Wise Natural Resources, LLC
34519 Riverside DR. SW
Albany, Oregon, USA 97321-9450

April 2, 2013

Subject: ***Oppose the Moratorium on Suction Dredge Mining, Senate Bill 838***

Dear Senator,

I am writing in opposition of Senate Bill 838. This is an unnecessary bill that has not been instigated to generate time to study possible negative effects from suction dredge mining (those questions have already been answered) but is a selfish attempt to block miners from earning an honorable income. I thought a primary goal of the 2013 citizen's legislation was the net creation of jobs?

There are copious suction dredge studies that show a lack of measureable harm to the environment that have previously been provided to this committee. Research has also shown associated net benefits to the environment from small-scale gold suction dredging.

Suction dredge benefits have tremendous importance to the ecosystem including: protection from predation at moderate levels of suspended sediment (turbidity); improvement and addition of fish refugia (dredge holes); better-quality spawning gravels; enhanced salmonid populations; increased macroinvertibrate density; and removal of waste products left by recreational users. These beneficial effects are a direct improvement to salmonid habitat resulting in healthier fish rearing environment.

Suction dredging also has a direct positive improvement on the economies of Oregon's rural communities that are in need of jobs.

Please include in Public Record if this bill goes to committee.

Sincerely,

Claudia J. Wise

Physical Scientist
U.S. EPA (Retired)

INTRODUCTION: Claudia J. Wise, Physical Scientist

I am a retired U.S. EPA Research Scientist and an invited member of the California Department of Fish and Wildlife Subsequent Environmental Impact Report Public Advisory Committee for small-scale gold suction dredging. During the Public Advisory Committee meetings I presented a science based PowerPoint presentations to the committee titled "Selenium Antagonism to Mercury".

I have 32-years of professional experience with the US Environmental Protection Agency, Corvallis Environmental Research Laboratory, Corvallis, OR. I worked primarily in chemical and biological instrumentation methods studying phytotoxicity of soil and plant growth effects. For 8-years I was assigned to the Western Fish Toxicology Station where I coauthored journal articles dealing with bioaccumulation of heavy metals in invertebrates and fish. I contributed to many projects and have coauthored numerous journal articles for Freshwater, Ecotoxicology, and Terrestrial habitat Branches. I concluded my EPA career while working in the Watershed Ecology Stable Isotope Research Facility in support of the Salmon habitat division.

My first experience with mining and surface soil contamination was in 1989. The study revolved around the Coeur d' Alene mining district wastes from the Kellogg, ID Sunshine silver mine and Bunker Hill smelter. The research was an analysis of the antagonistic properties of a zeolite soil amendment to Bunker Hill soil and 26 additional soil types from around Oregon. The goal was to determine if the zeolite would interact antagonistically with the heavy metals in the soil and reduce its toxicity.

I am acquainted with small-scale gold suction dredge mining around Oregon and California. I also have international experience working in Cambodia. I have 13 years experience observing and participated in suction dredge mining operations. My exposure to mining techniques have occurred on the Umpqua River, Calapooia River, Quartzville Creek, and Briggs Creek in Oregon, the Klamath River in California, and in the Ratanakiri Province of Cambodia. While there I was asked to write the environmental rules for operating gold suction dredges for the Country of Cambodia.

(1). Bullets Regarding the Beneficial Environmental Effects of Small-scale Gold Suction Dredging

I. Beneficial factors of Turbidity

Experts agree that **fish survival improves under turbid conditions.** Gregory (1993) reported similar situations noting that any reduction in feeding efficiency of fish may be offset by **reduced risk of predation at moderate levels of suspended sediment.**

Elevated TSS conditions, similar to **turbidity plumes created from dredging activity, have been reported to enhance cover conditions**, **reduce piscivorous fish/bird predation rates**, and improve survival (CH2MHill 2000).

