PUBLIC LANDS FOR THE PEOPLE INC.

501C-3 NON PROFIT ORGANIZATION

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State Water resources Control Board

Song Her

Clerk to the Board, Executive Office.

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RE: (Water Quality and Suction Dredging comments and facts)

Dear, Ms. Her

Suction Dredges the Mitigation Machines

Public Lands for the People (PLP) is a 501 c-3 non profit organization That has approximately 40,000 members. The function of PLP is to preserve the rights of the public to enjoy and use the public and private lands of the United States in perpetuity.

First we will discuss what a suction Dredge does to help resolve a problem that plagues many of the California Rivers today. One of those problems is that of lack of sufficient Dissolved Oxygen (DO). The lack of sufficient DO in the rivers and streams and what to do to create DO. These comments are based not on suction dredge studies themselves but on scientific studies about what creates DO and things that deplete DO.

A suction dredge rehabilitates and creates DO in the following manner and also leaves a long lasting ability for the currents of the rivers and streams to continue to create this DO long after the suction dredge is removed and sitting home in storage.

Water turbulence, Fast water, deep water, wave action, oxygen aeration, deep holes and last but not least clean gravels. These are some of the things that create and maintain DO to help rivers and streams remain healthy.

1. Water Turbulence and Fast Water – A suction dredge creates this turbulence in two ways, one is the water that travels through the hose and comes out of the header box at the end of the suction hose and traps oxygen in the water by a cascading of the water. And two is the fast water which also helps to create DO when it runs across the riffle system in the sluice box which traps and catches the heavy metals and also acts as a clean graveled river bottom which creates DO. At the end of the Sluice box when the water leaves the box it creates a waterfall like turbulence and more fast water in which both actions create dissolved oxygen.

2. Deep Water – In the late summer and early fall when the suction dredges leave the area they have a tendency to leave deep holes in the area they were dredging in. The deeper holes do create cooler water because the cooler deep gravels help keep the water cooler which is the basis for more retention of DO. Cooler water retains more DO than warmer water. This condition will remain long after the suction dredge is gone. Besides enhancing the water quality it helps to protect fish that need cooler water pools to survive.

3. Wave Action also helps trap air to create DO. The boat like action of the suction dredge and the cascading affect of the water coming over the end of a suction dredge sluice box creates the same wave action as the winds.

4. Aeration creates DO and the divers themselves, with the breathing apparatus through the regulator and releasing air pumped from the air compressor on the suction dredge, which in turn works its way to the surface of the water, much like air pump in an aquarium.

5. The clean gravels that the river runs over to create its own DO are at both ends of the suction dredge. This is done by vacuuming the gravels from the nozzle at one end of the suction dredge which vacuums the silt and compacted gravels up through the dredge and then deposits the clean gravels that come out the other end of the dredge sluice box.

6. One of the quoted papers by EPA talks of healthy rivers require deeper channelization or narrowing of stream channel to help keep the required

DO. Suction Dredging is the perfect tool to accomplish narrowing and channelization of the rivers that the EPA states makes for a healthy river. While loosening the compacted gravels that the dams create and preparing the loose gravels for fish spawning.

Dissolved Oxygen Concentrations

Low dissolved oxygen (DO) concentrations can be detrimental to aquatic life. DO concentrations in surface waters are determined by many factors, including water temperature, salinity, biological respiration, chemical oxygen demand, sediment oxygen demand, photosynthesis, and transfer of oxygen into the water from the atmosphere (i.e., re-aeration). While DO concentrations are known to fluctuate throughout the day, minimum DO concentrations in streams typically occur at night when aquatic plants do not photosynthesize but aquatic organisms, including plants, respire. The lowest daily DO concentrations generally occur immediately before dawn.
In most streams that do not receive significant input of materials with high chemical and biological oxygen demand and nutrients that stimulate plant growth and respiration, natural re-aeration will maintain adequate DO concentrations to support a healthy aquatic community. Natural re-aeration rates in a stream are influenced by stream properties such as depth, turbulence, frequency of riffle areas, and natural drops (e.g., waterfalls and natural obstructions that create turbulence). Disturbances such as channelization and excessive erosion reduce channel complexity and thus re-aeration potential. Types of restoration practices that can increase DO concentrations include the following:

