No. S222620

IN THE SUPREME COURT OF THE STATE OF CALIFORNIA

THE PEOPLE OF THE STATE OF CALIFORNIA

Plaintiff and Respondent,

v.

BRANDON LANCE RINEHART,

Defendant and Appellant.

Third Appellate District, Case No. C074662
Plumas County Superior Court, Case No. M1200659
Honorable Ira Kaufman, Judge

DEFENDANT AND APPELLANT'S CONDITIONAL SUPPLEMENTAL REQUEST FOR JUDICIAL NOTICE

James L. Buchal, SBN 258128
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Attorney for Defendant and Appellant

July 2, 2015

Appellant hereby moves, pursuant to Evidence Code §§ 452 & 459, and California Rules of Court 8.252(a) and 8.520(g), for judicial notice of the following attached documents:

Exhibit 1 is the Declaration of Joseph Greene, filed on or about May 18, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 2 is the Reply Declaration of Joseph Greene, filed on or about June 17, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 3 is the Declaration of Claudia Wise, filed on or about May 18, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 4 is the Reply Declaration of Claudia Wise, filed on or about June 17, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 5 is the Declaration of Eric Maksymyk, filed on or about May 18, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 6 is the Reply Declaration of Erik Maksymyk, filed on or about June 17, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 7 is the Declaration of David McCracken, filed on or about May 18, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 8 is the Reply Declaration of David McCracken, filed on or about June 17, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 9 is the Declaration of Thom Seal, filed on or about May 18, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibit 10 is the Reply Declaration of Thom Seal, filed on or about June 17, 2015 in the *Suction Dredging Cases*, Coordinated Case No. JCCP4720 (San Bernardino County).

Exhibits 1-10 are among "records of . . . any court of this state" pursuant to Evidence Code § 452(d).

Exhibit 11 consists of excerpts from an October 1946 report of the State of California, Department of Natural Resources Division of Miners reporting the obvious fact that even then, "power equipment" was required profitably to mine place deposits (*see* page 19). It is an official act of an executive department of the State of California within the meaning of § 452(c) of the Evidence Code.

Exhibit 12 is an Internal Mineral Report of a Certified Mineral Examiner conducted during a "validity" examination of the type discussed in the Exhibit W

to the People's Supplemental Request for Judicial Notice, the Declaration of Burrett W. Clay. This is the sort of material, easily determining that a suction dredge is "the only reasonable mining method" for underwater placer deposits, that Rinehart would be put before Mr. Clay in the unfortunate event that this Court were to find triable issues as to whether the State's allowing hand panning and other non-motorized mining would adequately vindicate the purposes of federal law. It is an official act of an executive department of the United States (the Forest Service) within the meaning of § 452(c) of the Evidence Code.

This Conditional Supplemental Request for Judicial Notice is conditioned upon the Court's determination to permit the People or others (*e.g.*, an *amicus curiae*) to present evidence concerning environmental impacts of suction dredging and the feasibility of alternative mining techniques. Should the Court so determine, Rinehart's conditional supplemental request for judicial notice should be granted.

Dated: July 2, 2015.

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Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **DECLARATION OF JOSEPH GREENE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36J Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49er's, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

Joseph Greene states:

1. I am an independent environmental consultant and make this Declaration in support of the Miner's motion for an injunction in this action.

Qualifications and Experience

2. I am a retired scientist, formerly employed by the United States Environmental Protection Agency, and have over 30 years of national and international professional experience including consulting, research, and teaching for industry and government regulatory agencies. My experience includes project management, contract administration, experimental design, preparation of research reports and technical documents, laboratory supervision, statistical analysis of data, computer simulation, development and application of biological methods, and performance of algal growth potential and aquatic and terrestrial toxicity tests.

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

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

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

applications. My Curriculum Vitae is attached to this Declaration as Exhibit 1.

6. In recent years, I have worked with Claudia Wise as a team to defend the rights of small scale suction dredging by providing scientific testimony concerning alleged adverse environmental impacts of suction dredge mining. I primarily investigated and testified concerning biological effects and Ms. Wise investigated and testified concerning water quality effects. Together we conducted a Preliminary Klamath River Water Quality Survey examining effects of suction dredging.

7. Both of us were invited members of the SEIR Public Advisory Committee (PAC) established by the California Department of Fish and Wildlife. During the PAC meetings, we presented two PowerPoint presentations to the committee "Selenium Antagonism to Mercury, Does Methylmercury Cause Significant Harm to Fish or Human Health?" and "Turbidity and Effect of Scale".

8. In general, allegations of adverse environmental impacts associated with suction dredge mining are not supported by scientific evidence, and are typically grossly exaggerated. Moreover, the California Department of Fish and Wildlife has consistently downplayed and minimized beneficial effects of suction dredge mining. I discuss the effects below in detail.

Beneficial Impacts of Suction Dredging: Trash and Toxics Removal.

9. Opponents of suction dredging often accuse suction dredgers of leaving unsightly messes of trash, gasoline barrels, and equipment in remote pristine forests. While there may be such miners, for the most part these charges are untrue and the trash found is not from the miners.

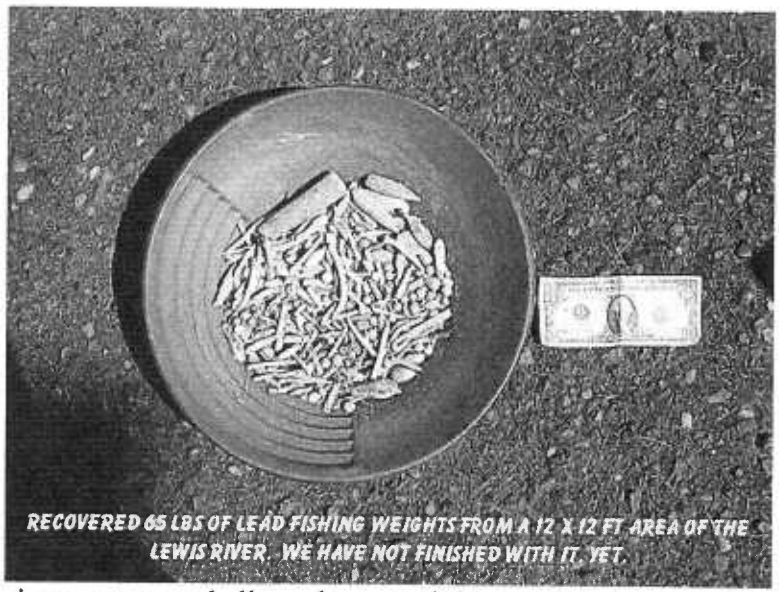
10. I have also found that opponents misinterpret what they are seeing. I have personal knowledge of a situation where hikers came across a mining operation and took photographs. They claimed that the site had been abandoned in that condition. Quite by accident I had a conversation with that miner. He said the mining operation was still underway. At the end of the season all of the materials that he brought in were removed by helicopter.

11. Miners are aware of these continuing accusations from environmentalists that they leave trash all about their camps and work areas. They are usually operating on federal mining

claims, a form of private property. The miners understand that they are under attack by the environmental community and are very careful to maintain clean work and living areas and their property.

12. Many miners in fact remove garbage, trash and toxic metals from the river, and display what they have collected, as in the following photographs:

Trash collected and removed from one mining claim in one year Along the American River in California. This is not mining trash.



13. There is no reason to believe that permitting suction dredge mining will produce

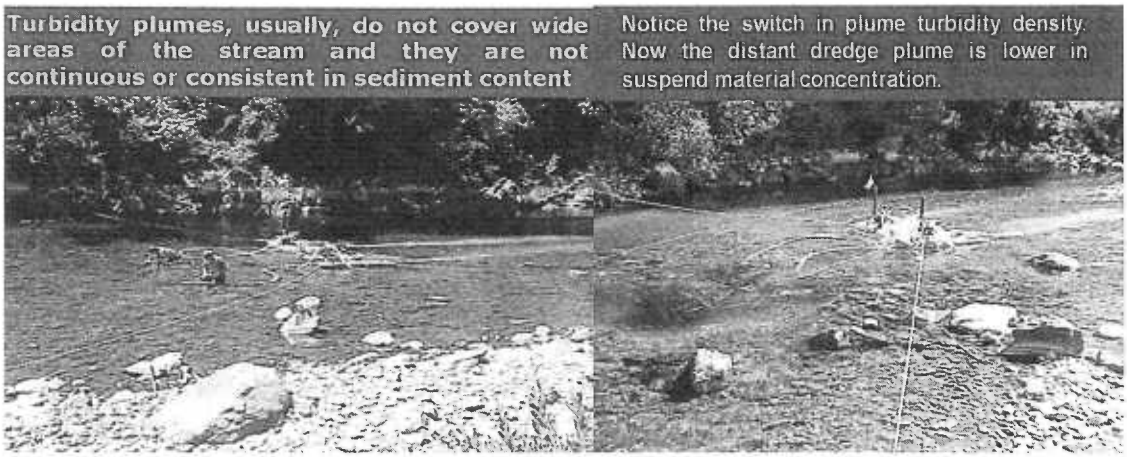
any net increase in trash and garbage in the forests. Only suction dredgers remove lead fishing weights that are captured in the dredges, and this is a benefit to the environment. The dredges also remove mercury that may be encountered.

The Turbidity Issue.

14. Turbidity is a measure of how clear the water is. Suspended particles such as soil, algae, plankton and microbes contribute to turbidity. Turbidity is not a pollutant. It is a measurement of the transmission of light through a standard length receptacle. This measurement of light transmission is a surrogate measurement of particle (usually sediment) concentrations in suspensions.

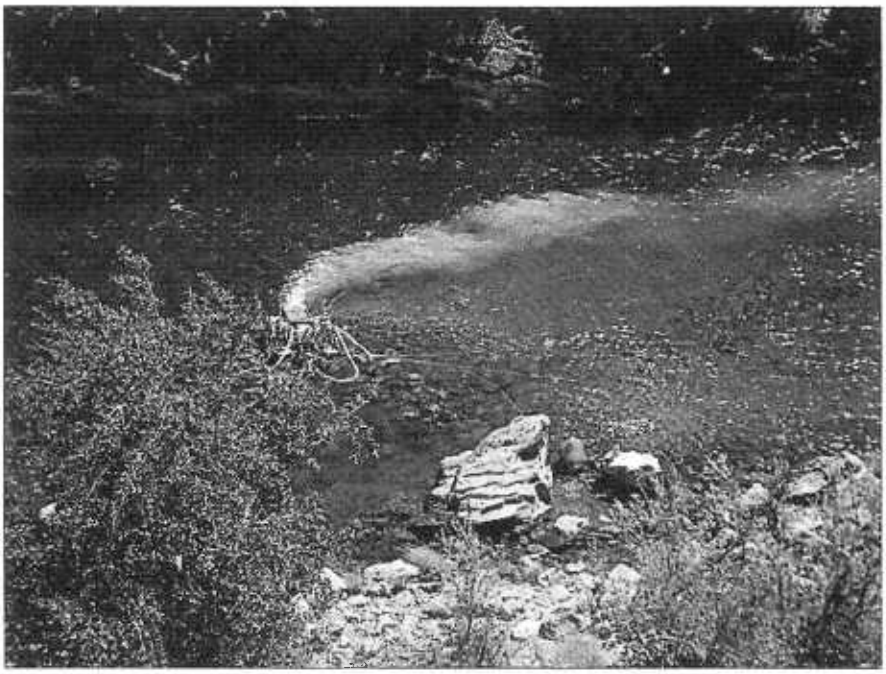
15. It is frequently claimed that dredging causes turbid plumes of fine sediment that may persist for several hundred feet below the dredge, and that the resulting fine sediment, as it settles back to the stream bed, can have adverse effects on habitat for aquatic insects and juvenile fish. In general, fish and invertebrates were not highly sensitive to dredging. For the sake of brevity, I have listed some of the conclusions from the recently published California Final Environmental Impact Report on Small-scale gold suction dredging.

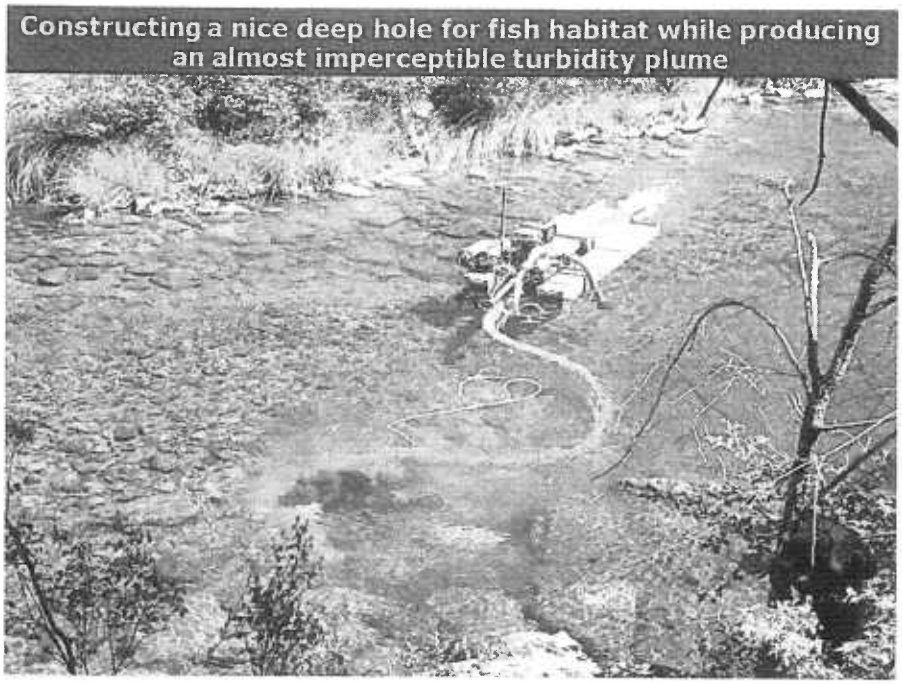
- Impact BIO-FISH-2: Direct Entrainment, Displacement or Burial of Eggs, Larvae and Mollusks (Less than Significant);
- Impact BIO-FISH-3: Effects on Early Life Stage Development (Less than Significant);
- Impact BIO-FISH-4: Direct Entrainment of Juvenile or Adult Fish in a Suction Dredge (Less than Significant);
- Impact BIO-FISH-5: Behavioral Effects on Juvenile or Adults (Less than Significant);
- Impact BIO-FISH-7: Effects on the Benthic Community/Prey Base (Less than Significant).



16. The photographs above illustrate that the turbidity plumes downstream of suction dredges are intermittent and seldom reach from shore to shore of the river. The left photo shows the dredge in the distance is putting out a turbidity plume. The right photo illustrates that now the closest dredge is putting out a plume.

17. Below is a photograph taken by Craig Tucker, an advocate working for the Karuk Tribe of California. It is a very clear illustration of how quickly the turbidity cloud dissipates from the water column.





The photo above shows an operating dredge without a turbidity plume. It is all about the natural environment. The dredges are not adding anything that is not already present in the river.

18. To put the turbidity issue into perspective, one should compare a photograph of a river in flood stage when salmon redds are present. The following picture of the Klamath River shows that the waters are very turbid. They are much more turbid than any waters shown in the photographs above which illustrate turbidity plumes downstream from small-scale gold suction dredges.

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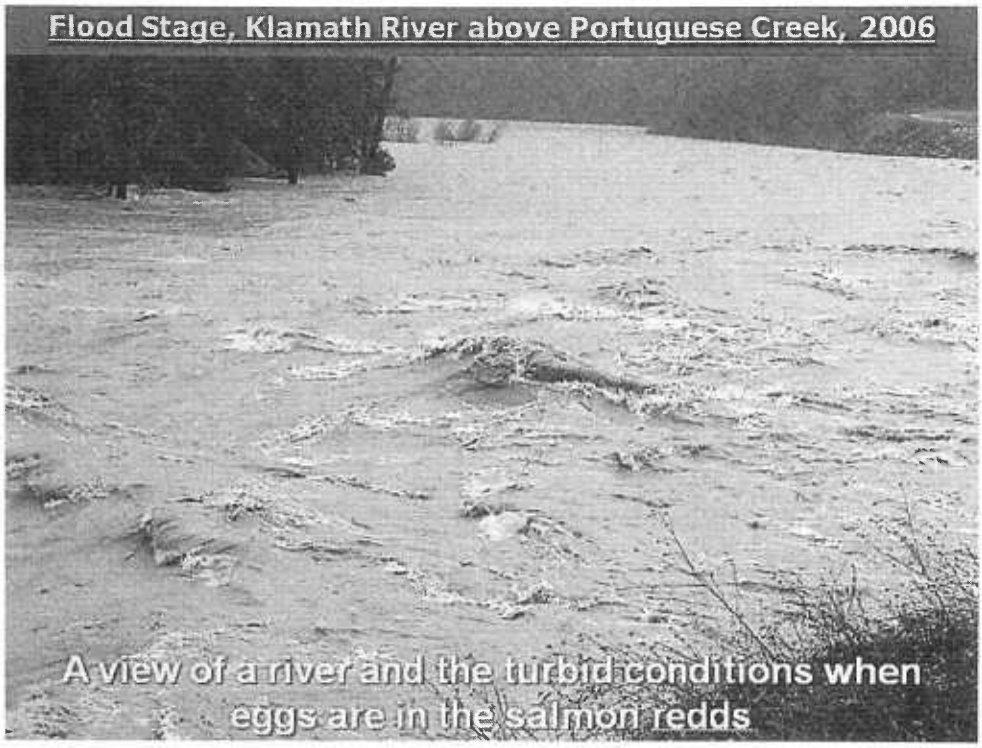

19. There is in substance no risk of appreciable adverse impacts to habitat from suction dredging plumes because there is not enough sediment transported by the water to smother habitat. Indeed, even during high water periods, river waters carry a surprisingly little amount of suspended sediments relative to the water volume which carries it.

20. The following photograph shows a sample that was collected from the Klamath River when the photograph above was taken. The suspended sediment in the vials was allowed to settle overnight. Prior to taking this photo the vial on the right was shaken to re-suspend the particulate materials. The small volume of sediment in the left vial was quite surprising.

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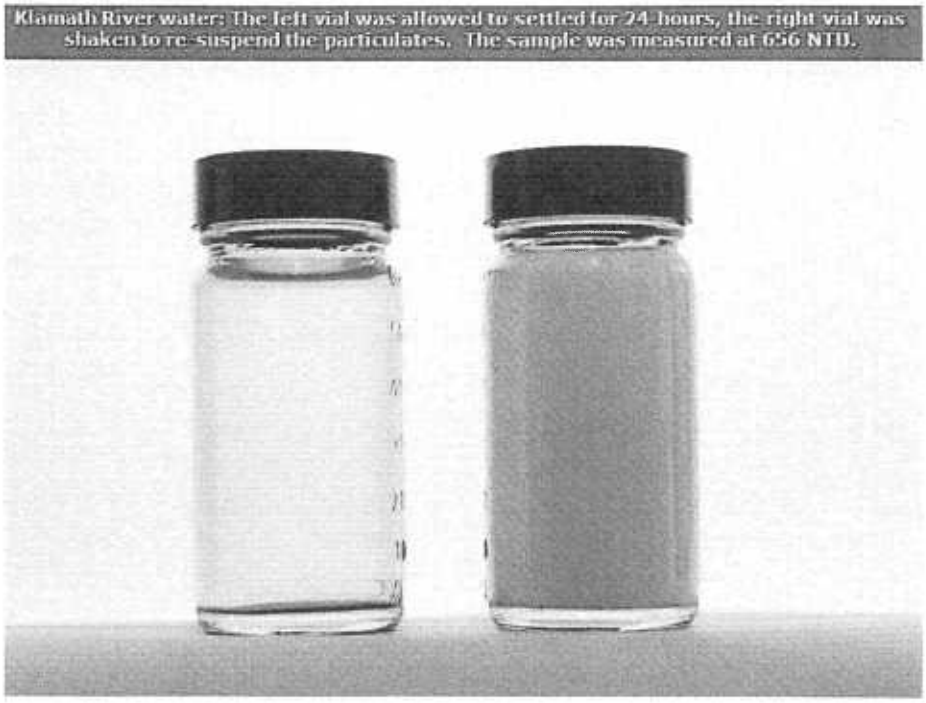

21. It should be noted that under many circumstances, turbidity improves fish survival. This is because although the feeding efficiency of fish may be reduced from reduced ability to see their prey, there is a larger effect that comes from concealing the fish from predators, particularly birds.