II. Suction Dredge Holes Create Safe Habitat for Fish

Dredge holes 3 feet or deeper are considered adequate refugia for fish. *Excavations from dredging operations can result in temporarily formed pools or deepen existing pools improve fish habitat.* ***Pools created by abandoned dredger sites can provide holding and resting areas for juvenile and adult salmonids****. Stern, G. R. 1988.*

III. Tailing Piles from Small-Scale Suction Dredging may be Included in excellent Spawning Gravels

Suction dredging breaks up compacted steam beds. The gravels are dispersed by the high stream flows, which included **dredge tailings, compose a portion of the suitable spawning gravels each year**.

IV. Small-Scale Gold Suction Dredge Tailings Protect Established Redds by Offering Additional Spawning Substrate in Areas of Limited Natural Substrate.

Salmonids show no preference for dredge tailings, for spawning, if natural substrate is available. If none is available redds built in cleaned dredge tailings that doesn't scour are a net benefit to increased salmonid numbers.

V. *One year after dredging at both sites…the study found that there was an increase in macroinvertibrate density in mined area….*

Forty Mile River…Final Report (1999), paid for by EPA: studied the 8 and 10 inch suction dredge:

VI. Miner's, On Their Own Claims Remove Waste Left Behind by Others

Small-scale gold suction dredge operators Improve water quality by removing massive amounts of lead weights, used water bottles, car debris, nails, bolts etc. The list goes on and on. Also remove waste left by other users of camping areas.

VII. Small-Scale Gold Suction Dredging Tourist Dollars Support Local Business.

Small-scale gold suction dredgers contribute an average $13,797 per miner into Oregon's economy. As well as, collectively paying $16,600 in permit fees to the state DEQ. These figures are based on calculations made from figures in the CDFG 2012 EIR and 2010 data received from the DEQ.

(2). The Beneficial Environmental Effects of Small-scale Gold Suction Dredging

I. Beneficial Factors of Turbidity

"Turbidities greater than 25 NTU can decrease the visual acuity of predatory fish" (McLeay et al. 1984, 1987; Redding et al. 1987; Reynolds et al. 1989). While Sigler (1984) and Lloyd (1987) reported avoidance of turbid water may begin as turbidities approach 30 NTU and then reach a threshold at 37 NTU (Servizi and Martens 1992).

From a personal note when suction dredges are in operation small fish are seen feeding near the nozzle safely away from the larger fish feeding behind the dredge. A kind of a pecking order is created. The larger fish are in the more turbid water potentially packed with tidbits of food loosened from the streambed and flowing over the dredge along with the other dredge materials. I would be interesting to measure the turbidity of the water near this group of fish and see if they are located just to the side of the more moderate turbidities in the 30-37 NTU range as noted in the research above maybe tucked just within the 25 NTU portion of the dredge plume.

Fish feeding off the back of a dredge

Perch feeding from tailings falling off the back of a suction dredge

Gregory (1993) reported similar situations noting that any reduction in feeding efficiency of fish may be offset by reduced risk of predation at moderate levels of suspended sediment. Juvenile Chinook salmon spend more time foraging in water of moderate turbidity (20-25 NTU) than in clearer water. Similarly, brook trout are more active and spend less time near cover in moderately turbid water than in clear water (Gradall and Swenson 1982) and juvenile estuarine fishes in laboratory channels actively seek moderate turbidity (Cyrus and Blaber 1987). Coho salmon do not avoid turbidities as high as 70 NTU but move into turbid water when frightened (Bisson and Bilby 1982). Elevated TSS conditions, similar to turbidity plumes created from dredging activity, have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival (CH2MHill 2000).

Fish have been observed feeding in turbid plumes created by suction dredging. Stern (1988) observed young steelhead feeding on dislodged invertebrates in turbid dredge plumes, even though clear water was available nearby. Cutthroat and rainbow trout have also been observed feeding.

The effects of suction dredging on the feeding of fish appears to be less than significant. Although invertebrate populations are negatively affected by suction dredging, the impacts are localized and short-term. Stern, G. R. 1988. Effects of Suction Dredge Mining on Anadromous Salmonid Habitat in Canyon Creek, Trinity County, California. Masters Degree Thesis, Humbolt State University, 80p.