- Reintroducing or constructing small hydrologic drop structure or other structures (e.g., boulders, logs) that increase hydrological turbulence and mixing that increase re-aeration rates;
- Restoring existing degraded wetlands or re-establishing natural streamside vegetation to intercept nonpoint sources of nutrients to reduce aquatic plant growth and respiration demand within the stream;
- Re-establishing trees and bushes along stream banks to reduce incident sunlight and water temperature, and to trap nutrients and sediments, thereby reducing aquatic plant growth and respiration demands;
- Restoring stream depth and undercut banks and re-narrowing stream width to reduce aquatic plant growth and water temperatures, thereby reducing respiration demands; and
- Re-establishing or creating, shallow riffle substrates to increase turbulence, mixing, and the area of stream surface exposed to the atmosphere, which will increase re-aeration rates.

The following quotes were taken from various studies and articles referring to DO which is probably the most essential requirement for health of rivers and streams. In all of quotes from these studies and articles we could not find one reference that suction dredging created any deleterious effect on water quality, including turbidity that is short term and localized by nature of the suction dredge.

We did however find that many of the studies and articles mentioned things that are duplicated by the natural use of a suction dredge and its activity. We have listed many of those beneficial associations above that will aid the waterways in the state of California to maintain and increase the dissolved oxygen and mitigate other water quality problems.

If in fact all human uses create a certain amount of deleterious affect in their uses of the streams and rivers it is quite clear that only suction dredging has any positive benefits to the streams and rivers during its normal use which would far exceed any effect that it may have.

Rafting, Kayaking and boating communities will break down the banks by landings and wading, defecate on the banks, leave trash and step out of the rafts in Salmon Redd Beds or the spawning beds of other fish. Suction Dredging is regulated out of the rivers and streams at these times and helps create spawning gravels and again is site specific and localized.

Fisherman Wade through these rivers during spawning periods at great length, catch Threatened and Endangered species, deposit lead, metal and glass objects. Suction dredging again is regulated out during those spawning times and recover the lead, glass and other metals that both hunters and fisherman deposit in the rivers and streams and suction dredging is site specific and localized.

All forms of day users, swimmers and wader that leave trash, glass and dirty diapers, romp through spawning gravels divert rivers, build dams and harass fish are also deleterious. Suction dredging dredges up and recovers all types of metal, glass and trash, tears down the dam obstructions and again suction dredging is site specific and localized.

"Dissolved oxygen (DO) is the amount of oxygen that is dissolved in water and is essential to healthy streams and lakes. The dissolved oxygen level can be an indication of how polluted the water is and how well the water can support aquatic plant and animal life. Generally, a higher dissolved oxygen level indicates better water quality. If dissolved oxygen levels are too low, some fish and other organisms may not be able to survive."

There are many ways that suction dredging helps water quality where the other uses have none. If I were the state of California Water Quality Control Board would foster and encourage any activity that has as many benefits as suction dredging, not to looking for a way to get rid of the activity.

Studies and Reports:

"Much of the dissolved oxygen in water comes from oxygen in the air that has dissolved in the water. Some of the dissolved oxygen in the water is a result of photosynthesis of aquatic plants. Other factors also affect DO levels such as on

sunny days high DO levels occur in areas of dense algae or plants due to photosynthesis. Stream turbulence may also increase DO levels because air is trapped under rapidly moving water and the oxygen from the air will dissolve in the water."

"In addition, the amount of oxygen that can dissolve in water (DO) depends on temperature. Colder water can hold more oxygen in it than warmer water. A difference in DO levels may be detected at the test site if tested early in the morning when the water is cool and then later in the afternoon on a sunny day when the water temperature has risen. A difference in DO levels may also be seen between winter water temperatures and summer water temperatures. Similarly, a difference in DO levels may be apparent at different depths of the water if there is a significant change in water temperature."