22. It is true that long-term continuous exposure to very high levels of turbidity can harm aquatic organisms, but even the very highest levels of turbidity reported in the scientific literature to result from suction dredges would require many months of continuous exposure to cause any harm. The turbidity produced by suction dredges is intermittent and immediately diluted as shown in the photographs above. In fact, fish are attracted to the outfall from dredges and often feed there; the notion that fish require a refuge from dredge operations is not grounded in reality.

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23. Absent special circumstances, turbidity downstream of small-scale gold suction dredges is not a genuine issue of environmental harm. It is an issue of aesthetics and attitude. Many people want outdoor settings to be left in a natural condition thus suction dredging is perceived as a conflict with these activities. This brings us back to the point of effects of scale. There are hundreds and hundreds of miles of rivers and streams in California where suction dredgers are not operating and outdoor enthusiasts can find the quiet enjoyment they are looking for.

Improving Streambed Habitat and the "Spawning on Tailings" Issue

24. Many of the streams in the Western United States have become embedded (armored). This means that the extent of loose spawning material has declined in some areas where the spawning salmon cannot open the overburden to deposit their eggs. There is anecdotal evidence that salmon spawning has increased in some areas where suction dredges moved in and began breaking through this armoring, but no quantitative studies of which I am aware.

25. Where spawning habitat is limited, salmon may be unable to spawn effectively, or spawn over previously deposited redds and destroy the nests of salmon that had arrived before them. One objection against suction dredge mining is that the salmon may also spawn on tailings piles left by suction dredgers, and that these tailing piles are more likely to be moved by winter flows, "scouring out" the salmon redd.

26. A number of studies have measured the prevalence of salmon spawning on tailing piles, and confirm that it is a small probability event. More importantly, no study has attempted to assess the increased risk to redds on tailings piles against the benefits of reducing armoring and producing looser stream gravels in which salmon can spawn. The extent to which dredge tailings are used for spawning, is generally recognized as being affected by the availability of suitable unaltered substrates and the relative quality of dredge tailings as spawning sites.

27. Information as to the extent of the phenomenon includes:

- In the lower 11 km of the Scott River in 1995, only 12 of 372 redds were located on tailings because (1) much more natural substrate than dredge tailings provided spawning habitat, and (2) the fish exhibited no strong preference for either substrate."
- "Approximately 60 salmonid redds were observed in a study on Canyon Creek, CA. None of the redds were found within dredge tailing piles."
- "In 1996 1,372 reds were observed on the mainstem Klamath River but only 2 redds were observed on recent dredge tailings."
- "In the last 3 years (1996-98), 72 of 1800 redds were counted on or near the tailings from suction dredge mining".

28. I note that if one redd survived on a tailing pile, it would increase the number of salmon eggs by approximately 2000 to even 17,000, depending on the size of the female chinook. This is a benefit that would not have been available without dredge tailings being provided in areas of limited natural substrate. There is no reason to believe that the impact of suction dredgers in creating looser stream gravels is on balance negative, and it is more likely to be positive.

29. Quite apart from loosening stream gravels, the holes left by suction dredges also can constitute valuable habitat for fish. In particular, dredge holes 3 feet or deeper are recognized as providing refugia for fish. In general, excavating pools can substantially increase

their depth and increase cool groundwater inflow, and reduce pool temperature. Where pools are excavated deeper than three feet, salmonid pool habitat can be further improved.

30. There is every reason to believe that holes left by suction dredge miners, which can often be many feet deep as the miners work toward bedrock, provide important cold-water habitats for salmonids living in streams with elevated temperatures. At least one California Department of Fish and Wildlife biologist, now retired, has testified that in some cases, holes left by suction dredgers formed the only locally-available habitat for adult coho to avoid dangerous high temperatures.

Suction Dredge Mining Is A Small-Scale Activity

31. There is a concept of "Effect of Scale" that must be understood when evaluating the effects of operating small-scale gold suction dredges in the environment. It is important to understand that the streambed sediment moved by suction dredge miners, even large number of miners, remains a tiny fraction of the natural movement of streambed materials.

32. A study in the Siskiyou National Forest compared the effect of the Forest's significant population of suction dredgers with the natural movement of such materials by surface erosion and mass movement. The calculations, which conservatively overestimated the effect of the dredges, resulted in a movement rate by suction dredge mining of less than 0.7% of natural rates.

33. A study in the Salmon River of dredge holes and tailings measurement survey determined that 53 dredge holes had disturbed 1,066 linear feet of river bottom. The entire river length, including all forks, was 417,120 linear feet. The small-scale gold suction dredging resulted in disturbance of <0.26% of the linear waterway. Again this figure is very conservative, because the action disturbance was less because suction dredgers do not affect the entire width of the river.

34. An example of effect of scale can also be seen in the following photograph. There is only one small-scale gold suction dredge visible in this entire stretch of river. It is located to the right of the red arrow.

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35. This second photograph shows two dredges, working side by side, in this long stretch of water.

36. These two illustrations are typical of the distribution of dredges. They cannot work too close together because the downstream dredger may be blinded by the occasional cloud of turbidity. This would result in dangerous working conditions. For safety this forces the downstream dredger to put distance between himself and the upstream dredge.

37. The Siskiyou National Forest engaged Dr. Peter Bayley, Dept. Fisheries & Wildlife, Oregon State University, to conduct a "Cumulative Effects Analysis" on the effects of suction dredging forest-wide. Dr. Bayley concluded that, "the statistical analyses did not indicate that suction dredge mining has no effect on the three responses measured, but rather any effect that may exist could not be detected at the commonly used Type I error rate of 0.05." (In other words, if there are effects, they are so small they can't measure them.)

38. He went on to say, "The reader is reminded of the effect of scale. Localized, short-term effects of suction dredge mining have been documented in a qualitative sense. However, on the scales occupied by fish populations such local disturbances would need a strong cumulative intensity of many operations to have a measurable effect." A true copy of the Bayley study is included as Exhibit 2 to this Declaration.

39. I conclude that area or length of river or streambed worked by suction dredgers as compared to total river length is relatively small compared to the total available area. This is an important factor making the impacts of suction dredgers less than significant.

General Conclusions Concerning Less that Significant Impacts.

40. It is my understanding that the relief sought in this action would permit California suction dredgers to operate under regulations in effect in 2009, when SB 670 halted permit issuance. Those regulations were adopted in connection with a 1994 EIR by the Department.

41. The 1994 EIR concluded that small-scale gold suction dredge mining conducted in accordance with such regulations had a less than significant effect on the environment. The Department stated that, "The Department recognizes there is a long history of other impacts to California's rivers and streams associated with other recreational and commercial activities. These activities include the construction of dams, commercial mining, rafting, fishing, road building and logging. In comparison, the cumulative detrimental effects of these activities are

more significant."

42. While the 1994 EIR reported a variety of potential adverse effects, including "loss of fish production, temporary loss of benthic/invertebrate communities, localized disturbance to streambeds, increased turbidity of water in streams and rivers, and mortality to aquatic plant and animal communities," the Report concluded that "based on best available data, it is anticipated that the project to adopt regulations for suction dredging as proposed, will reduce these effects to the environment to less than significant levels and no deleterious effects to fish.

43. Numerous other studies have found a similar lack of any appreciable adverse effects. Some of the more important studies and environmental impact reports include:

- Results from the 1992 Chugach National Forest, Alaska Report of Water Quality Cumulative Effects of Placer Mining ("impact is less than significant");
- Results from the 1994 Department of Fish & Game, California Final Environmental Impact Report ("impact is less than significant");
- In 2000 the U.S. Environmental Protection Agency reported the results of a study evaluating the performance of 10- 8- and 4-inch gold dredges and concluded environmental impacts from these operations were less than significant.
- Results from the 2001 Siskiyou National Forest, Oregon Draft Environmental Impact Report, Suction Dredging Activities ("impact is less than significant");
- Bayley, 2003, (for Siskiyou National Forest, Oregon) Response of fish to cumulative effects of suction dredge and hydraulic mining in the Illinois subbasin;
- Results from the 2004 Clearwater National Forest, Idaho Environmental Impact Supplemental Statement ("impact is less than significant");
- Results from the 2012 Wallowa-Whitman National Forest, Oregon FINAL Supplemental Environmental Impact Statement ("impact is less than significant"); and
- U.S. Environmental Protection Agencies Biological Evaluation Small Suction Dredge Placer Mining in Idaho ("impact is less than significant").

44. In sum, even before the latest SEIR from the Department of Fish and Wildlife, it was abundantly obvious that small-scale gold suction dredging conducted with reasonable

restrictions has a less-than-significant effect on the environment.

The Noise Issue

45. One of the allegedly significant and unavoidable effects of suction dredging reported in the SEIR is noise from suction dredging. At the outset, it is important to note that the SEIR found less than significant "Effects on the Quality of Recreational Resources or Experience (Impact REC-1).

46. It is true that gasoline-powered engines are a primary component of suction dredge equipment. The operation of such noise-generating equipment in the existing environments of the surrounding recreational areas could result in a perceptible increase in noise. Although noise generated from these engines does not differ from those used in motorized boats or other motorized recreational equipment, the manner in which it is operated may distinguish suction dredging from other activities. Suction dredge activities are generally stationary and equipment is often operated for extended periods throughout the day.

47. The level of noise emissions is related to the size, type, and number of equipment being used, though the potential for exceeding noise standards depends on the local ordinances. That said, numerous other activities may occur in similar settings which also use powered-equipment *i.e.* use of a motor boat, ATVs, etc.) and have potential to violate these standards. Even equipment regularly used in residential areas, (*e.g.* ringing telephones and lawn mowers) violates these standards.

48. It is an unfortunate fact that motors make noise. Small-scale gold suction dredge motors have mufflers and spark arrestors just as the lawn mowers we use at home. Miners would prefer quieter motors, but they employ the available level of technology, and there is no practical means of further reducing noise.

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

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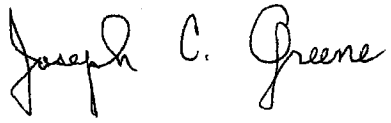
Executed on May 18, 2015.



Joseph Greene

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PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On May 18, 2015, I caused the following document to be served:

DECLARATION OF JOSEPH GREENE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
455 Golden Gate Avenue
San Francisco, CA 94102
Via U.S. Mail

Bradley Solomon
Deputy Attorney General
455 Golden Gate Avenue, Suite 11000
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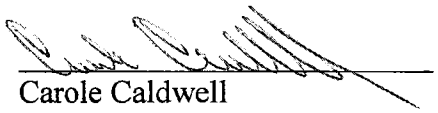

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JOSEPH C. GREENE

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<u>Summary of Experience</u>

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

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

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

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

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

Employment History

US Environmental Protection Agency (EPA), Terrestrial Processes & Effects	10/1994 - 06/2002
Oregon State University, Corvallis, OR (OSU)	10/1990 - 02/1997
US Environmental Protection Agency (EPA), Ecotoxicology Branch	10/1988 - 09/1990
US Environmental Protection Agency (EPA), Terrestrial Toxicology	10/1987 - 09/1988
US Environmental Protection Agency (EPA), Hazardous Waste & Water	10/1985 - 09/1987
US Environmental Protection Agency (EPA), Hazardous Material Team	10/1981 - 09/1985
US Environmental Protection Agency (EPA), Freshwater Toxicology	3/1979 - 10/1981
US Environmental Protection Agency (EPA), Special Studies	8/1976 - 03/1979
US Department of the Interior, National Eutrophication Research	6/1969 - 07/1976

US EPA, Terrestrial Processes & Effects Team- Research Biologist (Retired June 2002). Responsibilities include development of weather data sets for sites throughout the Western United States for simulating the effects of changes in CO_2 and ozone concentrations on global climate changes. Activities include performing data parameterization, sensitivity analysis, field studies, and computer simulations using the TREGRO model for ponderosa pine and Douglas fir.

Oregon State University, Dept of Civil Engineering- Adjunct Professor / Research Biologist (6-years). Developed an ecotoxicology research program to evaluate environmental contamination, nutrient pollution in surface waters, and standardized testing methodologies. This effort included the establishment of two modern ecotoxicology laboratories encompassing three temperature controlled environmental chambers, electronic particle counters, fluorometers, microscopes, a high-speed refrigerated ultracentrifuge, and high capacity commercial refrigerated storage. The facilities are used for the performance of aquatic and terrestrial toxicity tests such as: terrestrial acute toxicity tests and bioaccumulation in earthworms cultured in site soils; 48-static acute freshwater macroinvertebrate toxicity tests; 96-hour static chronic freshwater algal toxicity tests. 48-hour in-situ, acute marine mysid toxicity tests, Microtox toxicity tests; and SOS Chromotests. Research projects included ecotoxicology investigations involving the Burnt Fly Bog Superfund Site, Marlboro, NJ; Cannelton Superfund Site, Saulte Ste. Marie, MI; Camp Pendleton Marine Base, San Diego County, CA; Black Point Canals, Dade County, FL; Lower Granite Reservoir, Snake River, WA; and, near Kelly Boatworks, Coos Bay, OR. Project proponents included The US EPA, US Army Corps of Engineers, National Academy of Sciences (TRB), CH_2M-Hill, Jacobs Engineering Group, Ciba-Geigy Corporation,

EXHIBIT 1
PAGE 2 OF 18

Metropolitan Dade County Florida, Oregon Department of Environmental Quality, and the City of Corvallis, OR.

Research activities have resulted in numerous publications, peer reviewed journals, book chapters, conference proceedings, manuals, research reports, and consultation to the Canadian Association of Petroleum Producers and Environment Canada. The published research has been recognized and has resulted in national and international invitations to professional conferences and workshops.

US EPA, Ecotoxicology Branch- Research Biologist (2-years)
Responsibilities included project management for investigations of Superfund sites including: Drake Chemical, Loch Haven, PA; California Gulch, Leadville, CO. Activities included test design, statistical data analysis, and report writing.

US EPA, Terrestrial Toxicology- Biologist (1-year)
Responsibilities included project management for an investigation of toxicity at the United Chrome, Superfund Site, Corvallis, OR and a surface water pollution investigation of the Red River of the North for the International Red River Pollution Board. Activities included test design statistical data analysis, and report writing.

US EPA, Hazardous Waste & Water Branch- Biologist (2-years)
Responsibilities included project management for an investigation of toxicity at the largest Superfund Site in the US, Clark Fork River and Silver Bow Creek, MT, the Cabot/Carbon Superfund Site, Gainesville, FL, and Sapp Battery Superfund Site, FL. Activities included test design, statistical data analysis, and report writing.

US EPA, Hazardous Materials Team- Biologist (4-years)
Responsibilities included project management for an investigation of toxicity at the Rocky Mountain Arsenal Superfund Site, Denver, CO; Aberdeen Arsenal, MD; Sunflower Arsenal, KS; H&L Landfill, IL; and United Chrome Superfund Site, OR. Activities included test design, statistical data analysis, and report writing.

US EPA, Freshwater Toxicology- Biologist (2-years)
Responsibilities included project management for an investigation of surface water quality (toxicity and nutrient pollution) in: Lake Mead, NV; Zumbro Lake, MN; and Lake Pend Oreille, ID. Special research projects included investigations of the toxicity of Dimilin and Dimethyl Foramide to algae. Activities included test design, statistical data analysis, and report writing.

US EPA, Special Studies Branch- Biologist (3-years)
Responsibilities included an investigation of nutrient pollution (Eutrophication) in Shagawa Lake, MN; the Snake and Columbia River systems of ID, WA, and OR. A laboratory investigation was performed to determine the sensitivity of the green algae *Selenastum capricornitum* to zinc in the presence of EDTA and phosphorus. Activities included test

design, statistical data analysis, and report writing.

US EPA, National Eutrophication Research Program- Biologist (7-years)
Responsibilities included an investigation of nutrient pollution (Eutrophication) in: the South Fork Coeur d'Alene River, ID; Lake Coeur d'Alene, ID, the Spokane River, ID; Long Lake, WA; and 49 lakes throughout the United States. The objective of these studies was to test surface water samples and validate the results obtained from the performance of the Algal Growth Potential (AGP) laboratory assay. Investigations included: comparison of the indigenous algal biomass to that grown in the AGP laboratory tests; AGP yields in surface waters containing toxic concentrations of zinc; development of coefficients for the prediction of algal yields based upon chemical analysis of the growth limiting nutrient (nitrogen or phosphorus). These studies formed the basis of the U.S. EPA standard method for biologically measuring algal growth potential (nutrient pollution) in surface waters.

Professional Societies

- Society of Environmental Toxicology and Chemistry (*Charter member*), 1980-1997
- American Society for Testing and Materials, 1978-1997
- Pacific NW Society of Environmental Toxicology and Chemistry (Charter Member), 1990-1997.
- Hazardous Materials Control Resources Institute, 1992-1995.
- Water Environment Federation, 1992-1995

Professional Recognition

- Sigma Xi, the Scientific Research Society;
- Intergovernmental Personnel Act (IPA) exchange with Oregon State University, Department of Civil Engineering, Western Regional Hazardous Substance Research Center, 1990-1994;
- Courtesy Faculty Appointment, Adjunct Professor, Oregon State University, Department of Civil Engineering, 1990-1997.