Klamath River Suction Dredge

II. Small-Scale Gold Suction Dredge Holes Create Safe Habitat for Fish

1) IIt is generally accepted that most of the pools made by small-scale suction dredges last only until the following winter high water flows arrive. In the meantime they serve the fish as resting areas and safe locations from predation. The pools may or may not intersect cold ground water or hyporheic subsurface flows. This fact does not negate or makes the pools less beneficial to the survival of salmonids. The pools still serve as resting and protective locations between thermal refugia, that are generally located at the mouths of confluent streams that could be located some miles away (California Final Subsequent Environmental Impact Report, March 2012).

Salmon Circling a Dredge Hole on the Klamath River
Avery Rathburn, September 28, 2009

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

3) *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, 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.*

4) *During times of low flow in a river or stream, increased water depth can provide a refuge from predation by birds and mammals. Harvey, B. C., and A. J. Stewart. 1991. Fish size and habitat depth relationships in headwater streams. Oecologia. 87:336 - 342.*

5) *Pools created by abandoned dredger sites can provide holding and resting areas for juvenile and adult salmonids. 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.*

6) *Eight fish occupying a riffle during late summer in Butte Creek, California, moved into a dredged excavation nearby. Harvey, B. C. 1986. Effects of suction gold dredging on fish and invertebrates in two California streams. N. Am. J. Fish. Manage. 6:401 - 409.*

III. Dispersed Tailings from Small-Scale Suction Dredging are Included in Suitable Spawning Gravels

1) Gravels are dispersed by the high stream flows, which included dredge tailings, compose a portion of the suitable spawning gravels each year.

2) In the name of remediation of spawning beds augmenting with gravels from outside the waterway is considered an insignificant and obviously beneficial addition. I came across large project that includes 7 locations along the American River that includes augmenting waterways with 75,000 yards of gravels.

3) "Reclamation will add spawning gravel to the lower American River at seven sites from Nimbus Dam to Upper Sunrise Park and from Jed Smith Bridge to Arden Rapids. Three side-channel habitats would also be established. The purpose of the action is to replenish spawning gravel at the seven restoration sites and to establish side-channel habitat to increase and improve Chinook salmon and steelhead spawning and rearing habitat." (The Final Environmental Assessment/Finding Of No Significant Impact is available at http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=3202 .)

IV. Small-Scale Gold Suction Dredge Tailings Protect Redds by Protecting the Destruction of Redds in Areas of Limited Natural Substrate.

1) Salmonids show no preference for dredge tailings, for spawning, if natural substrate is available. If insufficient substrate is available Salmonids are left with the choice of spawning over, and destroying, previously built redds or using cleaned dredge tailings.

2) In areas where inadequate quantity of natural gravels exist dredge tailings provide a net benefit by saving previously built redds from destruction by later arriving salmonids and at the same time provide excellent future spawning gravels from dredge tailings. This creates, an overall, net positive effect.

V. *One year after dredging at both sites…the study found that there was an increase in macroinvertibrate density in mined area….*

There are dozens of government studies that show suction dredge activity even helps the environment for the fish and the biota. Here are a couple of studies in particular note:

1) Forty Mile River…Final Report (1999) paid for by EPA, which studied the use of an 8-inch and a 10-inch suction dredge: "One year after dredging at both sites showed recovery of Macroinvertibrate diversity appeared to be substantial…the study found that there was an increase in macroinvertibrate density in mined area…"

2) "If there were a cumulative effect of dredging, an increasing number of taxa should have declined in abundance after June at downstream stations." Harvey (1986)

VI. Miner's, on Their Own Claims Remove Waste Left Behind by Others

A service that **small-scale gold suction dredge operators improve water quality by removing waste** in the waterways left behind by other water users. Not only do many dredgers pickup trash around their camps and along the water banks but because of the nature of a dredge they are able to capture heavy waste found in the water such as lead fishing weights, fishing

line and lures long forgotten, old car parts, iron nails, bolts and the like. No only heavy wastes but sunken discarded and/or lost items.