"Dissolved oxygen levels typically can vary from 0 - 18 parts per million (ppm) although most rivers and streams require a minimum of 5 - 6 ppm to support a diverse aquatic life. Additionally, DO levels are sometimes given in terms of Percent Saturation."

Nawa et al. (1990) "documented stream temperature increases in rivers of south coastal Oregon due to riparian canopy removal. As upper tributary temperatures cooled after 10 to 20 years of revegetation, lower main river areas showed a lag time in recovery. This delay was ascribed to continuing channel widening and aggradation from more recent disturbances in the basin or from reworking of channel-stored sediment. While some sub-basins such as Madden, Plummer and Potato Creeks are probably showing cooling trends, the temperature in the main stem of the South Fork seems to be remaining extremely high" (Figure 3-5).

"Livestock will often graze near streams preferentially, stand in the shade of riparian trees during the heat of summer, or cross through riparian zones to get water. Over long periods of time, over-use of stream side areas by livestock can cause loss of riparian vegetation. Streams in Oregon lacking riparian cover were shown to experience temperature rises of one degree per mile (Ziller, 1985). Flow depletion due to agricultural diversion makes streams shallower and subject to warming, and return flows from irrigated pastures can further elevate stream temperatures. Streams heavily impacted by grazing in the South Fork Trinity River basin include Carr Creek, lower Salt Creek and its tributaries, lower Big Creek, Lower Tule Creek, lower East Fork of Hayfork Creek and the main stem of Hayfork Creek in Hayfork Valley."

Suction Dredging accomplishes the above requirement of the above study by Nawa et al.

The USFS (1990a, 1991a) "initiated an extensive monitoring program after the 1987 Fires to try to detect impacts from the fire and subsequent salvage logging

In fact, recent drought years have produced record high temperatures in the South Fork Trinity River (Dale, 1990)"

"Dean (in press) estimated 50% mortality for spring chinook adults during recent years. Fine sediment from stream side landslides is also suspected of capping spring chinook redds in the main stem of the South Fork, and lowering the survival of eggs and alevin (Mike Dean, personal communication)."

"Toxic pollutants are various metals and chemical compounds discharged as by-products of industrial processes. Cadmium, mercury, chromium, iron and lead and chemicals like PCBs and DDT are lethal to some organisms. They also interfere with the organisms normal biological processes. Household products, such as bleach, drain cleaners, and pesticides as well as herbicides and insecticide from farming, also represent toxins that find their way into river waters.

Toxic pollutants enter the food chain through organisms that process sediment, such as midges and worms. As these organisms are eaten by other animals, they move up the food chain and accumulate in organisms. In larger fish, toxins can cause lesions and deformities."

Thermal Pollution "is the result of industrial processes and runoff from streets and roads during rainy periods. Power generators and some industrial processes use river water as coolant. The discharged water is at a much higher temperature. Warm water holds less oxygen. Some organisms will not survive under warmer conditions while others will come to depend on the changed environment for their survival. Warmer conditions may also disrupt the food chain; insects can go through an early metamorphosis and deprive birds of an emergent insect population."

Suction Dredging Creates Dissolved Oxygem.

"Salmon, steelhead and trout require cool water temperatures and adequate levels of dissolved oxygen to thrive (Reiser and Bjornn, 1979). Optimal temperatures for salmon and steelhead range between 46-58°F. Many streams in the South Fork Trinity River basin experience summer temperatures that are far higher than the optimal range for fish, and some measured temperatures even exceed what are considered lethal levels (Reiser and Bjornn, 1979). Dissolved oxygen levels are directly correlated with stream temperatures, so low D.O. levels may be contributing to increased fish stress, mortality, and low fish densities in some stream reaches. For most streams there is a general inverse relationship between increased stream temperatures and density of juvenile salmonids."

Dam's are one of the major problems in creating unreliable water flows and suction dredging to what ever extent possible mitigates this problem by helping to create Dissolved Oxygen.