Committees, Commissions and Boards

- Joint Task Group Chairman, American Public Health Association, Standard Methods for the Examination of Water and Wastewater, Committee on Part 8111, Biostimulation (Algal Productivity) 1995-1997;
- Scientific Advisory Group Member, Canadian Association of Petroleum Producers, Testing of Toxicity Based Methods to Develop Site-Specific Cleanup Objectives, 1993-1994;
- Member, Middle Snake River (Idaho) Nutrient Management Technical Advisory Committee, 1992-1994;
- Chairman, American Society for Testing and Materials, Task Group for a Proposed Standard Guide for Conducting Static Chronic 96-h Toxicity tests on Hazardous Chemical Wastes Using the Freshwater Alga *Selenastrum capricornutum,* 1990-1991;
- Co-Chairman, American Society for Testing and Materials, Task Group for a Proposed Standard Guide for Conducting Seed Germination and Root Elongation Soil Elutriate

Chronic Toxicity Bioassays, 1990-1993;

- Co-Chairman, American Society for Testing and Materials, Task Group for a Proposed Standard Guide for Conducting Seedling Emergence Toxicity Tests in Soils or Sediments from Hazardous Waste Sites, 1990-1993;
- Member, Organization for International Standards (ISO), Technical Advisory Group for the United States, International Standards Committee, Technical Committee 147 for Water Quality, Subcommittee 5 for Aquatic Toxicology, 1988-1993;
- Chairman, American Society for Testing and Materials, Task Group for A Standard Guide for Conducting Static 96-Hr Toxicity Tests with Micro algae, 1987-1990;
- Reviewer, Journal of the Society of Environmental Toxicology and Chemistry (SETAC), 1987-1990;
- Reviewer, Acute Lethality Test Method Documents, Environment Canada, Conservation and Protection, Ottawa, Ontario, Canada, 1989;
- Reviewer, Archives of Environmental Contamination and Toxicology, 1985-1990.
- Reviewer, Journal of Water, Air and Soil Pollution, 1974-1985;
- Chairman, American Society for Testing and Materials, Committee on A Standard Practice for Algae Growth Potential Testing *with Selenastrum capricornutum,* 1977-1981;
- Chairman, American Public Health Association, Standards for the Examination of Water and Waste Water, Task Committee on Part 802, Biostimulation (Algal Productivity), 1977-1981;
- Chairman, American Public Health Association, Standards for the Examination of Water and Waste Water, Task Committee on Part 803, Toxicity Testing with Phytoplankton, 1977-1981.

Technical Advisor to Environment Canada

- Member Environment Canada's External Advisory Committee on Development of Guidance Document for Environmental Toxicological Data Interpretation and Application, 1993-1994;
- External reviewer for the "Toxicity Data Interpretation and Application Guidance Manual in support of the Environment Canada Steering Committee, 1993-1994
- Provide an International Review of toxicity bioassay protocols for use in the assessment of contaminated sites under the Canadian Governments National Contaminated Sites Assessment Program, 1991-1993;
- Member, Canadian Intergovernmental Aquatic Toxicity Group Subcommittee, Microplate Growth Inhibition test Using *Selenastrum capricornutum,* Environment Canada 1990-1992;
- Waste Management Division, Ottawa, Ontario. Participation led to an agreement to include a waste extraction procedure for hazardous wastes with a biological testing component included, 1986-1993;
- Oil, Gas and Energy Division, Ottawa, Ontario, Technical advisor to Environment Canada and the Canadian Petroleum Association, Participation led to a procedure for determining the character and environmental hazard of natural gas processing industrial waste sludge which includes a biological testing component, 1986-1992;

Awards

- Technical Contribution Award, U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis OR., 1988;
- Nomination for the Scientific and Technological Achievement Award for the research publication "Comparative Toxicology of Laboratory Organisms for Assessing Hazardous Waste Sites," U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, 1987;
- Nominated for The Gold Medal for Scientific Achievement, U.S. Environmental Protection Agency, Office of the Administrator, Washington. D.C., 1979;
- Special Achievement Award for Noteworthy Contribution in the Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR., 1979;
- Special Service Award for Special achievement in the Environmental Protection Agency, Environmental Research laboratory, Corvallis, OR, 1977;
- Special Achievement Award, U.S Environmental Protection Agency, Environmental Protection Agency, Corvallis, OR, 1974.

PUBLICATIONS

Books and Book Chapters

Application of Recommended Whole Organism Bioassays in the Assessment of Contaminated Sites in Canada. (with C. Keddy and M. A. Bonnell), Environmental Protection Service, Environment Canada, Ottawa, Ontario, Canada. 1996.

Evaluation of Hazard Potential of Chemicals and Chemical Wastes Through the Use of Toxicity Bioassays, In: **Pollution and Biomonitoring**, ed. Dr. B.C. Rana, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, India, ISBN 0-07-462351-6. 1995. pp. 101-116.

A Review of Whole Organism Bioassays for Assessing the Quality of Soil, Freshwater Sediment and Fresh Water in Canada, (with C. Keddy and M. A. Bonnell), Scientific Series No. 198, Ecosystem Conservation Directorate, Evaluation and Interpretation Branch, Environment Canada, Ottawa, Ontario, Canada. (ISBN 0-662-22155-9), March 1994, 185 pages.

Biological and Chemical Evaluation of Remediation Performed on Metal Bearing Soils, (with J.J. Barich, III), In: **Tailings and Mine Waste '94**, ed. A.A. Balkema, A.A. Balkema Publishers, Brookfield, VT, ISBN 90 5410 3647,1994, pp. 157-166.

The Toxicological Assessment of Remedial and Restoration Techniques, (with J.J. Barich and S.A. Peterson), In: **International Seminar on Nuclear War and Planetary Emergencies, 14th Session: Innovative Technologies For Cleaning The Environment: Air, Water and Soil**. ed. A. Zichichi, 1993, pp. 221-233.

Biological Assessment of Toxicity Differences in Survival for Four Organisms Cultured in Sodium Acetate Leaching Media and Elutriates of Municipal or Industrial Waste Leached with De-ionized Water or Sodium Acetate Leaching Media, (with S.A. Peterson and W.E. Miller), In: **Symposium on Waste Testing and Quality Assurance**: ASTM STP 1062 (D. Friedman ed.). American Society for Testing and Materials, Philadelphia, 1990 [INVITED].

Protocols for Short Term Toxicity Screening of Hazardous Waste Sites, (with C. L. Bartels, W.J. Warren-Hicks, B.R. Parkhurst G.L. Linder, S.A. Peterson, and W.E. Miller), U.S.

EXHIBIT 1
PAGE 6 OF 18

Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR., EPA/600/3-88/029, 1988.

Early Plant Development and Plant Toxicity Assessments: Seed Germination and Root Elongation Tests, (with G. Linder, C. Bartels, S. Nwosu, S. Smith, D. Wilborn and H. Ratsch), **1st Symposium on the Use of Plants for Toxicity Assessment**, American Society for Testing and Materials, Atlanta, GA., 1989.

Limnological Studies of Zumbro Lake and the Application of Quantitative Techniques to Control the Sources of Cultural Eutrophication, (with J.G. Schilling and C.N. Affeldt), In: **Surface Water Impoundments**, (H.G. Stephen, ed.) American Society of Civil Engineering, New York, 1982.

Bibliography of the Literature Pertaining to the Genus Selenastrum, (with A.A. Leishman and W.E. Miller) US Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. EPA 600/9-79-021. 1979.

The Selenastrum capricornutum Printz Algal Assay Bottle Test: Experimental Design, Application, and Data Interpretation Protocol, (with W.E. Miller and T. Shiroyama), U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. EPA 600/9-78-018. 1978.

"The Relationship of Laboratory Algal Assays to Measurements of Indigenous Phytoplankton in Long Lake, WA," (with R.A. Soltero, WE. Miller, A.F. Gasperino, and T. Shiroyama) In: **Biostimulation and Nutrient Assessment**, (E.J. Middlebrooks, D.H. Falkenborg and T.E. Maloney, eds.) Ann Arbor Science, 1976.

Application of Algal Assays to Define the Effect of Waste Water Effluents Upon Algal Growth in Multiple Use River Systems, (with W.E. Miller and T. Shiroyama) In: Biostimulation and Nutrient Assessment, (E.J. Middlebrooks, D.H. Falkenborg and T.E. Maloney, eds.) Ann Arbor Science, 1976.

The Algal Growth Responses of Selenastrum capricornutum Prinz and Anabaena flos-aquae (Lyngb.) De Brebisson in Waters Collected from Shagawa Lake, Minnesota, (with W.E. Miller and T. Shiroyama) In: Biostimulation and Nutrient Assessment, (E.J. Middlebrooks, D.H. Falkenborg and T.E. Maloney, eds.) Ann Arbor Science. 1976.

<u>Technical Journals</u>

Elevated CO_2 and Temperature Alter the Response of Pinus Ponderosa to Ozone: A Simulation Analysis, (with D.T. Tingey, J.A. Laurence, J.A. Weber, W.E. Hoggsett, S. Brown, and E.H. Lee), Ecological Applications, 11(5) 2001, pp1412-1424.

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Review of Whole-Organism Bioassays: Soil, Freshwater Sediment and Freshwater Assessment in Canada, (with C. Keddy and M.A. Bonnell), Ecotoxicology and Environmental (In Review) 1995.

How Chemically Stable is Stabilized Hazardous Waste? (with S.A. Peterson and J.J. Barich. III), Remediation: Journal of Environmental Cleanup Costs, Technologies, and Techniques, 1992.

Three Studies Using Ceriodaphnia to Detect Non-point Sources of Metals from Mine Drainage. (with D.R. Nimmo, M.H. Dodson, P.H. Davies, and M.A. Kerr), Research Journal Water Pollution Control Federation, Vol. 62, Number 1, January/February 1990.

EXHIBIT 1
PAGE 7 OF 18

Use of Selenastrum capricornutum to Assess the Toxicity Potential of Surface and Ground Water Contamination Caused by Chromium Waste, (with W.E. Miller, M. Debacon, M.A. Long, and C.L. Bartels), J. Environmental Toxicology and Chemistry 7:35-39, 1988.

The Effect of Secondary Effluents on Eutrophication in Las Vegas Bay, Lake Mead, Nevada, (with W.E. Miller and E. Merwin), J. Water, Air, and Soil Pollution 29:391-402, 1986.

Characterization of Chemical Waste Site Contamination and Determination of its Extent Using Bioassays, (with J.M. Thomas, J.R. Skalski, J.L. Cline, M.C. McShane, J.C. Simpson, W.E. Miller, S.A. Peterson, and C.A. Callahan) J. Environmental Toxicology Chemistry 5:487-501, 1986.

A Comparison of Three Microbial Assays Used for Measuring Chemical Toxicity, (with W.E. Miller, M.K. Debacon, M.A. Long and C.L. Bartels). Journal Environmental Quality 14(4):569-574, 1985.

Use of Laboratory Cultures of Selenastrum, Anabaena, and the Indigenous Isolate Sphaerocystis to Predict Effects of Nutrient and Zinc Interactions Upon Phytoplankton Growth in Long Lake, Washington, (with W.E. Miller, T. Shiroyama, R.A. Soltero, and K. Putnam), Mitt. Int. Ver. Limnol. 21:372-384, 1978.

Algal Productivity in 49 Lake Waters as Determined by Algal Assay, (with W.E. Miller and T.E. Maloney), Water Research 5:667-679, 1974.

Utilization of Algal Assays to Determine Effects of Municipal, Industrial and Agricultural Waste Water Effluents Upon Phytoplankton Production in the Snake River System, (with T. Shiroyama and W.E. Miller), J. Water, Air, and Soil Pollution 4:415-434, 1975.

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Selection and Application of Whole Organism Tests in Assessing Toxicity in Soil, Freshwater Sediment and Freshwater Collected from Chemically Contaminated Sites in Canada: Review and Evaluation of Published Procedures, (with J.J. Barich, III), II Congreso Internacional De Suelos Contaminados, Sociedad Publica Gestion Ambiental, Europa Congress Centre, Vitoria-Gasteiz, Spain, 20-22 September 1994, pages 87-89.

Evaluation of Bioassays for Their Application in Assessing the Toxicity of Complex Chemical Wastes, (with J.J. Barich, III), II Congreso Internacional De Suelos Contaminados, Sociedad Publica Gestion Ambiental. Europa Congress Centre, Vitoria-Gasteiz. Spain. 20-22 September 1994 pages 79-82.

Miniaturization of the 120-Hour Root Elongation Test Used For Measuring Toxicity in Elutriates Prepared from Chemically Contaminated Soils, (with J.J. Barich, III), II Congreso Internacional De Suelos Contaminados, Sociedad Publica Gestion Ambiental, Europa Congress Centre, Vitoria-Gasteiz, Spain, 20-22 September 1994, pages 95-98.

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A Miniaturized 120-Hour Root Elongation Test for Assessing Toxicity in the Water Soluble Fraction Eluted from Chemically Contaminated Soils, Third European Conference on

Ecotoxicology, Swiss Institute of Technology, Zurich, Switzerland. 28-31 August 1994.

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"*Toxicological Implications of Remediating Hazardous Wastes*, (with S.A. Peterson and J.J. Barich, III), VIII International Conference on Chemistry for Protection of the Environment, Lublin, Poland, September 16-I8, 1991, CONF-9109358.

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Toxicology Assessment of Hazardous Chemical Wastes, (with J.J. Barich, III), World Environment International Conference, International Association of Science and Technology for Development, Calgary, Alberta, Canada, April 8-I0, 1991 [INVITED].

Zinc Sensitivity of Selenastrum capricornutum in Algal Assay Medium with Various EDTA Concentrations, (with S.A. Peterson, L. Parrish, and D. Nimmo), Proceedings of the Seventeenth Annual Aquatic Toxicity Workshop, Vancouver, B.C., Canada, November 5-7, 1990, Can. Tech. Report. Fish. Aquatic Sci., No. 1774 (Vol. I.), February, 1991. [INVITED].

Three Studies Using Ceriodaphnia to Detect Non-point Sources of Metals from Mine Drainage, (with D.R. Nimmo, M.H. Dodson, P.H. Davies, and M.A. Kerr), Water Environment & Technology, 2(1):76, January, 1990.

Methods to Assess Toxicity in Three Rocky Mountain Streams, (with D.R. Nimmo, P.H. Davies, G.R. Phillips and R. McConnell), 10th Annual Meeting, Society of Environmental Toxicologists and Chemists, Session on Biological Assessment of Hazardous Wastes in North America, Toronto, Ontario, Canada. 1989 [INVITED].

Toxicity Evaluations for Hazardous Waste Sites: An Ecological Assessment Perspective, (with G. Linder), 5th Annual Testing and Quality Assurance Symposium, Washington, DC., 1989.

Three Case Studies on the Use of Ceriodaphnia as Indicators of Water Quality in Western Trout Streams, (with D.R. Nimmo, M.H. Dodson, R. McConnell and M.A. Kerr), In: Proceeding 23rd Annual Meeting Colorado/Wyoming Chapter of the American Fisheries Society, Fort Collins, CO. 1988.

Discovery of Toxicants in Colorado and Montana Streams Using Biomonitoring Techniques, (with D.R. Nimmo, M.H. Dodson, R. McConnell and M.A. Kerr), Special Symposium on Colorado Water Quality, Fort Collins, CO. 1988.

Comparison of Toxicity Results Obtained for Eluates Prepared from Stabilized and Non-Stabilized Waste Site Soils, (with J.J. Barich and C.L. Bartels), In: Proceedings of the 5th National Conference on Hazardous Wastes and Hazardous Materials, Las Vegas, NV. 1988.

Bioactivity Differences of Water and Sodium Acetate Eluate from Municipal and Industrial Wastes, (with S.A. Peterson and W.E. Miller), In: Proceedings 3rd Animal Solid Waste Testing and Quality Assurance Symposium, Volume I. Washington, D.C. 1987.

Use of Bioassays to Determine Potential Toxicity Effects of Environmental Pollutants, (with S.A. Peterson, W.E. Miller and C.A. Callahan), In: Perspectives on Non-Point Source Pollution:

Proceedings of a National Conference. EPA 440/5-85-001, Office of Water Regulations and Standards, Washington, D.C. 1985.

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Use of Algal Assays to Assess the Effects of Municipal and Smelter Wastes Upon Phytoplankton Production, (with W.E. Miller, T. Shiroyama, R.A. Soltero, and K. Putnam), Proceedings of the Symposium on Terrestrial and Aquatic Ecological Studies of the Northwest, Eastern Washington State College Press, Cheney, WA. 1976 [INVITED].

Use of Algal Assays to Define Trace-Element Limitation and Heavy Metal Toxicity, (with W.E. Miller and T. Shiroyama), Proceedings of the Symposium on Terrestrial and Aquatic Ecological Studies of the Northwest, Eastern Washington State College Press, Cheney, WA. 1976 [INVITED].

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Toxicity of Zinc to the Green Alga Selenastrum capricornutum as a Function of Phosphorus or Ionic Strength, (with W.E. Miller, T. Shiroyama, and E. Merwin), Proceedings of the Biostimulation Nutrient Assessment Workshop, U.S. Environmental Protection Agency, Corvallis, OR. (EPA 660/3-75-034), 1973.

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Evaluation of the Effects of Forest Management on Water Quality in the South Umpqua Experimental Forest Watersheds, Oregon, (with W.E. Miller, T. Shiroyama, and M. Knittel), American Geophysical Union, Chapman Conference on Nitrogen Cycling in Forested Catchments, Sunriver, OR, September 16-20, 1996.

Effects of Tailings Upstream of Yellowstone's Boundary: The Case Against Copper, (with D.R. Nimmo, M.J. Wilcox, T.D. Lafrancois, P.L. Chapman, and S.F. Brinkman), Conference on Advanced Technologies for Environmental Monitoring and Remediation, Session on Approaches for Measuring. Monitoring, and Assessing Metals in Aquatic Environments Impacted by Mine Wastes, August 2-4, 1996, Denver, CO. USA.

Simulation of the Response of Seedling and Mature Ponderosa Pine to Ozone Exposure Using TREGRO, (with J.A. Weber, C.A. Hendricks, and W.E. Hogsett), Annual Meeting, American Society of Biological Sciences, International Society of Ecological Modeling. Botanical Society of North America, North American Chapter, San Diego, CA, USA, August 1995.

Biomonitors to Assess the Toxicological Liabilities from The McLaren Tailings on Water Quality in Yellowstone National Park, (with D.W.R. Nimmo), International Conference on Environmental Monitors and Hazardous Waste Site Remediation, Munich, Germany, June 19, 1995 [INVITED].

Toxicity Bioassay Applications in Assessing Sites Contaminated with Complex Chemical Wastes, International Conference on Environmental Monitors and Hazardous Waste Site Remediation, Munich, Germany. June 19, 1995 [INVITEDI.

Standard Bioassessment Techniques: Essential Tools in the Identification of Remedial Measures, with J.J. Barich, III), 13th Annual Meeting, Society of Environmental Toxicologists and Chemists, Session on Biological Laboratory Testing of Contaminated Soils, Sediments, and Solid Wastes, Cincinnati, Ohio, November 11, 1992 [INVITED].

Review of Whole Organism Bioassays for Assessing Soil, Freshwater Sediment, and Freshwater at Contaminated Sites in Canada, (with C. Keddy, M. Bonnell, and .M. Wong), 13th Annual Meeting, Society of Environmental Toxicologists and Chemists, Session on Biological laboratory Testing of Contaminated Soils, Sediments and Solid Wastes, Cincinnati, OH., November 8-11, 1992 [INVITED].

Using Biological Testing to Assess Environmental Impacts from the South Dade County Landfill, Homestead Florida, (with D.R. Nimmo, Wilcox, R. Curry, and D.B. Hicks), 13th Annual Meeting. Society of Environmental Toxicologists and Chemists, Session on Biological Laboratory Testing of Contaminated Soils, Sediments, and Solid Wastes, Cincinnati, OH, November 8-11, 1992 [INVITED].

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EXHIBIT 1
PAGE 18 OF 18

Response of fish to cumulative effects of suction dredge and hydraulic mining in the Illinois subbasin, Siskiyou National Forest, Oregon*

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April, 2003

* Final report from a study, Cumulative effects of mining activities on the Siskiyou National Forest, based on a Cost-Reimbursable agreement between the USDA Forest Service, Siskiyou National Forest and Oregon State University under the provisions of the National Agricultural Research, Extension and Teaching Policy Act of 1977 (Pub.L. 95-113), as amended by the Food Security Act of 1985 (7 U.S.C., 3319a Pub. L. 99-198).