From the Lewis River, WA (Scott Atkinson)

All this garbage was taken from ONE dredge hole during a summer season on the S Fork of the American River, CA.

VII. Small-Scale Gold Suction Dredging Tourist Dollars Support Local Business.

The state DEQ, for 2010, collected $16,600 ($25 x 664 permits) from permit fees according to data received from Oregon DEQ (2010). In the California EIR (2012), CA calculated, on average, each small-scale gold suction dredge miner will spend about $15,424 per year on food, fuel, travel, and equipment. A huge benefit to the state's lagging economy.

(3). Comprehensive List of Scientific Publications that Support Information in the Bullets

Review of Beneficial Effects of Gold Suction Dredging

Compiled by: Claudia J. Wise, Research Physical Scientist

U.S. EPA – Retired

July 2006

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I. The Beneficial Factors of Turbidity

1) **McLeay, D.J., G.L. Ennis, I.K. Birtwell, and G.F. Hartman. 1984.** Effects On Arctic Grayling (Thymallus arcticus) of Prolonged Exposure to Yukon Placer Mining Sediment: A Laboratory Study. Canadian Technical Report of Fisheries and Aquatic Sciences 1241.

2) **McLeay, D.J., I.K. Birtwell, G.F. Hartman, and G.L. Ennis. 1987.** Responses of Arctic Grayling (Thymallus arcticus) to Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673

3) **Redding, J.M., C.B. Schreck, and F.H. Everest. 1987.** Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116:

4) **Reynolds, J.B., R.C. Simmons, and A.R. Burkholder. 1989.** Effects of Placer Mining Discharge on Health and Food of Arctic Grayling. Water Resources Bulletin 25: 625-635.

5) **Sigler, J.W., T.C. Bjornn, and F.H. Everest. 1984**. Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon. Transactions of the American Fisheries Society 113: 142-150.

6) **Lloyd, D.S. 1987.** Turbidity as a Water Quality standard for Salmonid Habitats in Alaska. North American Journal of Fisheries Management. 7: 34-45.

7) **Servize, J.A., and D.W. Martens. 1992.** Sublethal Responses of Coho Salmon (Oncorhynchus kisutch) to Suspended Sediments. Canadian Journal of Fisheries and Aquatic Sciences 49: 1389-1395.

8) **Gregory, R.S. 1993**. Effect of Turbidity on the Predator Avoidance Behavior of Juvenile Chinook Salmon (Oncorhynchus tshawytscha). Canadian Journal of Fisheries and Aquatic Sciences 50: 241-246.

9) **Gradall, K.S., and W.A. Swenson. 1982.** Responses of Brook Trout and Creek Chubs to Turbidity. Transactions of the American Fisheries Society 111: 392-395.

10) **Cyrus, D. P, and S. J. M. Blaber. 1987.** The influence of turbidity on juvenile marine fishes in estuaries. Part 2. Laboratory studies, comparisons with field data and conclusions. J. Exp. Mar. Biol. Ecol. 109:71-91.

11) **Bisson, P.A., and R.E. Bilby. 1982.** "Avoidance of Suspended Sediment by Juvenile Coho Salmon. North American Journal of Fisheries Management 4: 371-374.

12) **CH2MHILL. 2000.** Suspended Sediment Effects on Fish: A Literature Review.

13) **Stern, G.R., 1988.** Fish in Canyon Creek sought out dredge plumes to feed on exposed invertebrates.

14) **Stern, G. R. 1988.** Effects of Suction Dredge Mining on Anadromous Salmonid Habitat in Canyon Creek, Trinity County, California. Masters Degree Thesis, Humbolt State University, 80p.