DISSOLVED OXYGEN

"Dissolved oxygen is probably the single most important water quality factor that pond managers need to understand. Oxygen dissolves in water at very low concentrations. Our atmosphere is 20% oxygen or 200,000 ppm but seldom will a pond have more than 10 ppm oxygen dissolved in its' water. Dissolved oxygen concentrations below 3 ppm stress most warmwater species of fish and concentrations below 2 ppm will kill some species. Often fish that have been stressed by dissolved oxygen concentrations in the range of 2 or 3 ppm will become susceptible to disease."

"Waves on still water and tumbling water on fast-moving rivers mix atmospheric oxygen into the water."

EPA monitoring and Assessment

"The stream system both produces and consumes oxygen. It gains oxygen from the atmosphere and from plants as a result of photosynthesis. Running water, because of its churning, dissolves more oxygen than still water, such as that in a reservoir behind a dam. Respiration by aquatic animals, decomposition, and various chemical reactions consume oxygen."

"Wastewater from sewage treatment plants often contains organic materials that are decomposed by microorganisms, which use oxygen in the process. (The amount of oxygen consumed by these organisms in breaking down the waste is known as the biochemical oxygen demand or BOD. A discussion of BOD and how to monitor it is included at the end of this section.) Other sources of oxygen-consuming waste include stormwater runoff from farmland or urban streets, feedlots, and failing septic systems".

"High stream temperatures may result from removal of riparian trees during logging, stream widening due to aggradation, over-grazing of riparian zones, flow depletion and agricultural runoff. When debris flows inundate channels, riparian zones can also be devastated. The stream bed may remain unstable for a long duration, making recolonization of stream side trees difficult even by invasive species such as willows or alders (Lisle, 1985). Lower reaches of Pelletreau Creek and the South Fork Trinity River at Hyampom are classic examples of this problem. The linkage between sediment build up and changes in riparian canopy are described more completely in Chapter IV."

"Actions to cool **rivers** include planting and protecting trees near **streams** to provide shade; reducing sediment runoff and establishing more logs in **streams** to **create** deeper channels and cool pools; removing or setting back levees to allow **streams** to wander more naturally, thereby increasing cool groundwater inflow; restoring summer stream flow to make **streams** less susceptible to warming; and minimizing hot water discharges from industrial and municipal sources. These actions, which cool **rivers** and restore fish habitat, have begun to be implemented in many watersheds in the state."

Suction Dredges do anything in the above article except to plant trees.

The ideal stream will have high levels of dissolved oxygen, good water clarity, sufficient shade, a reliable water source, diverse habitat, a snake-like deep channel, a gradient between 0.5% and 2%, fertile water, a gravel bottom and cool temperatures. These factors work in harmony to determine the quantity and quality of fish.

TURBITIY

Suction Dredging is hammered for a plume of turbidity that it creates from the water and material that exit the Sluice Box. Here are some quotes from studies that feel that the turbidity is not the problem that it is made out to be.

"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)."

"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 (SNF, 2001) states, *"There is no evidence that suction dredging affects stream temperature."*

"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)."

MERCURY AND METHYLMERCURY

These heavy metals take a great toll on water quality in the lakes and streams of the state of California. Methylmercury which is created by Mercury through several processes has contaminated waters and fish and have been directly responsible for mental disease, physical handicap and even death in Humans.

There have been extensive studies to determine what the best methods of taking mercury out of our waterways and only a few suggestions on how to remove the Mercury cost affectively. One of the number one ways suggested to remove that mercury from waterways is the process of dredging. Whether it be bucket line dredges or suction dredges it is referred as cost prohibitive. That meaning the government could not afford the process. Yet the fact that suction dredging by suction dredge miners is actually free from government expense, it appears to be over looked by the environmental community and the agencies.

The environmental community has even suggested that the suction dredge process reintroduces the mercury back to the rivers. Even if that were a fact it would be such a minute amount in comparison to the amount of Mercury that is collected recovered from a suction dredge sluice box and removed from the river for ever that the amount that might be reintroduced would be negligible.

The liquid mercury that lays in the river silts and gravels is in constant danger of being attacked by bacteria and turned into methylmercury, which is a danger to all fish and biota in the river. These contaminated biota are eaten by the fish and in turn consumed by humans causing a build up in their systems which can and does create mental, physical and emotional problems and sometimes even death.