Contents

Abstract 3

1. Introduction 3
   1.1 Acknowledgements 4
   1.2 Background 4

2. Approach 5

3. Methods: Response variables
. 5
   3.1 ODFW Spawning anadromous salmonid surveys 6
   3.2 Summer snorkeling counts by SMART program 6
   3.3 Fish habitat 8

4. Methods: Potential effects on fish populations 8

5. Analysis and results 9
   5.1 Rating potential influence of explanatory variables 10
   5.2 Deriving a set of independent explanatory variables 11
   5.3 Linear statistical analyses 12
   5.4 Results 13

6. Discussion and Conclusions 14

7. References 15

Appendix 1. Estimation of pool dimensions from SMART calibrations. 16

Appendix 2. Rationale for representing the effect of a land-use on a stream reach. 22

Figures 1 through 21 23-37

"Truth, like gold, is to be obtained not by its growth, but by washing away from it all that is not gold."

- Leo Tolstoy

Abstract:

Potential cumulative effects of suction dredge mining (SDM) was assessed in combination with early hydraulic mining and other independent variables reflecting land-uses on fish in the Illinois subbasin. Fish response data were from 59 reaches sampled by summer snorkeling under the SMART program. Responses utilized were pool densities of salmonids over one year old, of young-of-the-year salmonids, and a stream habitat measure, width-to-depth ratio. Intensity of suction dredge mining was estimated from a directed survey that censused the quantity of sediment proposed to be moved per unit stream length in each 640-acre Section. The potential cumulative effect for each explanatory variable was estimated by summing the inverse distance of each corresponding pixel in each drainage defined by the location of each fish sample. Cumulative SDM was found to be non-significant (tested at P=0.05, with significance of coefficient always >0.5) for each of the three response variables tested in a general linear model. However, early hydraulic mining was found to have a significant negative effect (P=0.03) on observed density of salmonids over one year old.

1. Introduction

The activities of suction dredge mining (SDM) in streams of the Siskiyou National Forest have attracted the attention of environmental organizations, many of whom oppose such activity in the Forest, particularly in the Kalmiopsis Wilderness. This opposition has been met with similarly well-organized miners who wish to retain their claims. The U.S. Forest Service has responded with a set of guidelines for miners to minimize environment effects of their activities, and an EIS has been prepared.

The ingredient that is lacking in this process is scientific information and analysis that accounts for suction dredge mining and other potential confounding effects on stream biota, including early hydraulic mining (HM). This report describes a first analysis of existing, recent data which

accounts for cumulative effects of suction dredge mining, early hydraulic mining, and other activities as reflected by land-use on measures of fish populations and habitat in the Illinois subbasin (Fig. 1).

1.1 Acknowledgements

The following colleagues are thanked for their help during this project: John Bolte, Randall Frick, Steve Jacobs, Kevin Johnson, John Nolan, Tom Atzet, Bonnie Howell, Karen Honeycutt, Edmund Hall, Margaret McHugh, Dan Delany, Roger Mendenhall.

1.2 Background

Suction dredge mining (SDM) involves pumping streambed material via a pipe, passing it over a sluice box to sort out any gold, and discarding the tailings downstream (Fig. 1).

There have been several studies on local effects on stream biota of SDM that have been reviewed from scientific (Harvey and Lisle 1998) and policy (Bernell et al. 2003) points of view. Rather than repeat the details of these excellent reviews, I summarize here the key issues as they may pertain to the area of study.

There have been several localized effects of SDM documented depending on where and at what time of the year it is carried out. These have included entrainment and subsequent mortality of fish larvae, fish eggs, or invertebrates and the use of unstable tailings for spawning by some salmonids (Harvey and Lisle 1998). There are potential effects due to a plume of suspended fine sediment downstream that does not normally occur during summer flows, due to the physical disturbance of riparian habitat or stream banks, effects due to site access by vehicles, and to the inevitable spills of fuel or oil. 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.

In a comprehensive policy review of recreational placer mining in Oregon Scenic Waterways, Bernell et al. (2003) deduce from the literature, stakeholders, and government agencies that the most effective control to prevent potential effects of poor mining practice is self-control, which requires more investment in education and compliance.

Because most SDM activity (e.g., Fig. 1) 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 subbasin (Fig. 2).

2. Approach

Designing and executing a study specifically for this purpose would not only require fish sampling during several years, but also a parallel labor-intensive process of tracking and measuring current mining activities in an extensive and challenging landscape. Existing mining claims provide an unreliable measure of potential impact because most claims are not active during any one season, and those that are vary considerably in mining intensity. Therefore, a study based on a new sampling design was beyond the resources available and would not be timely for required management decisions.

Fortunately, two factors coincided to make this study possible. First, a survey of SDM was completed in 1999 (Kevin L. Johnson, Area Mining Geologist, USFS, Grants Pass, OR) that included a measure of the intensity of mining as quantity of sediment moved. Secondly, independent fish survey data were available from the SMART program of USFS (USFS 2001), and ODFW salmon spawning survey data (provided by Steven Jacobs, ODFW Hwy 34 lab., Corvallis, pers. comm.) described in www.streamnet.org.

However, merely combining fish and suction dredge mining data sets alone would not provide sufficient information for a valid analysis, because the study was observational rather than a fully controlled experiment (Diamond 1986). In order to account for any significant influence of other differences among riverscapes and avoid potential confounding with any SDM effects, other 'nuisance' variables were required to represent those potential effects.

Rationales for determining the response and potential effects for the derivation of explanatory variables are described below.

3. Methods: Response variables

For the purposes of this study, a response variable representing fish or fish habitat in a stream needs to (1) be sensitive to habitat change that includes potential effects of SDM, (2) have a sufficient range of values, (3) not be dominated by zero values to prove statistically intractable, (4) be measurable with consistent bias among sample sites, (5) be from a survey with independent and random - or at least representative - samples of consistent protocol, and (6) be from samples that are independent.

A fish habitat variable was used that satisfied the relevant conditions. Regarding fish responses

and (4), all fish sampling methods are biased, but the important issue here is that the protocol and sampling conditions beyond the protocol do not produce a variable bias that may be related to the potential causal effects being tested. Two existing surveys satisfied the foregoing conditions:

3.1 ODFW Spawning anadromous salmonid surveys:

In a given stream and year, replicate counts of visible spawning or spawned anadromous salmonids are made by trained personnel during the spawning season, producing "Adult Return-Peak" and "Adult Return-Estimates of Spawning Population" estimates by species, stream reach and year. The "Adult Return-Estimates of Spawning Population" estimates are made by an integration of all counts during the season ('area-under-the-curve' method, English et al. 1992)) over a defined length of stream. These spawning population totals, estimated by ODFW, were expressed as number of adults on a per-stream-kilometer basis for coho salmon, chinook salmon, and all anadromous species combined (that also includes some steelhead).

Data from 1995 through 2000 were obtained from 53 sites (stream reaches) that had been randomly selected in the Illinois subbasin (Fig. 3), in which a subset of those sites had been sampled each year.

3.2 Summer snorkeling counts by SMART program

USFS's SMART (Stream Management, Analysis, Reporting, and Tracking database) has included sampling of reaches in the system during two phases: 1989-1995 and 1996 to the present. Data from the second phase, in which training and recording were more rigorous, were utilized from 1996-1999. Ranger District biologists were required to sample all fish bearing streams within 10 years, and the design protocol required that each stream was to be randomly selected for sampling in a given year.

Summer, daytime snorkel counts by species, with breakdowns for salmonids into size or age groups, were made in a reach from successive pools and riffles progressing upstream. Considerably fewer fish were observed in riffles than in pools. Riffle counts were not included because in summer it is difficult to obtain representative snorkel counts in many riffles due to shallow, turbulent water and coarse substrates.

Sixty-one samples were taken from reaches during the second phase which began in 1996. Of these, two samples were taken from one reach in different years. One of these was eliminated by coin toss. A second reach was eliminated because only one riffle was sampled for fish. Therefore 59 independent reaches were retained for the analysis (Fig. 4). These reaches averaged 3.3 km

(range 0.8 - 9.4) long. A mean of 10 pools per reach (range 1-23) was sampled for fish.

Physical measurements of pools and riffles were taken directly every 10th pool (minimum of 10 pool-riffles measured when available).

Mean pool width varied between 5.6 ft (1.7 m) and 37.4 ft (11.4 m), and averaged 17.7 ft (5.4 m). Measurements of remaining habitat units were estimated by identified crew members, estimates that were calibrated with measurements every 10th pool (Appendix 1). Basin drainage areas corresponding to each sample (downstream end of reach) varied from 584 to 51,500 acres (236 to 20,840 Ha).

Only fish data from pool observations were included because it is difficult to maintain consistency when attempting quantitative observations in riffle and other habitat types during low summer conditions. The species breakdown of fish taxa observed in pools in shown in Fig. 5, along with the frequency of presence in all pools and reaches sampled. A total of 610 pools were sampled among the 59 reaches. All reaches contained fish, and a zero fish count was only record for one pool. Sampled pool frequencies (every 10th pool) varied from 1 to 27 pools per reach. Total reach lengths varied from 0.6 to 6.3 miles. Young-of-the-Year (YOY or O+) salmonids were observed in 502 pools and 58 reaches, while older salmonids were observed in 434 pools and 58 reaches.

Only Rainbow trout (which may have included juvenile steelhead which are the same species), occurred consistently throughout the reaches. Statistical analysis would be difficult for other species because of large numbers of zero observations. Because all salmonids are sensitive to higher temperature and restricted habitats during summer and low flows, it was decided to represent all native salmonid species in response variables. However, because of different behaviors and habitat preferences among YOY and older salmonids, these were analyzed as two separate responses. It is easy for trained snorkelers to distinguish between YOY and older salmonids because of their size difference.

The response variable was expressed in density form as the number of a defined fish group (young-of-year or older salmonids) observed per 1000 m^2 of pool area. The number of fish are summed over all pools snorkeled:

Fish Response = S(# fish observed in pool, i)/S(surface area of pool, i)

Methods and results of corrected estimates of pool dimensions, based on SMART calibration data, used to estimate pool area are described in Appendix 1.

3.3 Fish habitat

One of the most useful measures of fish habitat is the dimensionless variable, width-to-depth ratio, based on wetted stream habitat dimensions. Streams that are deep for their width (i.e., low width-to-depth ratio) tend to provide more habitat for fish, especially salmonids during summer (Scarnecchia and Bergersen 1987; Kozel and Hubert 1989). Natural differences in the ratio do exist due to differences in sediment type, transport, and deposition, and also whether the reach channel is constrained geomorphically. However, degradation of streams through riparian forest removal, changes in hydrology, and transport of sediment generally tends to widen streams at the cost of mean depth, a process that is consistent with reduction of overhanging bank habitat and bankside vegetation. Maximum depth of pool or riffle was measured for all sampled habitats, therefore this depth measure was used instead of the strongly correlated mean depth that was estimated for less than half of sampled habitats. The mean ratio for a reach was estimated by calculating the mean of all pool and riffle width-to-depth ratios.

Width-to-depth ratio averaged 9.2, and ranged from 5.4 to 15.5 for the same 59 reaches sampled in the SMART program that contributed to the fish response data (Fig. 4).

All response variables were checked for quality and internal consistency, but were not compared to explanatory variables until an independent set had been derived from the latter as described in Sections 4, 5.1, and 5.2.

4. Methods: Potential effects on fish populations

The primary potential effect represents the object of this study, suction dredge mining (SDM). The 1999 survey of SDM included (1) a census of the proposed amount of sediment that miners were anticipating that they would transfer downstream during the summer season, and (2) an extensive field sample of the mining activity in which the actual amount of sediment moved was measured. Notwithstanding some individual differences in between expected and actual quantities moved, there was a good correlation from 48 samples ($r = 0.600$, $P<0.00001$, Fig. 6). Because it was essential to have a measure of cumulative effects from all SDM operations, the measure of the estimated (proposed) amount to be moved was adopted, because this resulted from a census during the 1999 season. This was also considered to be more appropriate because fish responses were measured over a 5-year period, and proposed SDM that did not occur during 1999 could have occurred during other years.

The proposed measure adopted was expressed as the quantity of sediment moved per unit length of stream in segments that were contained in 640-acre (close to 1-mile square) Sections. Derivation of potential cumulative effect of several processes in a given drainage is described below under Cumulative Effects.

Any effect on the fish response from causes other than SDM could potentially confound interpretation. These 'nuisance' variables include early hydraulic mining (HM) and several land-use effects.

HM mostly occurred in 1860-1910 (Fig. 7), but was included because it had a long-lasting visible effect on the surface geology, soils, and vegetation of riparian zones (e.g., Fig. 8). HM peaked in the early 1900's but continued to occur sporadically until as recently as a single operation on Althouse Creek in the mid 1980's (John R. Nolan, USFS, Pers. comm.).

Also land use varied, with forest type, degree of deforestation, urban, and agriculture uses differing among drainage areas sampled for fish. For quantifying the relative effect of these land uses, the best available source covering the whole basin was the Western Oregon Digital Imagery Project (WODIP: Nighbert et al. 2000). That project classified the region into 25-by-25-m pixels representing 49 land-use types, largely on the basis of satellite imagery and ground truth information. Their very detailed forest classification included estimates of mixed or single stands of hardwoods and conifers, four tree size classes, and canopy cover down to 10% intervals. These distinctions were far too fine to indicate differences among basins statistically in this study, so a reduced set of forest and other land-use components was derived that did not involve the elimination of pixels (Fig. 9). In addition a road cover image was obtained through U.S. Forest Service, Grants Pass, which was merged with the simplified WODIP land-use cover .

Water-use effects on hydrology from dams is negligible in the basin, and water abstraction effects would be related to the potential agricultural and urban influence already being measured. The foregoing data sources were analyzed as follows.

5. Analysis and results:

Before performing a definitive statistical analysis (5.3), an appropriate method for encoding potential influence to derive explanatory variables is described (5.1), followed by the process to derive an independent set of those explanatory variables (5.2).

5.1 Rating potential influence of explanatory variables

The fish sampled at a given location are mostly influenced by habitats in their home range, which is roughly of the same order as the reach lengths sampled. However, these habitats are primarily influenced by natural and anthropomorphic activities upstream. What is the most rational way of measuring potential influence stream and land-use types?

The traditional approach is simply to sum the number of pixels corresponding to each classification, with each sum being the explanatory variable representing the potential influence of each classification (Fig. 10 A). This process provided equal weights to each pixel, so a land-use at the periphery of the drainage basin would be deemed equally influential as one of similar area adjacent to the sample point. This scoring procedure was unrealistic for assessing effects on a stream reach. Given the importance of riparian zones on streams, a stream buffer zone approach (Fig. 10B) became popular, but the distance from the stream (buffer width) beyond which land-use effects were rated at zero has become a controversial issue. Moreover, a land or stream use in the buffer zone was still considered to have the same effect whether it was close or distant from the sampled reach.

A solution to the foregoing problems is to weight each land-use (including mining use) according to some inverse function of its distance, as the water flows, to the sample location ('pour point'). A rationale for utilizing an inverse-distance weighting method is derived (Appendix 2) and illustrated (Fig. 11). This process produces an explanatory variable datum that represents a cumulative measure of the potential impact on each sampled reach from all sources of each candidate effect in the drainage associated with that sample.

Explanatory variables for all land-use types, including SDM and hydraulic mining (HM) activities along the stream corridor, were converted where necessary to raster (25-m pixel) images. A recent 10-m resolution DEM was used to develop a 25-m raster image indicating flow path directions over the entire landscape, a process that also defines the drainages basins corresponding to each fish sample. The process, developed by John Bolte (Department of Bioresources, Oregon State University), utilizes a program (ZOI) that interfaces with the flow direction cover map to derive sums of inverse-distance weighted values for each classification in each drainage basin ARC-INFO GIS software (Bayley et al. 2001; Kehmeier et al. in submission).

The two mining activities were coded as follows. The proposed cubic yards of sediment to be moved (see above) by Suction dredge mining (SDM) in 1999 was expressed on a per unit stream length (cu. yds/1000 ft of stream) in each Section where this mining was involved. This measure of intensity of mining was converted to classes and assigned to pixels in a rasterized GIS

image (Figs. 2,3). The process outlined above weighted each pixel by the measure of mining intensity in addition to its inverse distance from the sampled reach.

The stream reaches where early hydraulic mining (HM) occurred was mapped by John Nolan and Roger Mendenhall (USFS, Grants Pass, OR). They assigned one of four ranks to each reach to describe the visual effects (e.g. see Fig. 8) that reflected the intensity of this mining activity independently of other activities. These rankings were assigned intensities of 1 through 4 that were applied to classes in a similar manner as SDM. Different units for different mining effects do not matter in a linear statistical analysis; what is important is to reflect the relative intensity and cumulative effect of each mining activity in each drainage.

Figure 12 provides an example of a combined image with drainage basins corresponding to three SMART fish samples, with corresponding calculations of inverse distance weights of aggregated land-uses (see next section). This process does not eliminate any land or water use in the drainage, but weights each pixel of each classification according to the inverse of its distance to the fish response measured.

5.2 Deriving a set of independent explanatory variables

Any statistical analysis that investigates the significance and magnitude of a potential influence requires that the explanatory variable representing that influence is independent of potentially confounding variables. A fair assessment of whether correlations are insufficiently correlated among a set of candidate variables must account for the multiple testing effect. Consequently Bonferroni adjustments were made to the overall alpha value of 0.05 used as a rejection criterion.

Because the response variables involved two surveys with separate sets of drainages that required separate statistical modeling, a multiple correlation test was performed on the explanatory variables of each data set. Fig. 13 shows the Pearson correlation matrix for all cumulative-effect, explanatory variables for the 53 drainages corresponding to the ODFW salmon spawning samples. Even though Bonferroni corrections (at P=0.05) were used, there is a serious problem because of the highly significant correlation between the SDM and HM cumulative effects (Fig. 14). Because subsets of the sites were sampled during different years, the explanatory variables of those subsets were separately analyzed. However, the significant correlation among the mining types persisted. Although there is some overlap between the types, this persistence was partly attributed to lack of proximity to upstream mining of a large proportion of the sites (Fig. 3).

Therefore, an analysis of the salmon spawning response could not proceed, because it

would not be possible to distinguish between the mining activities any effects that may be indicated statistically. Impasses such as this are not uncommon when trying to impose a sampling design on existing data, and do not reflect the quality of the information in the data set.

The Pearson correlation matrix for all explanatory, cumulative-effect variables for the 59 SMART drainages is shown in Fig. 15. Here, fortunately, there were no significant (again, Bonferroni at P=0.05) correlations between SDM and any other explanatory variables. While it is not incorrect to proceed with analyses relating this set to the fish response, there are redundancies among several of the remaining 'nuisance' variables that will unnecessarily consume degrees of freedom. Also, some cover types were sparse and did not vary much among drainages (Fig. 16). There were three clusters of strongly interrelated variables that generally represented decreasing degrees of vegetation cover and, to a large extent, human disturbance: (1) agriculture, urbanization, and roads, (2) forest with less than 50% canopy, non-forest vegetation, and barren, and (3) forest with greater than 50% canopy.