II. Small-Scale Gold Suction Dredge Holes Create Safe Habitat for Fish

1) **California Final Subsequent Environmental Impact Report**, March 2012.
2) **Siskiyou National Forest, 2001**
3) ***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.*
4) ***Harvey, B. C., and A. J. Stewart. 1991.*** *Fish size and habitat depth relationships in headwater streams. Oecologia. 87:336 - 342.*
5) ***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.*
6) ***Harvey, B. C. 1986.*** *Effects of suction gold dredging on fish and invertebrates in two California streams. N. Am. J. Fish. Manage. 6:401 - 409.*

III. Dredging are Included in Suitable Spawning Gravels

1) The Final Environmental Assessment/Finding of No Significant Impact is available at **http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=3202**

2) Hassler, T.J., W.L. Somer and G.R. Stern, 1986

IV. Small-Scale Gold Suction Dredge Tailings Protect Redds by Protecting the Destruction of Redds in Areas of Limited Natural Substrate

California Final Subsequent Environmental Impact Report, March 2012.

V. One year after dredging at both sites…the study found that there was an increase in macroinvertibrate density in mined area….

1) 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 and Resurrection Creek, Alaska***. Prepared for: U. S. Environmental Protection Agency, Region 10, Seattle, WA.
2) 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.

VI. Miner's, on Their Own Claims Remove Waste Left Behind by Others

Reports and pictures of waste collected in small-scale Gold Suction Dredge Holes. **Miner's report.**

VII. Small-Scale Gold Suction Dredging Tourist Dollars Support Local Business

Calculated from California EIR (2012) using permit numbers received from ODEQ (2010).

VIII. Small-Scale Dredging Efficiency and Rates

1) Studies to date have not shown any actual effect on the environment by suction dredging, except for those that are short-term and localized in nature (USACE, 1994);
2) This is an official recognition, by the U. S. Army Corps of Engineers, that below a certain size, the effects of suction dredging are so small and so short-term as to not warrant the regulations being imposed in many cases (USACE, 1994);
3) The U. S. Environmental Protection Agency, has ignored this concept, although numerous studies, including the EPA's own 1999 study of suction dredging, repeatedly and consistently support the Corps finding de minimus effects (USACE, 1994);
4) Four-inch and smaller dredges have inconsequential effects on aquatic resources (USACE, 1994);
5) Reports consistently find no actual impact of consequence on the environment, and so almost always fall back to the position that the ***potential*** for impact exists (USACE, 1994);T
6) he majority of dredge operations studied did not work long periods or disturb large areas of the streambed (Hassler, T.J., W.L. Somer and G.R. Stern, 1986);
7) Dredging improved permeability and velocity of water in gravel (Lewis, R., 1962);
8) The unmodified dredge moved about 2% of the manufacturer's maximum rating (Griffith, J.S. and D.A. Andrews, 1981);
9) Two hundred of the miners interview, only 57 spent more than 500 hours dredging per season (McCleneghan, K., and R.E. Johnson, 1983);
10) The average time spent dredging was 235 hours per season (McCleneghan, K., and R.E. Johnson, 1983);
11) No cumulative effects were indicated by the water sample data (Huber, C. and D. Blanchet, 1992);
12) Suction dredging and hand tool operations in the active stream channel caused no noticeable impact to water quality (Huber, C. and D. Blanchet, 1992);
13) There were no detectable water quality changes from numerous suction dredge operations located on the same creek (Huber, C. and D. Blanchet, 1992);
14) A 6-inch dredge is appropriate where substrate gravel size is large, but a large aperture may be disruptive in a small channel (Lewis, R., 1962);
15) Dredge holes and piles in the center of the stream are usually gone in one year (Stern, G.R., 1988);
16) Dredge piles along the bank of the creek may linger. This is similar to piles left by historic miners (Stern, G.R., 1988); and,
17) When done properly, legal dredging must be allowed by law and effects are acceptable (USDA, 1997).

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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

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Thomas, V.G. 1985. ***Experimentally determined impacts of a small suction gold dredge on a Montana stream***. North American Journal of Fisheries Management 5:480-488.

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