It would appear that there are two things that the scientists and or the agencies involved in resolving mercury contamination problems would take into consideration. One would be to encourage any activity that removes the mercury from the rivers and streams. Suction dredges and their operators do just that, they remove the mercury during their normal activities. Suction dredgers may not be intentionally collecting mercury but because of its like weight of gold it is inadvertently collected with the gold. Since all intelligent miners know mercury also holds fine gold they are not going to throw it back in the river but save it and extract the gold that the mercury holds. And, number two for the agency to consider is to have collection centers where that mercury can be turned in of get it out of circulation and keep it out of the rivers and streams. This latter method of collecting the mercury was suggested as an idea that I have introduced to the CA. Fish and Game as far back as 1993 in the rule making process for suction dredging regulations. It fell on deaf ears then and I expect it will now as well.

It appears that the State of CA. agencies are all about what the problem is and not how to help resolve the problem. The state of Washington and some others have collection programs for mercury and as recently as Feb. 2007 I visited Washington for a 2 day gold show. The Washington state Dep. Of Ecology and

had a booth at the Resources Coalition yearly gold show. The Dept. of Ecology has been at the show 3 years running and this year they collected over 70 pounds of mercury from the suction dredge community.

During the 1980's on the Yuba River in Ca., I collected some 300 pounds of mercury in a time frame of about 7 years. It would appear to me that some agency in the state of California would take advantage of that collection of mercury from the suction dredge community by creating some sort of a collection or deposit program.

"Mercury is used in a wide variety of household products, including paint, thermometers, thermostats, batteries, fluorescent lamps, disinfectants, antiseptics, diuretics and preservatives. in pigments and dyes, detergents, and explosives (mainly in the past)."

"Temperature, **mercury** and **bacteria** are three main pollutants presenting widespread problems in the Basin.

Mercury enters the water column from deposition from the atmosphere and transport of sediment
particles from run-off. Mercury enters the water column in a form that is not readily bioavailable.
In the water column and sediment, mercury interacts with **bacteria** to produce methyl mercury,

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which is bioavailable. The mercury that is deposited directly to the water column, reactive
gaseous mercury, is very reactive and tends to stick to particles. Mercury is constantly being
recycled in the environment."

6.1.4 "Effective **waste management** is another **control method** which can reduce releases, for instance from spills or gradual leakage (e.g. from broken thermometers or auto switches and dental amalgams)."

"Historic hydraulic mining and the use of mercury to remove gold through amalgamation has left the Bear and Yuba Rivers and watersheds with a legacy of eroding hillsides, mercury, and excess sediment. The USGS estimates that up to 8,000,000 of the 26,000,000 lbs used in the Sierra Nevada may have been "lost" during gold recovery. The mercury is present in the bottom

(benthos) of rivers and reservoirs, as well as in pits, sluices, and tunnels remaining in abandoned mine lands (AMLs) from which it may be mobilized. It is transported by erosion and runoff as elemental mercury and in ionic form (e.g., Hg^{2+}), in dissolved form, adsorbed to particles, and as droplets of the metal. The mercury can be converted by microbial action into methylmercury, which can then be absorbed by microbes, plants, and animals. As methylmercury makes its way up the food chain (bioaccumulation) it is concentrated (biomagnification), so that in larger predatory fish (e.g., trout and bass) concentrations can exceed levels of concern for human consumption (>0.3 parts per million, ppm). There are very few areas (primarily within AMLs) where mercury concentrations in surface water are high enough to warrant concern for public health from consuming the water itself."

"Studies by scientists at the University of California, Davis in the mid-90s and follow-up studies by US Geological Survey scientists in 1998-2000 have demonstrated that there are both "hotspots" of mercury contamination in AMLs and in downstream aquatic wildlife populations that have levels approaching and exceeding 1 ppm. Although concentrations of methylmercury in fish, amphibians, aquatic insects, and water are known for certain sites, the total amount of mercury ("load") in the watersheds and rivers is not known and can currently only be guessed. In addition, it is unknown what populations within the Sierra Nevada and the Sacramento Valley could be affected and to what extent, due to consumption of mercury-tainted fish."