The cumulative-effect variables representing these three land-use cover types, and those for the two mining activities, produced a much cleaner correlation matrix (Fig. 17). Because no land-use types from WODIP have been eliminated, and all their areas add to 100% in each drainage, there will clearly not be independence in any set. In this case, a strong negative correlation exists between set (2) and (3) (Fig. 18), indicating that one cumulative variable should be dropped. In this case, a weak correlation was indicated between variable (2) and (1), so variable (2) was eliminated, leaving a set of four variables (Urban-Ag-Roads (1), Forest >50% (3), HM (4), and SDM (5)) that were uncorrelated at the Bonferroni-corrected 5% level. This set of explanatory variables was used in the statistical analyses described below.

5.3 Linear statistical analyses

The response variable is a count of fish in a given sampled area. The fish may or may not be randomly distributed in that area. Expressing the error distribution according to the negative binomial model (White and Bennetts 1996), accounts for any additional variance, μ^2/θ , (μ = mean, θ = constant) to that corresponding to a random error as in a Poisson distribution.

The linear statistical model fit to the SMART data set was:

(1) $$Y = exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_3 x_3 + \beta_{12} x_1 x_2 + \beta_{13} x_1 x_3 \ \ldots\ldots\ + \beta_{34} x_3 x_4)$$

where Y = number of fish per 1000 m^2 of total pool area sampled in the reach

(juvenile + adult native salmonids greater than 1 year old or YOY salmonids),

β_0 = fitted constant,

β = fitted coefficients with non-zero subscripts corresponding to the following variables:
x_1 = 'Urban-Ag-Roads' cumulative effect,
x_2 = 'Forest >50%' cumulative effect,
x_3 = Hydraulic mining (HM) cumulative effect,
x_4 = Suction dredge mining (SDM) cumulative effect,
$x_i x_j$ = all first order interaction terms between ith and jth variables ($i \neq j$),

with the error corresponding to the variance function of the negative binomial distribution:

(2) $var\ (Y) = \mu + \mu^2/\theta$

where μ = mean of count, Y

μ^2/θ = variance additional to Poisson (random) variance

θ = fitted constant

An S-Plus routine that fits the θ constant in the negative binomial model jointly with the model coefficients with an iterative procedure (Venables and Ripley 1999) was used to compute the general linear models. In the case of the stream width-to-depth ratio response, a simple Normal linear statistical model (regression) was applied.

In this study the principal interest is in whether the coefficient, β_4, that estimates the magnitude and sign of any effect of Suction dredge mining (SDM), is significantly different from zero, providing that the SDM variable, x_4, is not part of a significant interaction with another explanatory variable. Other explanatory variables need to be included because interactions with them may confound our interpretation. If the model does not indicate significant interactions, those terms are removed and the reduced model is refitted. The modelling process was repeated after dropping non-significant ($P > 0.05$) interactions. Non-significant main effects (β_i) were not dropped if they were part of a significant interaction.

5.4 Results

With the models on native salmonids greater than one year old, no significant first order interactions remained after the elimination procedure. Fig 19A illustrates a later model run with an interaction term between the two mining activities, Fig. 19B show a run with only main effects, and Fig. 19C shows a model with the least significant ($P > 0.5$) effect, suction dredge mining, removed. Only the cumulative effect of hydraulic mining (HM) indicated a modest significance (at

P = 0.03) among the main effects. It's sign was negative, indicating that the greater the severity of this activity had been, the greater the reduction in salmonids over 1 year old.

Model diagnostics are critical to assess the appropriateness of the statistical procedure and assumptions. Theoretically, deviance residuals are expected to be approximately normal (Pierce and Schafer 1986), so models producing large departures should be viewed with suspicion. A normal probability plot of the deviance residuals suggested reasonable conformity (Fig. 20). A second issue is the independence of the data used. Although the inverse distance weighting effect gave more emphasis to land-uses occurring closer to the sample site, drainage areas of several sample points overlapped to varying degrees. Also the longitudinal movement of fish populations among adjacent sites sampled in the same year may be sufficient to render the samples non-independent statistically. Therefore, spatial autocorrelation among samples could occur to a degree that the key assumption of independence of samples would be questioned. To this end, the SMART samples were ordered according to proximity 'as the fish swims' and the corresponding deviance residuals from the model (Fig. 19C) tested for spatial autocorrelation. The mean correlation among the consecutively placed samples was 0.14 with a standard error of 0.13, so autocorrelation was not close to being significant.

As a matter of interest, Fig. 21 indicates through examples the predicted increase in salmonid density in summer pools that would be expected to occur if the prevailing negative effects on habitat of hydraulic mining did not exist.

Testing the Salmonid young-of-the year (YOY) response with similar models did not produce any significant coefficients of explanatory variables or their interactions. Similarly the stream width-to-depth ratio response using simple linear models produced no significant effects. In both cases SDM coefficients were in fact positive but not remotely significant at P>0.5.

6. Discussion and Conclusions

Analyses of observational field data sets can never be expected to produce strong results compared with laboratory or field experiments (Diamond 1986; Rose 2000). This is particularly true when the sampling study has not been designed to test the specific variable of interest. However, there are not realistic alternatives because this variable, suction dredge mining, cannot be controlled or easily measured over a sufficiently larger number of drainages to provide a design robust enough to account for confounding factors and provide enough statistical power.

The statistical analyses did not indicate that suction dredge mining has no effect on the three

responses measured, but rather any effect that may exist could not be detected at the commonly used Type I error rate of 0.05. The fact that the analysis was able to detect a negative effect of another mining process, HM, on native salmonids, is an indication of the long-lasting effect that hydraulic mining has had on the environment, particularly on riparian zones and floodplain sections in geomorphically unconstrained reaches (Fig. 8).

The reader is reminded of the effect of scale. Localized, short-term effects of suction dredge mining have been documented in a qualitative sense. However, on the scales occupied by fish populations such local disturbances would need a strong cumulative intensity of many operations to have a measurable effect. Local information reveals that most suction dredge miners more or less adhere to guidelines that have recently been formalized by the Forest Service (Kevin L. Johnson and John Nolan, pers. comm.) and generally in the Oregon (Bernell et al. 2003), but there are individual cases where egregious mismanagement of the immediate environment has occurred, particularly with respect to damaging river banks in various ways. This analysis cannot account for individual transgressions, and a study to do so at an appropriate scale would be very expensive if feasible.

Given that this analysis could not detect an effect averaged over good and bad miners and that a more powerful study would be very expensive, it would seem that public money would be better spent on encouraging compliance with current guidelines than on further study.

7. References

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Appendix 1. Estimation of pool dimensions from SMART calibrations.

Each set below is a regression result for habitat length and width from a specific MasterKey (stream) and observer combination. The linear regression models are:
Ln(HAB_LEN) = LHAB_LEN = CONSTANT + LEST_LEN*(Ln(EST_LEN))
Ln(HAB_WID) = LHAB_WID = CONSTANT + LEST_WID*(Ln(EST_WID))
where HAB_LEN = measured habitat length at water surface,
EST_LEN = independent visual estimate of habitat length at water surface,
CONSTANT, LEST_LEN, LEST_WID = fitted coefficients
HAB_WID = measured mean habitat width at water surface,
EST_WID = independent visual estimate of mean habitat width at water surface.

Therefore, Pool area = HAB_LEN*HAB_WID.

"Observer ID_Masterkey"

VARIABLE	COEFFICIENT	STD ERROR	STD COEF TOLERANCE	T	P(2 TAIL)
"B16110300055"					

EXHIBIT 2 531
PAGE 16 OF 31

DEP VAR:LHAB_LEN	N:	39	MULTIPLE R:	0.985	SQUARED MULTIPLE R:	0.971
CONSTANT	0.160	0.132	0.000	.	1.213	0.233
LEST_LEN	0.986	0.028	0.985	1.000	35.269	0.000
DEP VAR:LHAB_WID	N:	39	MULTIPLE R:	0.931	SQUARED MULTIPLE R:	0.867
CONSTANT	0.437	0.193	0.000	.	2.266	0.029
LEST_WID	0.886	0.057	0.931	1.000	15.523	0.000

"C13110300057"

DEP VAR:LHAB_LEN	N:	20	MULTIPLE R:	0.991	SQUARED MULTIPLE R:	0.982
CONSTANT	0.043	0.141	0.000	.	0.307	0.763
LEST_LEN	1.011	0.032	0.991	1.000	31.201	0.000
DEP VAR:LHAB_WID	N:	20	MULTIPLE R:	0.753	SQUARED MULTIPLE R:	0.566
CONSTANT	0.924	0.419	0.000	.	2.205	0.041
LEST_WID	0.704	0.145	0.753	1.000	4.850	0.000

"C13110300058"

DEP VAR:LHAB_LEN	N:	20	MULTIPLE R:	0.991	SQUARED MULTIPLE R:	0.982
CONSTANT	0.043	0.141	0.000	.	0.307	0.763
LEST_LEN	1.011	0.032	0.991	1.000	31.201	0.000
DEP VAR:LHAB_WID	N:	20	MULTIPLE R:	0.753	SQUARED MULTIPLE R:	0.566
CONSTANT	0.924	0.419	0.000	.	2.205	0.041
LEST_WID	0.704	0.145	0.753	1.000	4.850	0.000

"C13110300059"

DEP VAR:LHAB_LEN	N:	20	MULTIPLE R:	0.991	SQUARED MULTIPLE R:	0.982
CONSTANT	0.043	0.141	0.000	.	0.307	0.763
LEST_LEN	1.011	0.032	0.991	1.000	31.201	0.000
DEP VAR:LHAB_WID	N:	20	MULTIPLE R:	0.753	SQUARED MULTIPLE R:	0.566
CONSTANT	0.924	0.419	0.000	.	2.205	0.041
LEST_WID	0.704	0.145	0.753	1.000	4.850	0.000

"D05110500019"

DEP VAR:LHAB_LEN	N:	44	MULTIPLE R:	0.995	SQUARED MULTIPLE R:	0.989
CONSTANT	-0.100	0.066	0.000	.	-1.515	0.137
LEST_LEN	1.037	0.017	0.995	1.000	62.325	0.000
DEP VAR:LHAB_WID	N:	44	MULTIPLE R:	0.970	SQUARED MULTIPLE R:	0.941
CONSTANT	-0.082	0.113	0.000	.	-0.722	0.474
LEST_WID	1.028	0.040	0.970	1.000	25.768	0.000

"D06110500022"

DEP VAR:LHAB_LEN	N:	18	MULTIPLE R:	0.995	SQUARED MULTIPLE R:	0.991
CONSTANT	-0.011	0.100	0.000	.	-0.107	0.917
LEST_LEN	1.001	0.024	0.995	1.000	41.996	0.000
DEP VAR:LHAB_WID	N:	18	MULTIPLE R:	0.983	SQUARED MULTIPLE R:	0.966
CONSTANT	0.175	0.108	0.000	.	1.626	0.123
LEST_WID	0.939	0.044	0.983	1.000	21.381	0.000

"D06110500023"

DEP VAR:LHAB_LEN	N:	47	MULTIPLE R:	0.991	SQUARED MULTIPLE R:	0.981
CONSTANT	0.103	0.091	0.000	.	1.135	0.262
LEST_LEN	0.979	0.020	0.991	1.000	48.780	0.000
DEP VAR:LHAB_WID	N:	47	MULTIPLE R:	0.981	SQUARED MULTIPLE R:	0.963
CONSTANT	-0.028	0.092	0.000	.	-0.308	0.760

LEST_WID	1.013	0.030	0.981	1.000	34.104	0.000
"B16110500024"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R:	0.974	SQUARED MULTIPLE R:	0.948
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000
"B16110500025"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R:	0.974	SQUARED MULTIPLE R:	0.948
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000
"B16110500026"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	20	MULTIPLE R:	0.999	SQUARED MULTIPLE R:	0.999
CONSTANT	0.021	0.021	0.000	.	0.998	0.331
LEST_WID	0.991	0.008	0.999	1.000	119.981	0.000
"B16110500027"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R:	0.974	SQUARED MULTIPLE R:	0.948
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000
"B16110500043"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	35	MULTIPLE R:	0.943	SQUARED MULTIPLE R:	0.889
CONSTANT	0.231	0.203	0.000	.	1.143	0.261
LEST_WID	0.945	0.058	0.943	1.000	16.285	0.000
"B17110500030"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R:	0.974	SQUARED MULTIPLE R:	0.948
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000
"B17110500033"						
DEP VAR:LHAB_LEN	N:	411	MULTIPLE R:	0.994	SQUARED MULTIPLE R:	0.987
CONSTANT	0.053	0.024	0.000	.	2.239	0.026

LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R: 0.974	SQUARED MULTIPLE R: 0.948		
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000

"B17110500034"

DEP VAR:LHAB_LEN	N:	411	MULTIPLE R: 0.994	SQUARED MULTIPLE R: 0.987		
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R: 0.974	SQUARED MULTIPLE R: 0.948		
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000

"B17110500055"

DEP VAR:LHAB_LEN	N:	411	MULTIPLE R: 0.994	SQUARED MULTIPLE R: 0.987		
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R: 0.974	SQUARED MULTIPLE R: 0.948		
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000

"B18110500043"

DEP VAR:LHAB_LEN	N:	21	MULTIPLE R: 0.995	SQUARED MULTIPLE R: 0.990		
CONSTANT	0.065	0.102	0.000	.	0.644	0.527
LEST_LEN	1.002	0.023	0.995	1.000	43.145	0.000
DEP VAR:LHAB_WID	N:	21	MULTIPLE R: 0.897	SQUARED MULTIPLE R: 0.804		
CONSTANT	0.043	0.340	0.000	.	0.127	0.900
LEST_WID	0.979	0.111	0.897	1.000	8.822	0.000

"B19110500046"

DEP VAR:LHAB_LEN	N:	411	MULTIPLE R: 0.994	SQUARED MULTIPLE R: 0.987		
CONSTANT	0.053	0.024	0.000	.	2.239	0.026
LEST_LEN	0.996	0.006	0.994	1.000	177.376	0.000
DEP VAR:LHAB_WID	N:	411	MULTIPLE R: 0.974	SQUARED MULTIPLE R: 0.948		
CONSTANT	0.050	0.031	0.000	.	1.608	0.109
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000

"D05110500028"

DEP VAR:LHAB_LEN	N:	21	MULTIPLE R: 0.990	SQUARED MULTIPLE R: 0.981		
CONSTANT	-0.175	0.115	0.000	.	-1.526	0.143
LEST_LEN	1.063	0.034	0.990	1.000	31.362	0.000
DEP VAR:LHAB_WID	N:	21	MULTIPLE R: 0.940	SQUARED MULTIPLE R: 0.883		
CONSTANT	0.380	0.140	0.000	.	2.718	0.014
LEST_WID	0.811	0.068	0.940	1.000	11.981	0.000

"D06110500029"

DEP VAR:LHAB_LEN	N:	24	MULTIPLE R: 0.997	SQUARED MULTIPLE R: 0.994		
CONSTANT	-0.060	0.073	0.000	.	-0.824	0.419
LEST_LEN	1.019	0.018	0.997	1.000	58.080	0.000
DEP VAR:LHAB_WID	N:	24	MULTIPLE R: 0.945	SQUARED MULTIPLE R: 0.892		
CONSTANT	-0.370	0.242	0.000	.	-1.527	0.141
LEST_WID	1.106	0.082	0.945	1.000	13.502	0.000

"D06110500031"

DEP VAR:LHAB_LEN	N:	23	MULTIPLE R:	0.997	SQUARED MULTIPLE R:	0.994
CONSTANT	0.040	0.066	0.000	.	0.597	0.557
LEST_LEN	1.001	0.016	0.997	1.000	61.503	0.000
DEP VAR:LHAB_WID	N:	23	MULTIPLE R:	0.968	SQUARED MULTIPLE R:	0.938
CONSTANT	0.038	0.143	0.000	.	0.268	0.791
LEST_WID	0.989	0.056	0.968	1.000	17.793	0.000

"D06110500032"

DEP VAR:LHAB_LEN	N:	20	MULTIPLE R:	0.998	SQUARED MULTIPLE R:	0.996
CONSTANT	-0.026	0.058	0.000	.	-0.444	0.663
LEST_LEN	1.008	0.014	0.998	1.000	71.231	0.000
DEP VAR:LHAB_WID	N:	20	MULTIPLE R:	0.954	SQUARED MULTIPLE R:	0.910
CONSTANT	-0.117	0.198	0.000	.	-0.594	0.560
LEST_WID	1.044	0.077	0.954	1.000	13.503	0.000

"D06110500060"

DEP VAR:LHAB_LEN	N:	22	MULTIPLE R:	0.982	SQUARED MULTIPLE R:	0.965
CONSTANT	0.028	0.170	0.000	.	0.164	0.871
LEST_LEN	1.002	0.043	0.982	1.000	23.580	0.000
DEP VAR:LHAB_WID	N:	22	MULTIPLE R:	0.922	SQUARED MULTIPLE R:	0.851
CONSTANT	0.277	0.218	0.000	.	1.269	0.219
LEST_WID	0.891	0.083	0.922	1.000	10.673	0.000

"D06110500061"

DEP VAR:LHAB_LEN	N:	22	MULTIPLE R:	0.997	SQUARED MULTIPLE R:	0.995
CONSTANT	0.024	0.063	0.000	.	0.378	0.710
LEST_LEN	0.998	0.016	0.997	1.000	61.761	0.000
DEP VAR:LHAB_WID	N:	22	MULTIPLE R:	0.971	SQUARED MULTIPLE R:	0.944
CONSTANT	0.077	0.129	0.000	.	0.595	0.558
LEST_WID	0.968	0.053	0.971	1.000	18.297	0.000

"D06110500062"

DEP VAR:LHAB_LEN	N:	22	MULTIPLE R:	0.986	SQUARED MULTIPLE R:	0.972
CONSTANT	0.162	0.141	0.000	.	1.147	0.265
LEST_LEN	0.973	0.037	0.986	1.000	26.459	0.000
DEP VAR:LHAB_WID	N:	22	MULTIPLE R:	0.986	SQUARED MULTIPLE R:	0.972
CONSTANT	-0.013	0.094	0.000	.	-0.143	0.888
LEST_WID	1.006	0.038	0.986	1.000	26.320	0.000

"D06110500063"

DEP VAR:LHAB_LEN	N:	20	MULTIPLE R:	0.980	SQUARED MULTIPLE R:	0.961
CONSTANT	0.243	0.168	0.000	.	1.447	0.165
LEST_LEN	0.952	0.045	0.980	1.000	21.088	0.000
DEP VAR:LHAB_WID	N:	19	MULTIPLE R:	0.897	SQUARED MULTIPLE R:	0.804
CONSTANT	0.370	0.221	0.000	.	1.670	0.113
LEST_WID	0.820	0.098	0.897	1.000	8.350	0.000

"D06110500064"

