrate in the two streams (Griffith and Andrews, 1981).

Hassler (1986) noted "...during dredging, suspended sediment and turbidity were high immediately below the dredge, but diminished rapidly within distance downstream." He measured 20.5 NTU 4 meters below a 5-inch dredge that dropped off to 3.4 NTU 49 meters below the dredge. Turbidity from a 4-inch dredge dropped from 5.6 NTU 4 meters below to 2.9 NTU 49 meters below with 0.9 NTU above. He further noted "...water quality was impacted only during the actual operation of the dredge...since a full day of mining by most Canyon Creek operators included only two to four hours of dredge running time, water quality was impacted for a short time." Also "...the water quality of Canyon Creek was very good, and only affected by suction dredging near the dredge when it was operated."

In American studies, average turbidity levels have been shown to be between five and 15 NTU 5 meters below dredges. But even the maximum turbidity level measured in a clay pocket (51 NTU) fell below 10 NTU within 45 meters. Turbidity increases, from even large dredges on moderate sized streams, have shown to be fairly low, usually 25 NTU or less, and to return to background within 30 meters. The impact is localized and short lived; indicating minimum impact on moderate and larger waterways.

Within any waterway, sediment is primarily carried in suspension during periods of rainfall and high flow. This is an important point, as it indicates that a dredging operation has less, or at least no greater effect on sediment mobilization and mobility than a rain storm."

All of these research studies have concluded that only a local significant effect occurs, with it decreasing rapidly downstream. The studies have been wide spread, having been undertaken in Alaska, Idaho, California, Montana and Oregon.

Water Temperature

Solar radiation is the single most important energy source for the heating of streams during daytime conditions. The loss or removal of riparian vegetation can increase solar radiation input to a stream increasing stream temperature. *Suction dredge operations are confined to the existing stream channel and do not affect riparian vegetation or stream shade* (SNF, 2001). It is illegal to dredge stream banks. Dredging occurs only in the wetted perimeter of the stream. Therefore, it is highly unlikely suction dredging will cause a loss of cover adjacent to the stream, and a concomitant increase in water temperature.

Dredge mining had little, if any, impact on water temperature (Hassler, T.J., W.L. Somer and G.R. Stern, 1986). In addition, the Oregon Siskiyou Dredge Study states, "*There is no evidence that suction dredging affects stream temperature*" (SNF, 2001).

Increases in sediment loading to a stream can result in the stream aggrading causing the width of the stream to increase. This width increase can increase the surface area of the water resulting in higher solar radiation absorption and increased stream temperatures. *Suction dredge operations are again confined to the existing stream channel and do not affect stream width* (SNF, 2001).

Stream temperature can also increase from increasing the stream's width to depth ratio. The suction dredge operation creates piles in the stream channel as the miner digs down into the

streambed. The stream flow may split and flow around the pile decreasing or increasing the wetted surface for a few feet. However, within the stream reach that the miner is working in, the change is so minor that the overall wetted surface area can be assumed to be the same so the total solar radiation absorption remains unchanged. *Suction Dredging results in no measurable increase in stream temperature* (SNF, 2001).

"Small streams with low flows may be significantly affected by suction dredging, particularly when dredged by larger dredges (Larger than 6 inches) (Stern, 1988). However, the California Department of Fish and Game concluded, "current regulations restrict the maximum nozzle size to 6 inches on most rivers and streams which, in conjunction with riparian habitat protective measures, results in *a less than significant impact to channel morphology*" (CDFG, 1997).

Water Chemistry

Concern has been raised that small-scale dredge operations may degrade the downstream water column. To these concerns, I offer:

Suction dredging causes less than significant effects to water quality. (CDFG, 1997).

"Suction dredges, powered by internal combustion engines of various sizes, operate while floating on the surface of streams and rivers. As such, oil and gas may leak or spill onto the water's surface. *There have not been any observed or reported cases of harm to plant or wildlife as a result of oil or gas spills associated with suction dredging"* (CDFG, 1997).

The impact of turbidities on water quality caused by suction dredging can vary considerably depending on many factors. Factors which appear to influence the degree and impact of turbidity include the amount and type of fines (fine sediment) in the substrate, the size and number of suction dredges relative to stream flow and reach of stream, and background turbidities (CDFG, 1997).

"Effects from elevated levels of turbidity and suspended sediment normally associated with *suction dredging as regulated in the past in California appear to be less than significant with regard to impacts to fish and other river resources* because of the level of turbidity created and the short distance downstream of a suction dredge where turbidity levels return to normal" (CDFG, 1997).

I believe the most comprehensive study to date concerning how water quality is affected by suction dredging was contracted by the EPA to analyze of the effects on mining in the Fortymile River in Alaska. I have worked this river. I brief, the report stated:

"This report describes the results of our research during 1997 and 1998 into the effects of commercial suction dredging on the water quality, habitat, and biota of the Fortymile River. The focus of our work on the Fortymile in 1997 was on an 8-inch suction dredge (Site 1), located on the mainstem At Site 1, dredge operation had no discernable effect on alkalinity, hardness, or specific conductance of water in the Fortymile. Of the factors we measured, the primary effects of suction dredging on water chemistry of the Fortymile River were increased turbidity, total filterable solids, and copper and zinc concentrations downstream of the dredge. These variables returned to upstream levels within 80-160 m downstream of the dredge. The results from this sampling revealed a relatively intense, but localized, decline in

water clarity during the time the dredge was operating" (Prussian, A.M., T.V. Royer and G.W. Minshall, 1999).

"The data collected for this study help establish regional background geochemical values for the waters in the Fortymile River system. As seen in the chemical and turbidity data *any variations in water quality due to the suction dredging activity fall within the natural variations in water quality*" (Prussian, A.M., T.V. Royer and G.W. Minshall, 1999).

From personal experience on many of northern California rivers I know that large amounts of mercury are removed by dredgers. Whenever it is found, it is captured and removed, as it often has gold in it. This removal is a beneficial side effect of dredging.

From the above one can reasonably conclude the following:
--The hours of dredging activity which might be harmful are very small.
--The amount of the watershed affected by dredging is very small.
--The volume of material moved is very small in comparison with natural processes.
--There is no appreciable e effect on water temperature; and
--Water chemistry is not impacted to any significant level.
Gold prospecting and mining has been a productive activity in California since the 1840s. Certainly some of the earlier practices were harmful to the environment. However, those days are gone. Modern suction dredging today is carefully regulated by DFG and other agencies to ensure that the overall impacts do <u>not</u> create any measurable negative impact.

For the above reasons I urge you to renew the state-wide water quality exemption for suction dredgers. Good science and good governance demands it.

Thank you very much for considering my comments.

Sincerely,

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