"Mercury can cause a variety of health problems in humans, primarily neurological, including declining motor skills and sensory ability, tremors, inability to walk, convulsions, and death. The primary pathway for mercury poisoning in humans (and other animals) is through fish consumption and is a more serious problem for children due to their lower weight. Although there have been national surveys of mercury exposure through fish consumption, this information is not adequate for a local or regional analysis of mercury exposure for humans."

"Nevada County has also joined with SWRCB and the USFS in requesting that county residents bring mercury they may have to a central location on special collection days. Over two hundred pounds of mercury was recovered in this fashion on two separate days at a cost of over $1,000. Because this approach will eventually reach the end of casually-available mercury (e.g., from peoples' garages), it has limited impact on the problem. Similar outreach is being attempted to recreational dredge miners in order to encourage them to collect mercury they observe or recover incidental to their operations. This method has slightly greater potential to recover mercury from the rivers and streams where it is, presumably, continuously being re-supplied from surrounding AML lands and tunnels."

"Contributing factors to mercury contamination Atmospheric deposition of mercury can be a significant source of mercury in certain regions. There have been measurements of mercury deposition downwind of the Bay Area showing deposition rates higher than other areas in Northern California. Urban centers are a potentially significant source of mercury due to incinerators, automobiles, and poor emission controls. This mercury could be considered the background level, however, its actual contribution to current mercury contamination is unknown and may be worth measuring. Land-use near abandoned mine lands and within the affected

watersheds (Yuba/Bear) can impact the distribution of mercury, its chemical transformation, and growth of mercury-methylating bacteria. Most human land-use results in impacts on hydrology, nutrient cycles, or sediment contributions to streams and rivers. Because these processes all influence mercury distribution and transformation, assessing their potential or actual impacts is an important part of managing and cleaning up mercury-contaminated landscapes and river systems. This could be accomplished through a GIS that included potential and actual land-use/development maps, topography and hydrology, and other natural resource information."

"Exposure to mercury through food, water and air can cause significant harm to human health. Methyl mercury, which is the most commonly found form of mercury in the environment, can cause permanent damage to the central nervous system, lungs and kidneys.

Methyl mercury intake through fish can put unborn fetuses at great risk. The mercury can cross the placental barrier and cause fetal brain damage without any symptoms in the expectant mother. Newly born infants may experience mental and physical disabilities and delayed development of motor and verbal skills.

During the 1960s and 70s, the Minamata Bay mercury pollution disaster received global media attention, opening the world's eyes to the negative health effects of methyl mercury. Between 1932 and 1968, the Japanese Chisso Corporation discharged about 27 tonnes of methyl mercury with its wastewater into the bay. The pollution caused severe damage to the central nervous system of the people who ate large quantities of contaminated fish and shellfish from the bay. In addition, congenital Minamata disease occurred as many infants were born with a condition resembling cerebral palsy caused by methyl mercury poisoning of the fetus during pregnancy. The disease, which was officially recognized on 1 May 1956, caused many people to lose their lives or suffer from physical deformities."


EUGENE SMITH

It would appear that the state of California in their collaborative attempts to rid their waters of suction dredgers by regulating them into oblivion is a misguided and misplaced waste of time for several reasons. The main reason is that the use of suction a dredge is the only reasonable way to create a positive effect on fish and water quality of any of the waterway users or all of them combined. For the state or the agency not to foster and encourage suction dredge mining is beyond our comprehension.

The Federal laws demand that the agencies foster and encourage mining. With the current attempts at regulating suction dredge mining by the different agencies in the state and the federal government we are hard pressed to understand the need for duplicative and or prohibition like regulations on an activity that actually can do some good the environment. With this information in mind we would encourage the Water Quality Control Board to continue their regulative authority by re-issuing or reinstating its state wide permit on suction dredging.

Public Lands for the People and myself have given your agency a method to help fix a long standing problem and we feel that the agency should take advantage of the offer from the suction dredge community to help the Water Quality Control Board with its water quality problems.

Thank You

Gerald Hobbs

President, Public Lands for the People

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