DEP VAR:LHAB_LEN	N:	26	MULTIPLE R:	0.997	SQUARED MULTIPLE R:	0.994
CONSTANT	0.017	0.062	0.000	.	0.278	0.783
LEST_LEN	1.002	0.016	0.997	1.000	62.348	0.000
DEP VAR:LHAB_WID	N:	26	MULTIPLE R:	0.911	SQUARED MULTIPLE R:	0.830

```
CONSTANT              0.017         0.188         0.000         .         0.090     0.929
LEST_WID              0.986         0.091         0.911     1.000        10.820     0.000

"D06110500065"
DEP VAR:LHAB_LEN       N:       28  MULTIPLE R:  0.992  SQUARED MULTIPLE R:  0.985
CONSTANT              0.094         0.092         0.000         .         1.029     0.313
LEST_LEN              0.991         0.024         0.992     1.000        41.150     0.000
DEP VAR:LHAB_WID       N:       28  MULTIPLE R:  0.962  SQUARED MULTIPLE R:  0.926CONSTANT
0.024         0.144          0.000         .         0.170     0.866
LEST_WID              0.998         0.055         0.962     1.000        18.048     0.000

"D07110500056"
DEP VAR:LHAB_LEN       N:      411  MULTIPLE R:  0.994  SQUARED MULTIPLE R:  0.987
CONSTANT              0.053         0.024         0.000         .         2.239     0.026
LEST_LEN              0.996         0.006         0.994     1.000       177.376     0.000
DEP VAR:LHAB_WID       N:      411  MULTIPLE R:  0.974  SQUARED MULTIPLE R:  0.948
CONSTANT              0.050         0.031         0.000         .         1.608     0.109
LEST_WID              0.984         0.011         0.974     1.000        86.759     0.000

"D08110500066"
DEP VAR:LHAB_LEN       N:       39  MULTIPLE R:  0.998  SQUARED MULTIPLE R:  0.996
CONSTANT             -0.019         0.049         0.000         .        -0.393     0.696
LEST_LEN              1.000         0.010         0.998     1.000        97.917     0.000
DEP VAR:LHAB_WID       N:       39  MULTIPLE R:  0.969  SQUARED MULTIPLE R:  0.939
CONSTANT              0.469         0.108         0.000         .         4.355     0.000
LEST_WID              0.853         0.036         0.969     1.000        23.924     0.000

"D10110500085"
DEP VAR:LHAB_LEN       N:      411  MULTIPLE R:  0.994  SQUARED MULTIPLE R:  0.987
CONSTANT              0.053         0.024         0.000         .         2.239     0.026
LEST_LEN              0.996         0.006         0.994     1.000       177.376     0.000
DEP VAR:LHAB_WID       N:      411  MULTIPLE R:  0.974  SQUARED MULTIPLE R:  0.948
CONSTANT              0.050         0.031         0.000         .         1.608     0.109
LEST_WID              0.984         0.011         0.974     1.000        86.759     0.000

"D10110500086"
DEP VAR:LHAB_LEN       N:      411  MULTIPLE R:  0.994  SQUARED MULTIPLE R:  0.987
CONSTANT              0.053         0.024         0.000         .         2.239     0.026
LEST_LEN              0.996         0.006         0.994     1.000       177.376     0.000
DEP VAR:LHAB_WID       N:       38  MULTIPLE R:  0.995  SQUARED MULTIPLE R:  0.990
CONSTANT              0.028         0.041         0.000         .         0.685     0.498
LEST_WID              0.987         0.016         0.995     1.000        60.364     0.000
```

The following bias corrections, based on observers who had consistently valid calibrations across streams, were used in reaches where unsatisfactory calibration data sets were encountered. Those were deemed unsatisfactory because they had identical values for estimates and measurements of pool length and depth, and comprised 42% of all data.

```
DEP VAR:LHAB_LEN       N:      411  MULTIPLE R:  0.994  SQUARED MULTIPLE R:  0.987
CONSTANT              0.053         0.024         0.000         .         2.239     0.026
LEST_LEN              0.996         0.006         0.994     1.000       177.376     0.000
```

DEP VAR:LHAB_WID	N:	411	MULTIPLE R:	0.974	SQUARED MULTIPLE R:	0.948	
CONSTANT	0.050	0.031	0.000	.	1.608	0.109	
LEST_WID	0.984	0.011	0.974	1.000	86.759	0.000	

Appendix 2. Rationale for representing the effect of a land-use on a stream reach.

It is intuitive that the greater the distance a land-use is from the location of a measured response, the lesser will be its potential impact. An analogy is provided by the simple inverse square distance law of light intensity: The intensity from a point source of light is inversely related to the distance from the source. The intensity, I_1, at distance r_1 changes to I_2 at greater distance r_2 according to the increasing surface area of a sphere of radius r with the light source at the center:

$$I_1 4\pi r_1^2 = I_2 4\pi r_2^2$$

If the inner sphere 1 is unit distance (say one pixel from the source) , then the intensity I_2 at distance r_2 is reduced relative to I_1 thus:

$$I_2 / I_1 = 1/r_2^2$$; hence the inverse square law.

However, this represents a decay in energy intensity in three dimensions. While at that extreme one could envisage loss in the effect of intensity of a land-use in three dimensions (e.g., a pollution effect dissipating outwards and downwards into the water table), one can also envisage some effects (e.g. the distribution of large wood, which decays very slowly, down a stream from a riparian source) as being one-dimensional. Between these extremes, the predominantly two-dimensional nature of landscapes at the scale of drainages containing 2nd to 4th order streams probably mediates the decay of most processes over distance, even when considering the relatively shallow layers of groundwater or hyporheic zones. Therefore, the decay of intensity in two dimensions would be equivalent to that of a light source in a circle of perimeter $2\pi r$:

$$I_1 2\pi r_1 = I_2 2\pi r_2$$

or $$I_2 / I_1 = 1/r_2$$

Hence the inverse rule that has been adopted in this analysis (Fig. 11).

The software, ZOI, produces inverse and inverse square measures. It also produces separate measures for instream and out-of-stream distance components from each pixel. While theoretical arguments can be made for combinations of these alternatives there are statistical limitations.

First, splitting the distance into instream and out-of-stream components doubles the number of coefficients that need to be fitted in the statistical analysis. This reduces degrees of freedom, and therefore power, and also increases the probability of lack of independence among variables or significant interactions between them. To attempt to resolve these issues a designed, stratified study covering many more drainages than in this study would be necessary.

Second, while it is tempting to repeat the statistical analysis using alternative derivations of effects (such as inverse and inverse squared variables), this compromises the meaning of the adopted error rate (e.g., the conventional 5% alpha level). In other words, unless one takes the required penalty of lowering the effective significance level to account for multiple testing, one can be accused of undertaking a 'fishing expedition' with the data set.

Fig. 1. Typical suction dredge mining activities.
(photographs by Kevin L. Johnson)

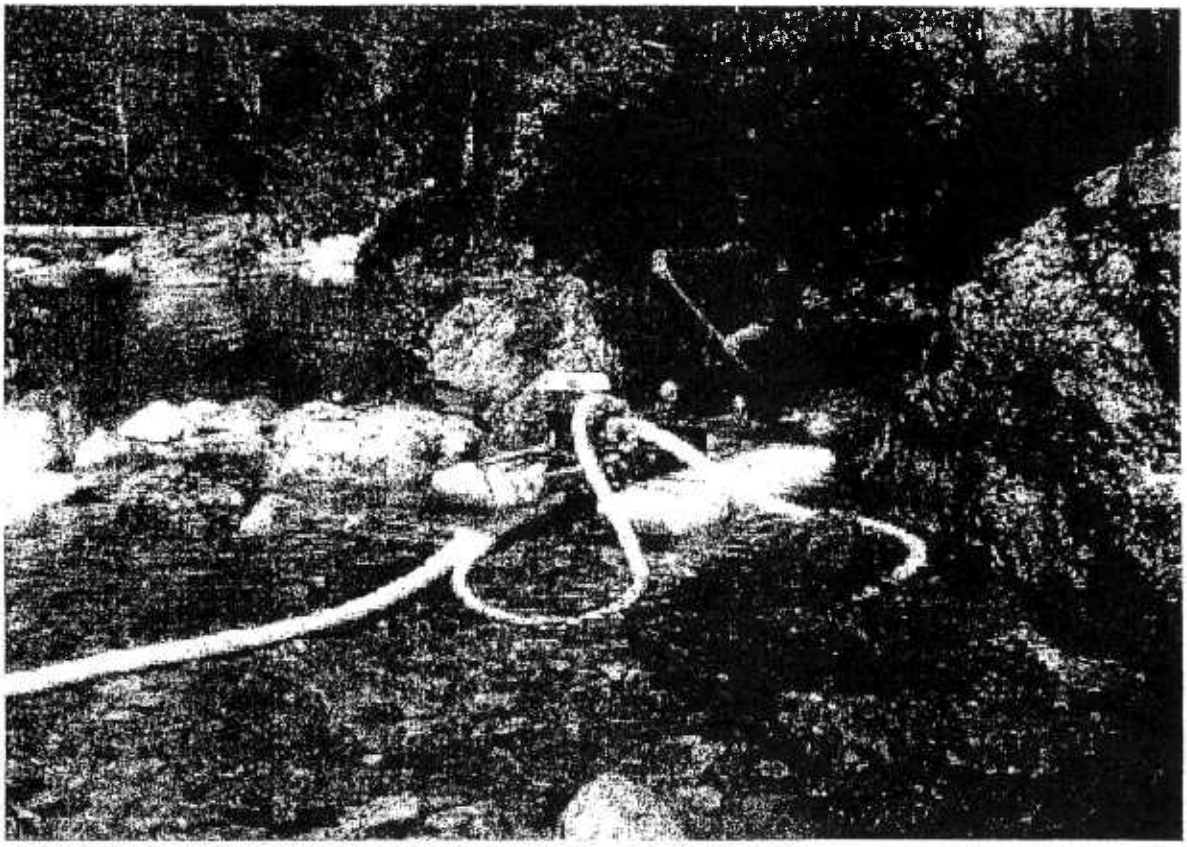


EXHIBIT 2
PAGE 23 OF 31 538

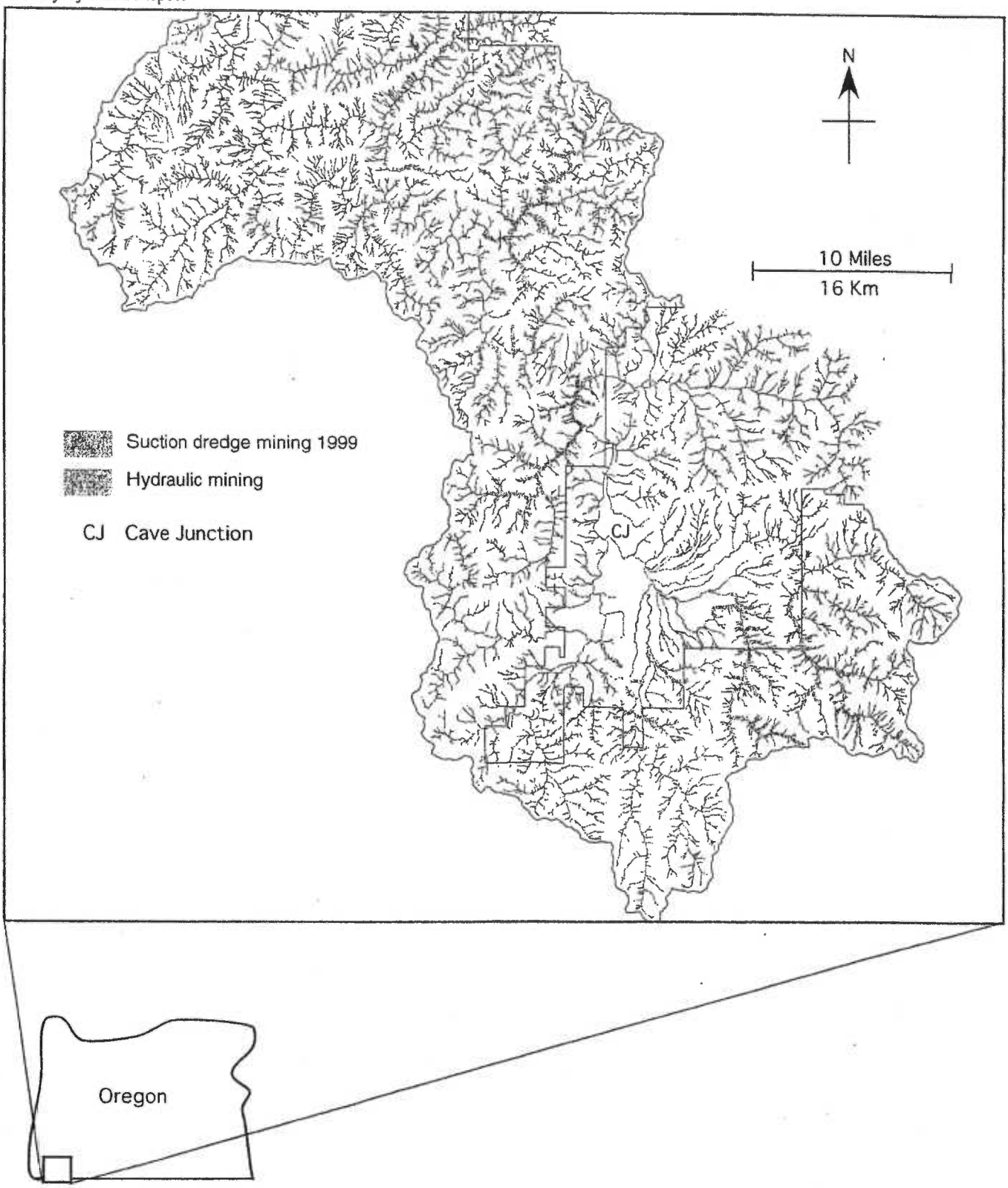


Fig. 2. Illinois river subbasin and location, showing reaches where suction dredge mining activities and early hydraulic mining occurred. Black line shows boundary of the Siskiyou National Forest.

EXHIBIT 2
PAGE 24 OF 31

539

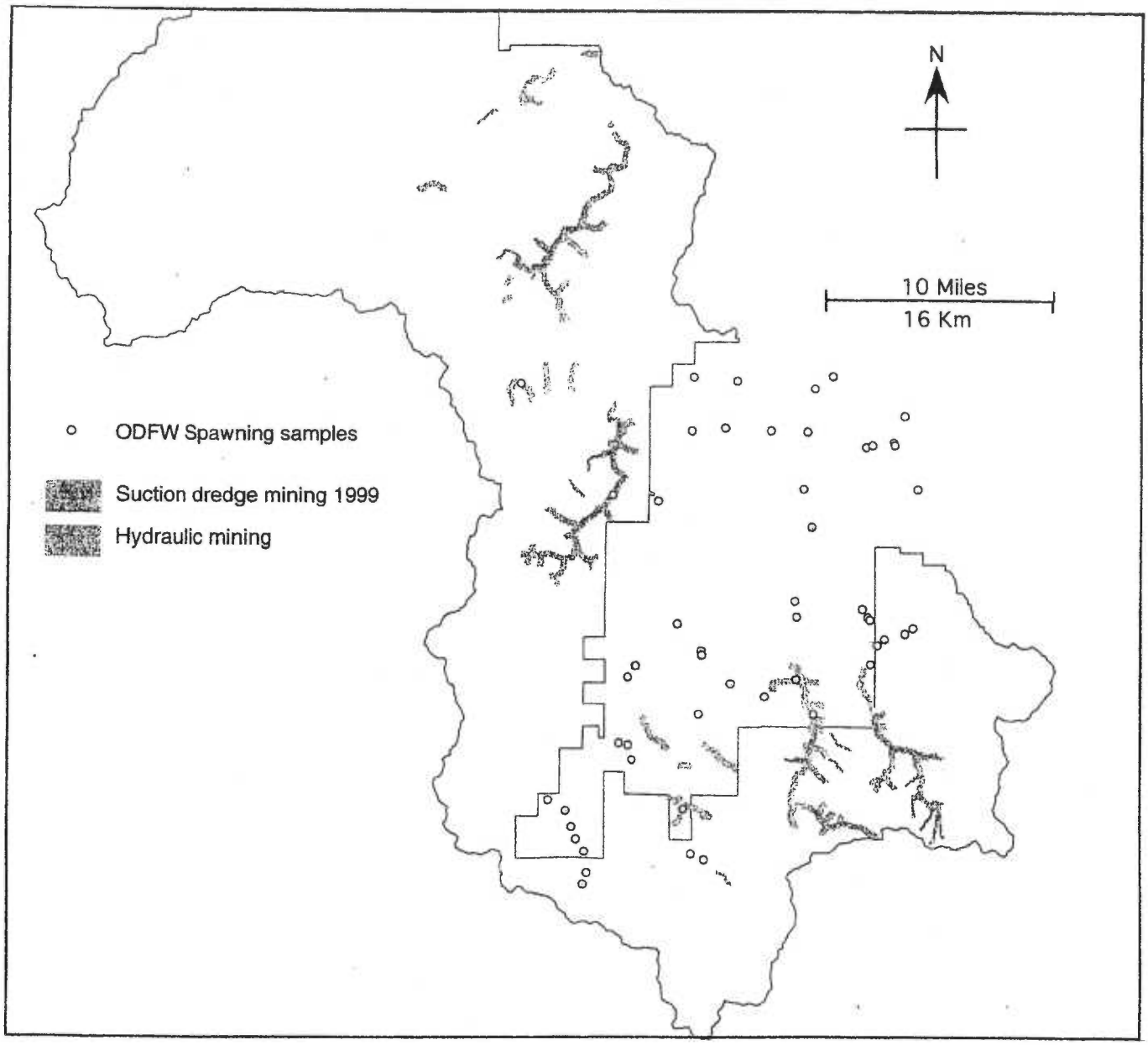


Fig. 3. Locations of ODFW Salmonid spawning stations from 1995-2000 (downstream starting points of reaches sampled) in Illinois subbasin, and reaches where suction dredge mining activities and early hydraulic mining occurred. Black line shows boundary of the Siskiyou National Forest.

EXHIBIT 2 540
PAGE 25 OF 31

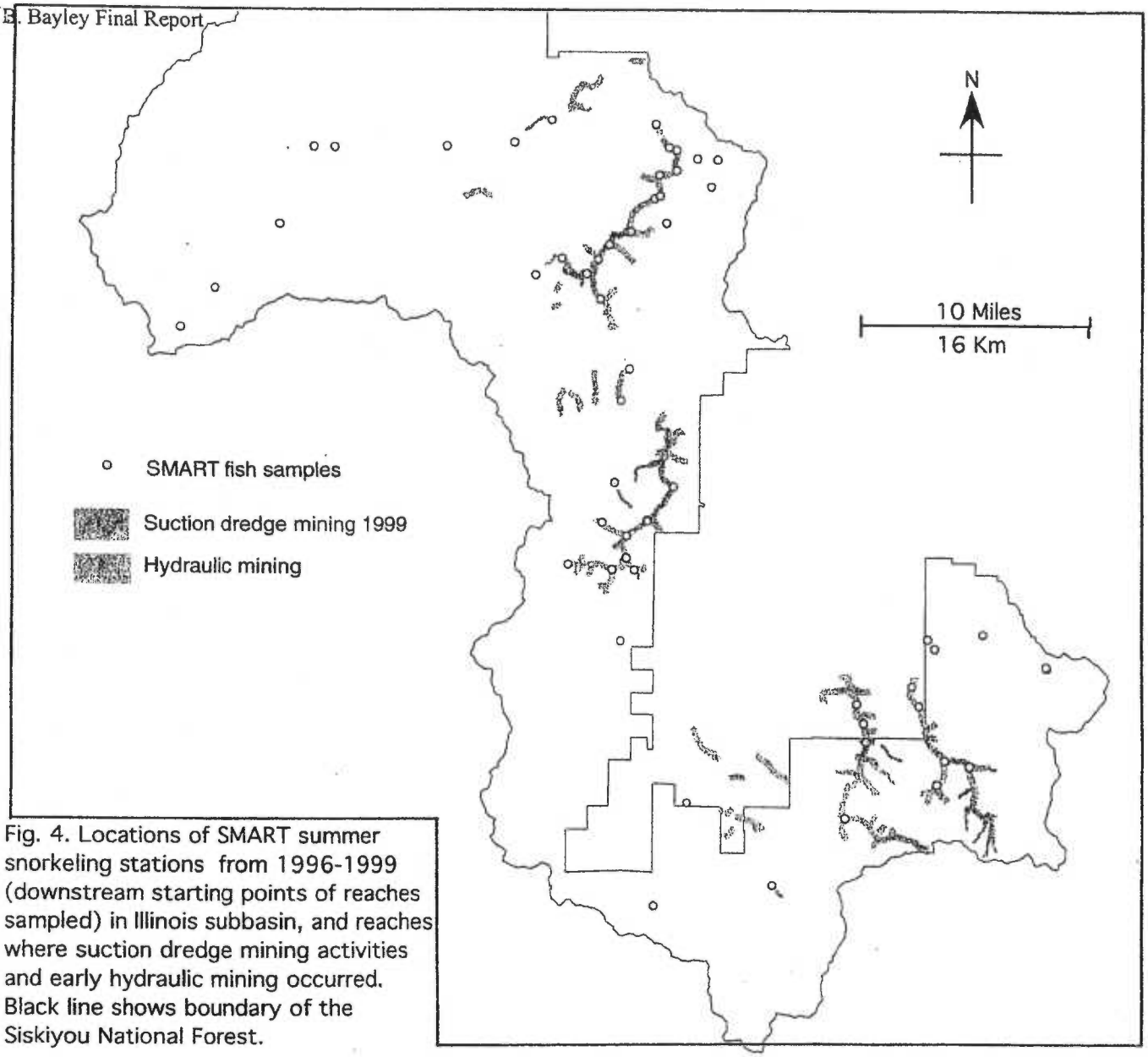


Fig. 4. Locations of SMART summer snorkeling stations from 1996-1999 (downstream starting points of reaches sampled) in Illinois subbasin, and reaches where suction dredge mining activities and early hydraulic mining occurred. Black line shows boundary of the Siskiyou National Forest.

Common name	Scientific name	Total No. individuals observed	No. Pools species was observed	No. reaches species was observed
Rainbow trout*	Oncorhynchus mykiss	5368	531	55
Coastal cutthroat trout	Oncorhynchus clarki	335	127	34
Coho salmon	Oncorhynchus kisutch	21	9	4
Brook trout*	Salvelinus fontinalis	5	5	1
sculpins**	Cottus spp.	257	33	16
Redside shiner	Richardsonius balteatus	93	4	2
Northern pikeminnow	Ptychocheilus oregonensis	84	8	3
Aggregate values		6163	610	59
Total number of units sampled			611	59

* introduced species **enumerated in about half of pools sampled

Fig. 5. Numbers of fish observed by species, and numbers of pools and reaches in which separate species and all taxa were observed from 59 SMART summer snorkeling reaches visited from 1996-1999. Fish observed in non-pool habitats were excluded here and from the analysis.

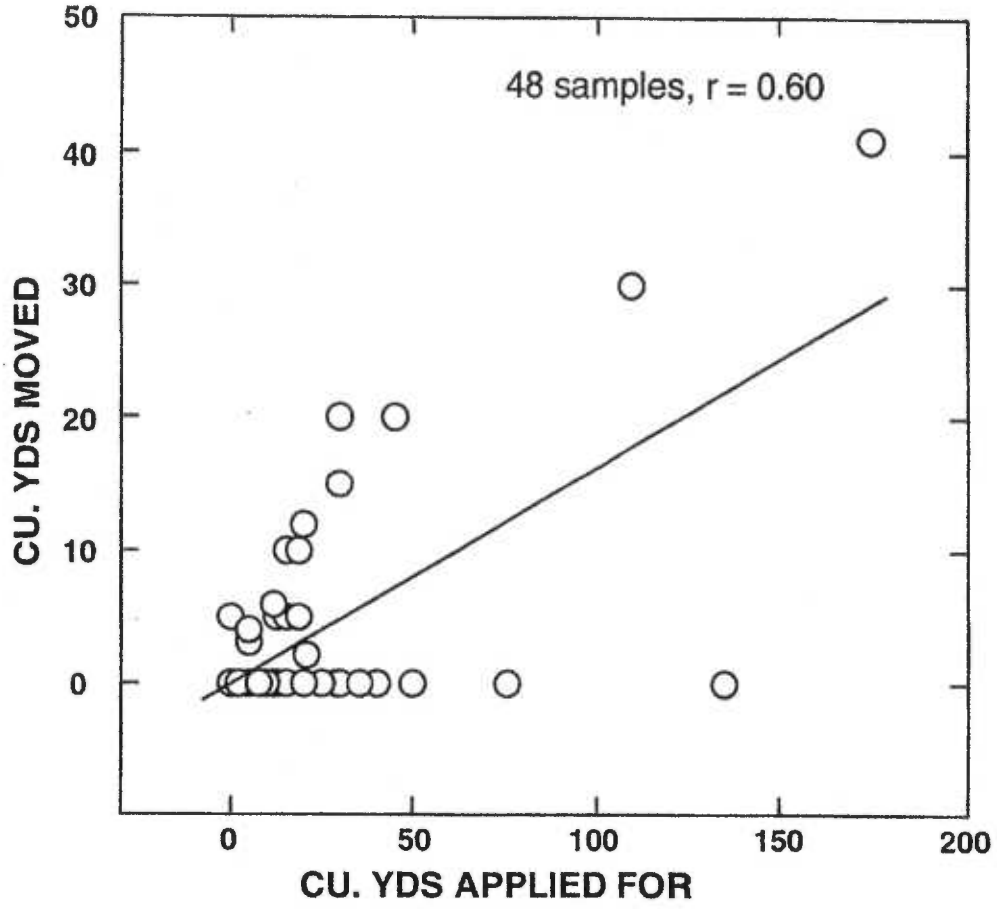


Fig. 6. Sediment moved by independent suction dredge mining operations in 1999. [x-axis = amount estimated prior to season; y-axis = amount moved downstream during season. Least squares regression line shown]
(source: Kevin Johnson, USFS, Grants Pass, OR)

EXHIBIT 2
PAGE 27 OF 31
542

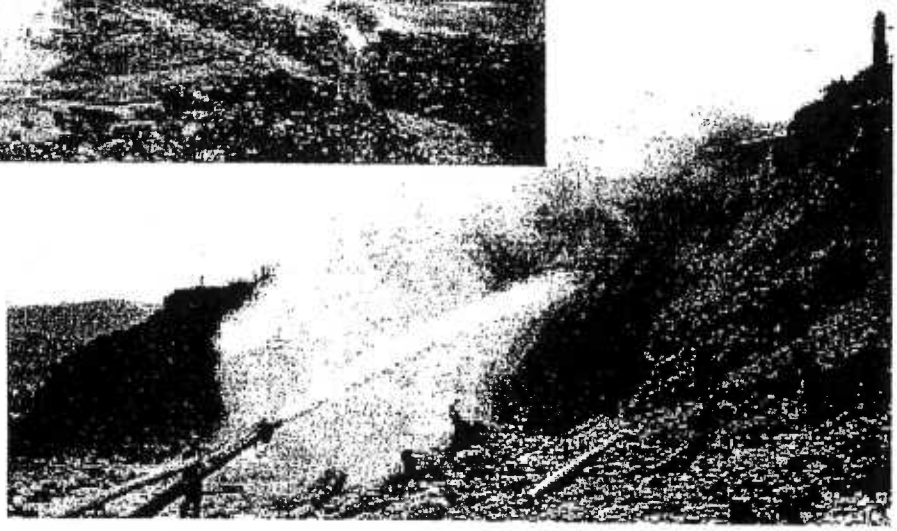


Fig. 7. Examples of late 19th Century hydraulic mining (photograph at left by Nome 1900)

P. B. Bayley

Fig. 8. Sucker Creek floodplain in 2001 that was subject to 19th Century hydraulic mining.

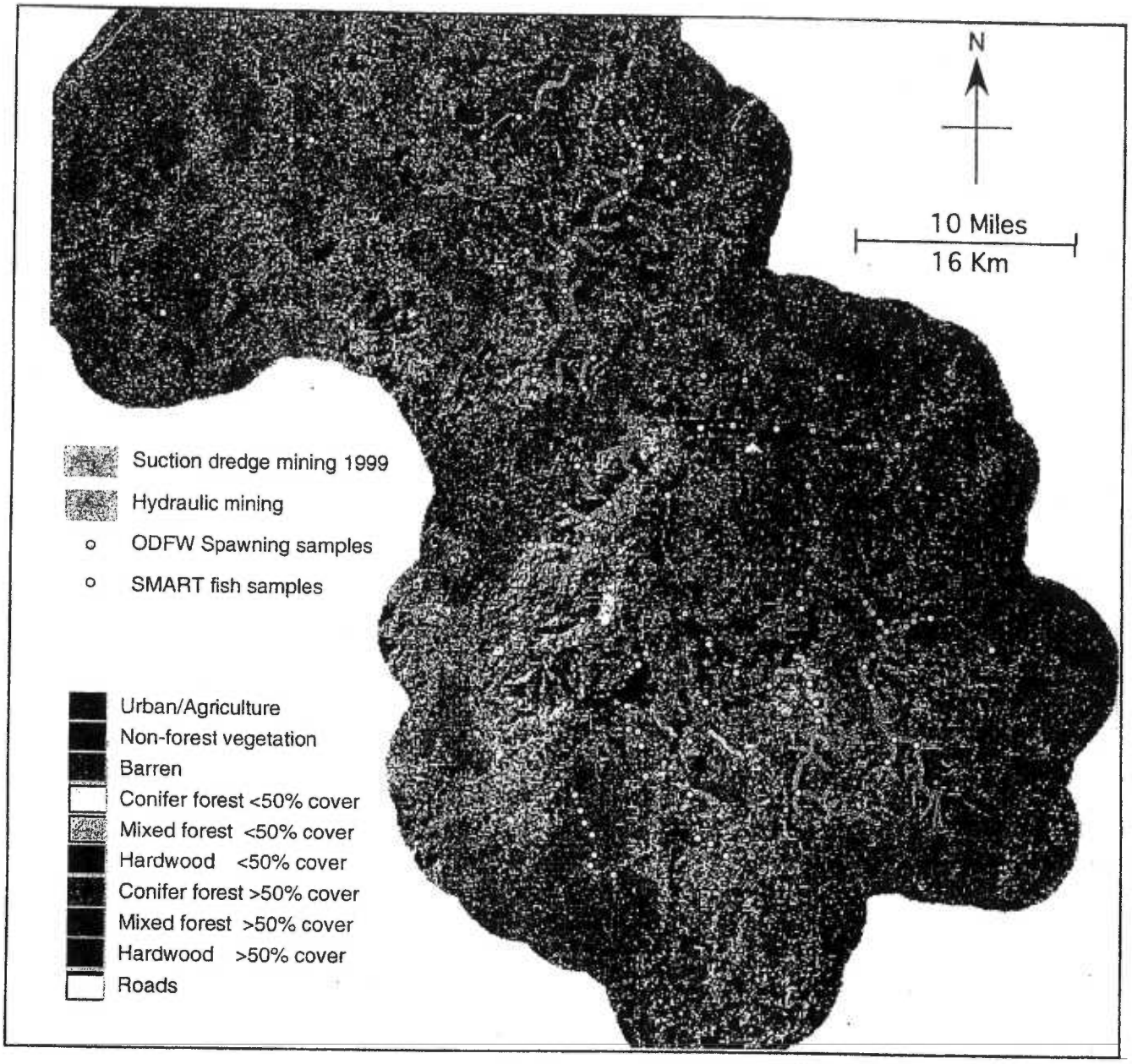


Fig. 9. WODIP classification of land-cover types in the Illinois subbasin, fish sample locations, and reaches where suction dredge mining activities and early hydraulic mining occurred. (Roads are are too fine to be observable at this scale.) Black line shows boundary of the Siskiyou National Forest.

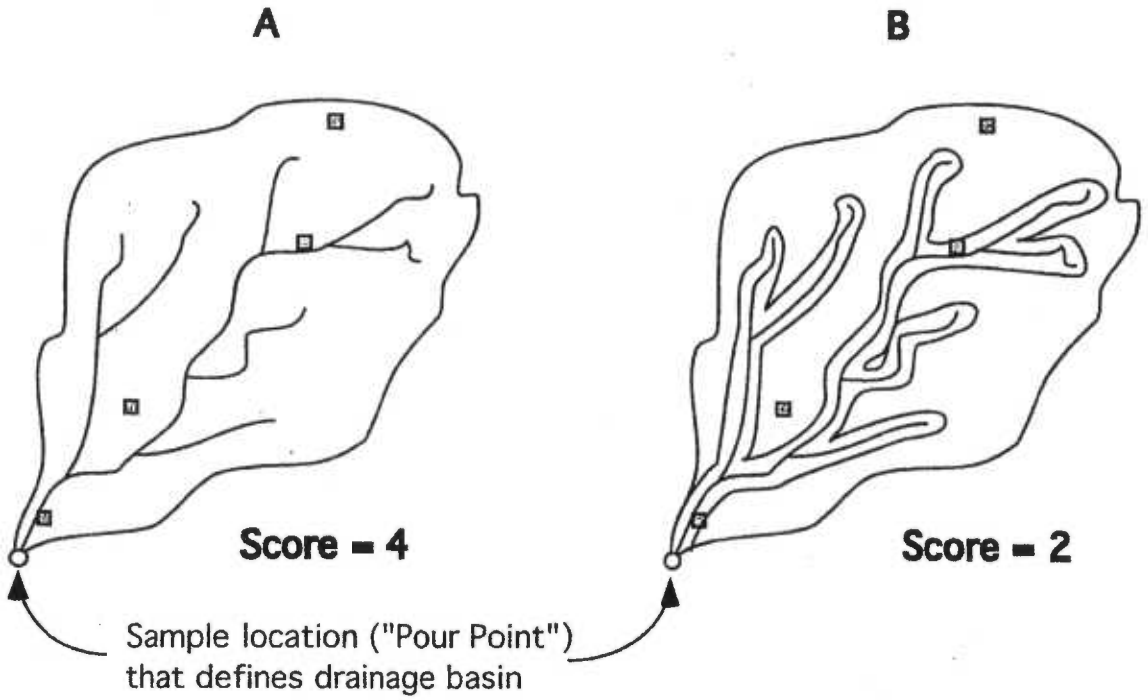


Fig. 10. Examples of scoring land-use classifications for potential influence on a stream sample (A) All pixels for a given classification in the drainage basin summed, (B) Only pixels falling within a defined buffer zone arounf permanent stream are summed.

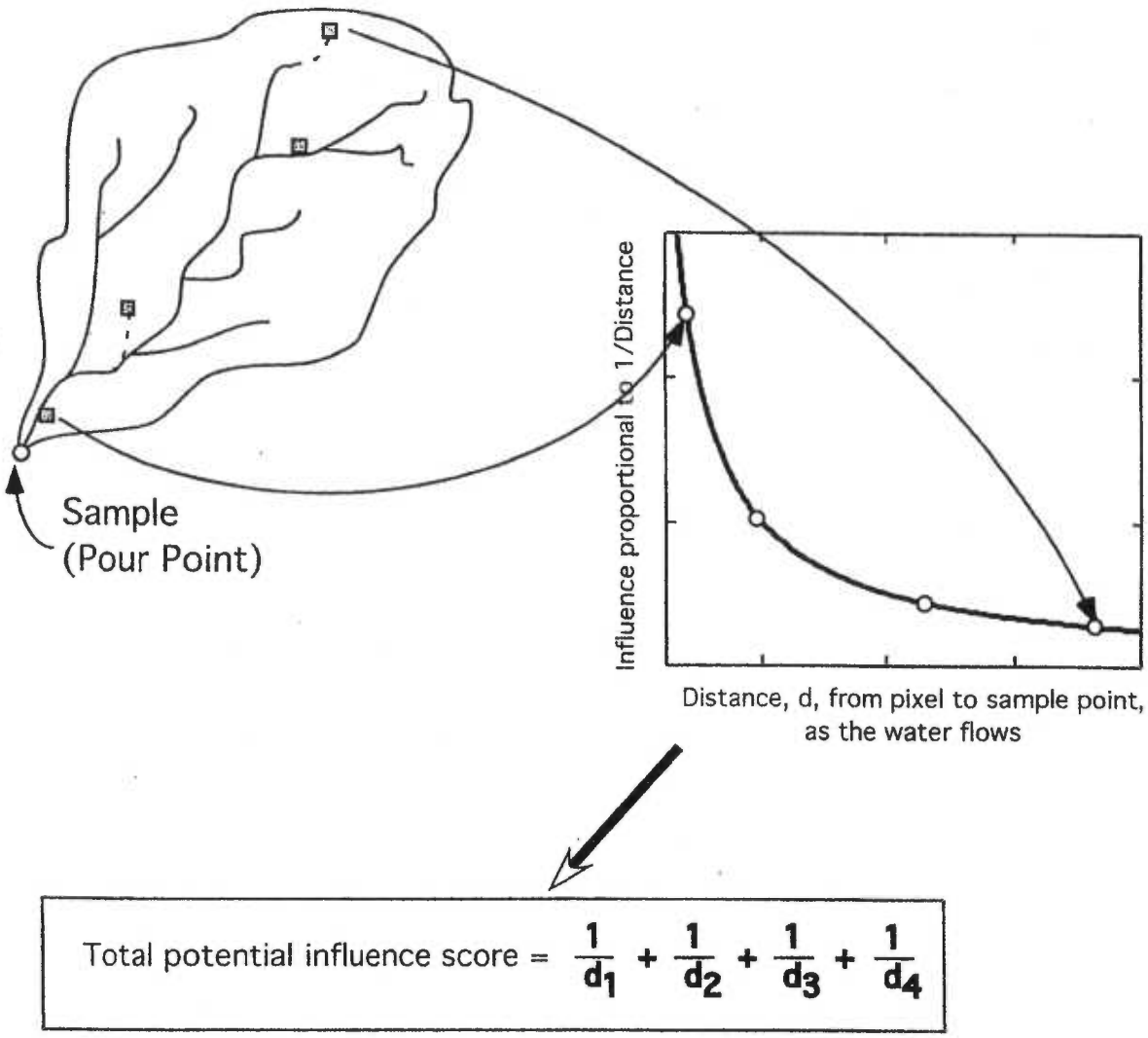
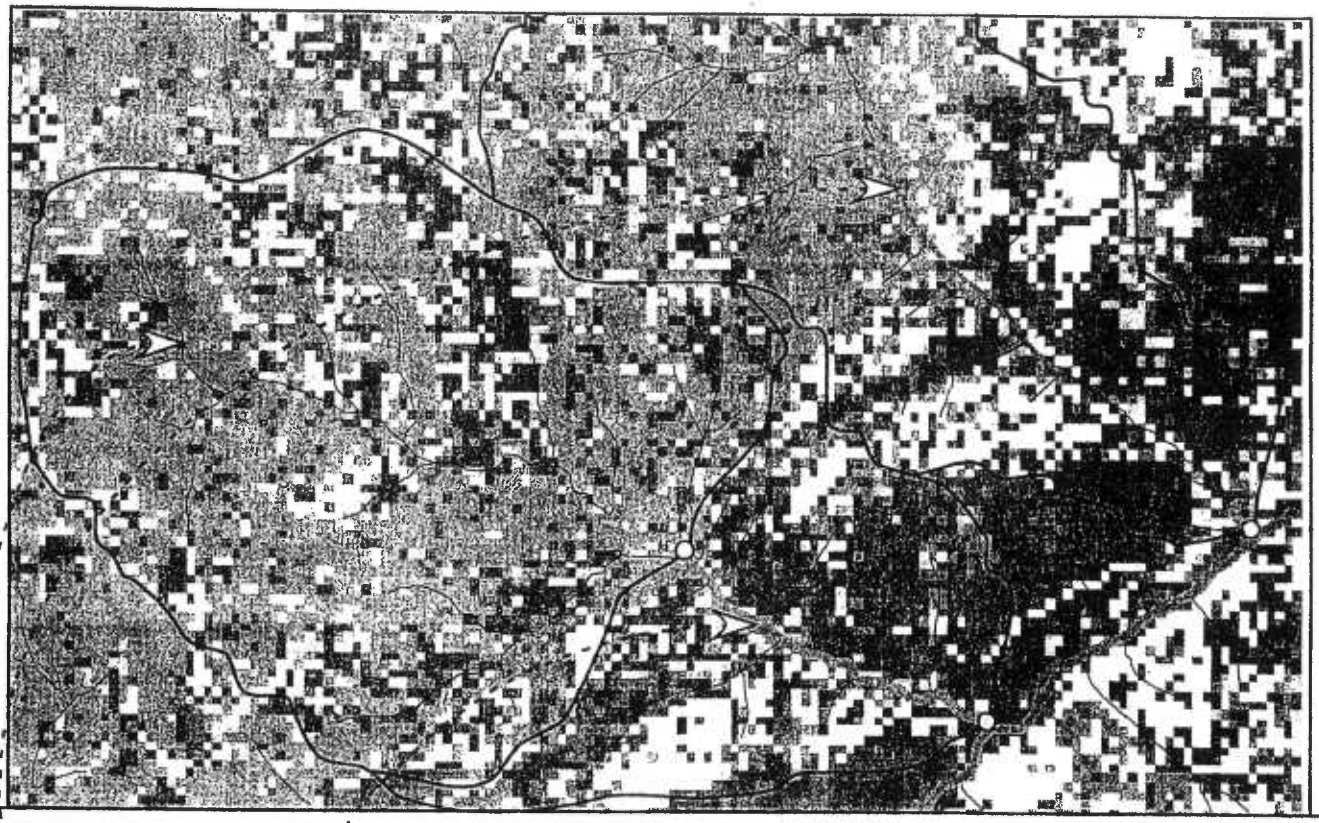


Fig. 11. Example of scoring land-use classifications for potential influence on a stream sample in which all pixels for a given classification are weighted by their inverse distance to the sample location and summed (dotted lines show flow paths overland from off-channel pixels determined by a flow map derived from a 10-m DEM (Digital Elevation Map)).



Stream	1/Distance weights (Percent coverage in basin)				
	Ag-Urban -Roads	<50% Forest	>50% Forest	Hydraulic Mining	Dredge Mining
Days Gulch	4.7 (5.2)	68 (49)	27 (46)	14 (1)	7.5 (12)
Fiddler Gulch	2.4 (3.2)	63 (46)	35 (51)	36 (11)	0 (0)
Fiddler Gulch (upper)	3.8 (4.3)	28 (29)	69 (67)	27 (3.4)	0 (0)

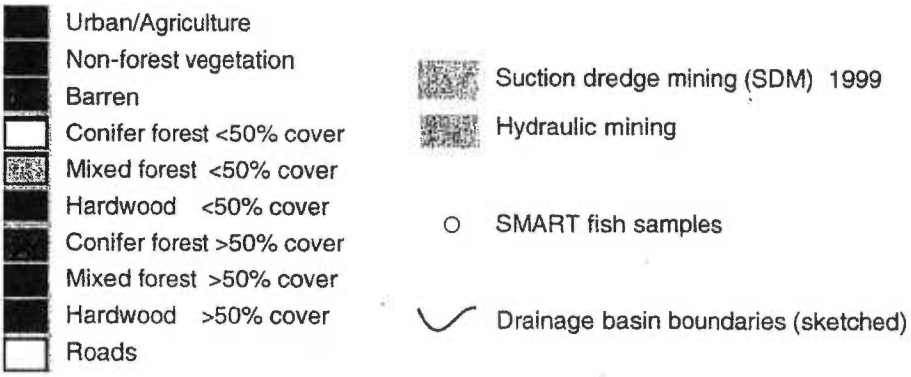


Fig. 12. Example of distribution of original land-use and mining classifications (25-by-25-m pixels), showing three SMART fish sampling locations in Josephine Creek basin, and explanatory variable results. Table shows inverse distance weighting measures for aggregated land-use and mining classifications, which were the explanatory variable values used, in the three drainages. (Percent coverage values based on sums of pixels are shown in parentheses for comparison)

	Urban -Ag	Non-For _Veg	Barren	Forest <50% canopy Conifer	Mixed	Hwood	Forest ≥50% canopy Conifer	Mixed	Hwood	Roads	Hydraul Mining	Suction Dredge Mining
Urban-Ag	1.000											
Non-For_Veg	0.12	1.000										
Barren	0.152	0.770***	1.000									
Con_For<50%	0.019	0.710***	0.667***	1.000								
Mix_For<50%	0.282	0.405	0.399	0.422	1.000							
Hwd_For<50%	-0.510**	-0.519**	-0.443	-0.504**	-0.757***	1.000						
Con_For>50%	-0.469*	-0.893***	-0.758***	-0.759***	-0.527**	0.659***	1.000					
Mix_For>50%	-0.464*	-0.790***	-0.770***	-0.572**	-0.353	0.569**	0.824***	1.000				
Hwd_For>50%	-0.333	-0.577***	-0.501**	-0.585***	-0.444	0.743***	0.595***	0.632***	1.000			
Roads	-0.300	0.015	-0.157	0.076	-0.399	0.179	0.051	-0.019	-0.100	1.000		
HM	-0.210	0.055	0.257	0.298	0.019	-0.189	-0.043	-0.099	-0.280	0.334	1.000	
SDM	-0.203	0.133	0.406	0.366	-0.121	-0.045	-0.142	-0.179	-0.225	0.442	0.670***	1.00

Fig. 13. PEARSON CORRELATION MATRIX of cumulative effects of drainages defined by 53 ODFW salmon spawning samples. Bonferroni-corrected probabilities: * P<0.05, ** P<0.01, **P<0.001.
(Urban-Ag = Urban and agriculture areas combined; Non-For_Veg = Non-forest vegetation; HM = Hydraulic mining; SDM = Suction Dredge Mining)

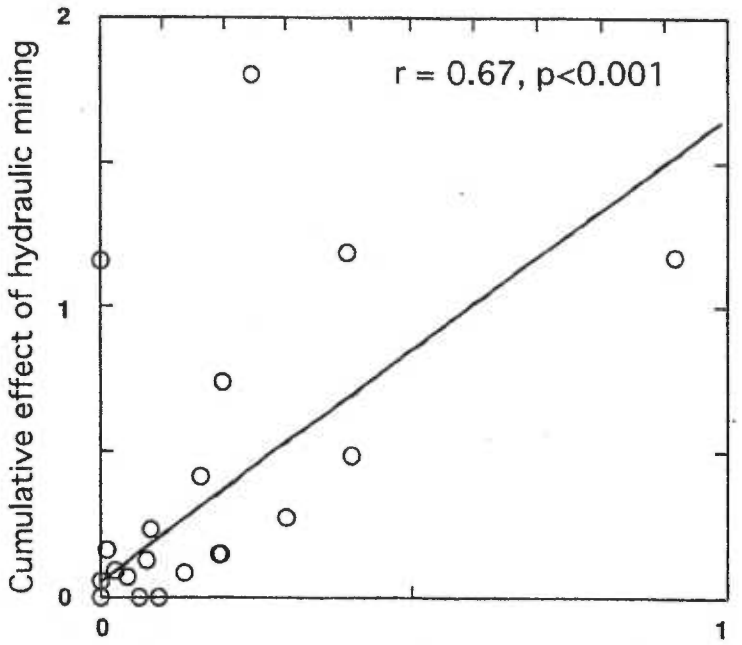


Fig. 14. CORRELATION between cumulative effects of Hydraulic mining and Suction Dredge Mining from drainages defined by 53 ODFW salmon spawning samples.

EXHIBIT 7 548
PAGE 33 OF 37

	Urban -Ag	Non-For _Veg	Barren	Forest <50% canopy Conifer	Mixed	Hwood	Forest >50% canopy Conifer	Mixed	Hwood	Roads	Hydraul Mining	Suction Dredge Mining
Urban-Ag	1.000											
Non-For_Veg	-0.022	1.000										
Barren	-0.070	0.825**	1.000									
Con_For<50%	0.025	0.835**	0.890**	1.000								
Mix_For<50%	-0.178	0.530**	0.442*	0.509**	1.000							
Hwd_For<50%	-0.081	0.157	0.072	0.155	0.078	1.000						
Con_For>50%	0.009	-0.947**	-0.875**	-0.927**	-0.634**	-0.217	1.000					
Mix_For>50%	0.060	-0.647**	-0.759**	-0.640**	-0.098	0.239	0.575**	1.000				
Hwd_For>50%	0.017	-0.427*	-0.482**	-0.497**	-0.115	0.377	0.364	0.473*	1.000			
Roads	-0.063	-0.303	-0.352	-0.433*	-0.340	-0.448*	0.333	0.015	0.080	1.000		
HM	-0.117	-0.111	0.022	-0.017	-0.066	-0.309	0.118	-0.079	-0.343	0.039	1.000	
SDM	-0.045	-0.049	0.034	-0.011	-0.112	-0.145	0.078	-0.106	-0.113	-0.057	0.255	1.00

Fig. 15. Pearson correlation matrix of cumulative effects of drainages defined by 59 SMART samples. Bonferroni-corrected probabilities: * P<0.05, ** P<0.01, **P<0.001.
(Urban-Ag = Urban and agriculture areas combined; Non-For_Veg = Non-forest vegetation; HM = Hydraulic mining; SDM = Suction Dredge Mining)

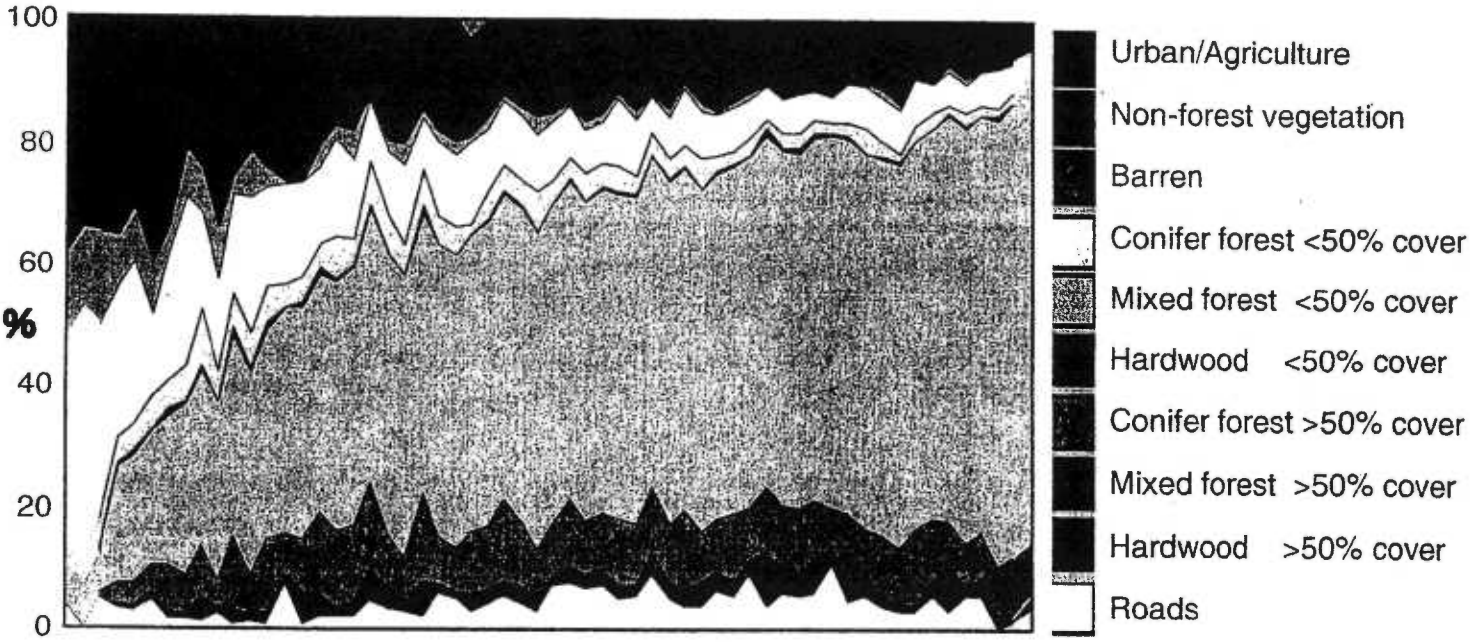


Fig. 16. Proportions of WODIP-based explanatory variables, by area of drainage occupied, from drainages defined by 59 SMART fish samples. (Samples ordered on x-axis by increasing canopy >50% of all forest to illustrate ranges of explanatory variables. The legend identifies the variables in the same order as shown on the graph).

	Urban + Agric. + Roads	Forest <50% canopy + Non-For_Veg + Barren	Forest >50% canopy	Hydraulic Mining	Suction Dredge Mining
(1) Urban-Ag-Roads	1.00				
(2) For.<50%+Non-For.+Barren	-0.401*	1.00			
(3) Forest >50% canopy	0.299	-0.994***	1.00		
(4) Hydraulic Mining	0.019	-0.061	0.059	1.00	
(5) Suction D. Mining	-0.064	-0.031	0.040	0.255	1.00

Fig. 17. PEARSON CORRELATION MATRIX of reduced set of cumulative effects of drainages defined by 59 SMART samples. Bonferroni-corrected probabilities: * P<0.05, ** P<0.01, **P<0.001. [see text for (1), (2), etc.,].
(Urban-Ag-Roads = Urban, agriculture and road areas combined;
For.<50%+Non-For.+Barren = +Forest less than 50% canopy, Non-forest vegetation, and barren areas combined)

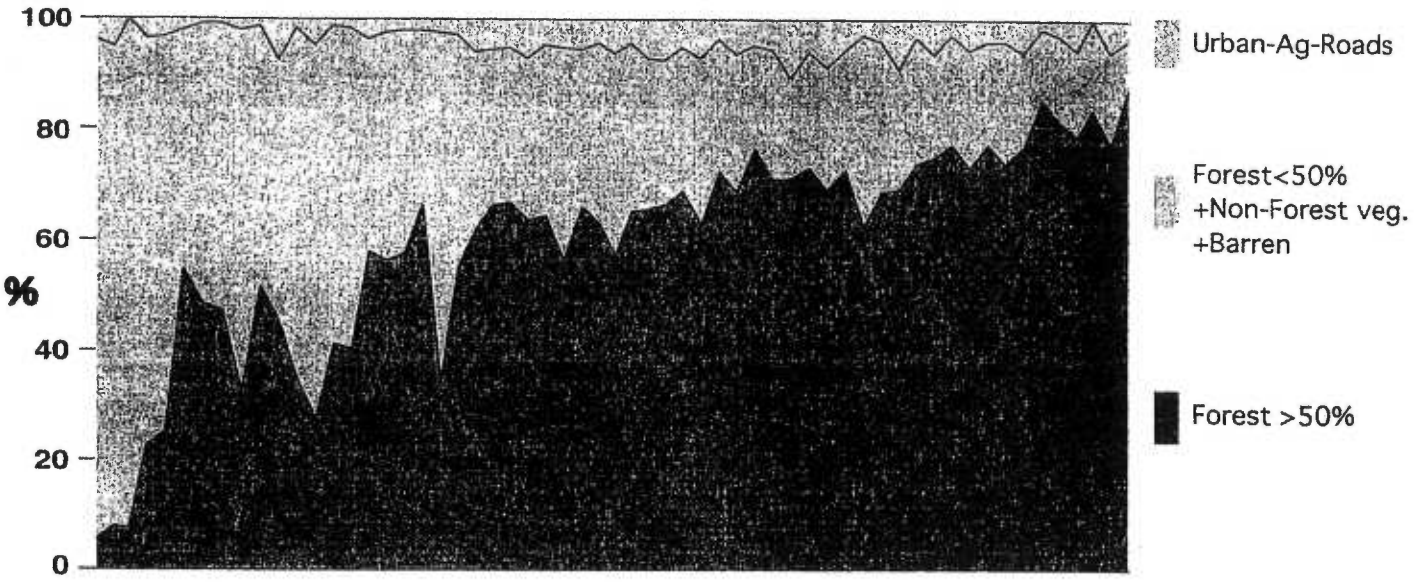


Fig. 18. Proportions of reduced WODIP-based explanatory variables, by area of drainage occupied, from drainages defined by 59 SMART fish samples.

EXHIBIT 2 550
PAGE 35 OF 37

(A) Model: Response: Density of Salmonids 1yr-old
Explan. vars.: Ag-Urban-Roads + Forest>50% + Hydraulic Mining + Suction Dredge Mining + Hydraulic Mining*Suct.Mining

Coefficients:

	Value	SE	t-value
(Intercept)	4.04		
Ag-Urban-Roads	-4.96	5.65	-0.88
Forest>50%	0.39	0.73	0.53
Hydraul.Mining	-0.40	0.19	-2.04#
Suct.Mining	-0.33	0.29	-1.16
Hydraul.*Suct.Mining	0.25	0.23	1.06

(B) Model: Response: Density of Salmonids 1yr-old
Explan. vars.: Ag-Urban-Roads + Forest>50% + Hydraulic Mining + Suction Dredge Mining

Coefficients:

	Value	SE	t-value
(Intercept)	3.86		
Ag-Urban-Roads	-5.45	5.68	-0.96
Forest >50%	0.66	0.68	0.97
Hydraul.Mining	-0.36	0.19	-1.90
Suct.Mining	-0.05	0.08	-0.56

(C) Model: Response: Density of Salmonids 1yr-old
Explan. vars.: Ag-Urban-Roads + Forest>50% + Hydraul.Mining

Coefficients:

	Value	SE	t-value
(Intercept)	3.85		
Ag-Urban-Roads	-5.46	5.67	-0.96
Forest >50%	0.68	0.67	1.00
Hydraulic Mining	-0.38	0.18	-2.13# (P=0.03)

Fig. 19. General linear model results using negative binomial fits to 59 SMART fish samples on the density of Native Salmonids ≥1yr-old (* = interaction between two variables; # signidicant coefficient at P<0.05; see text for refs. to A, B, and C).

EXHIBIT 2 551
PAGE 36 OF 37

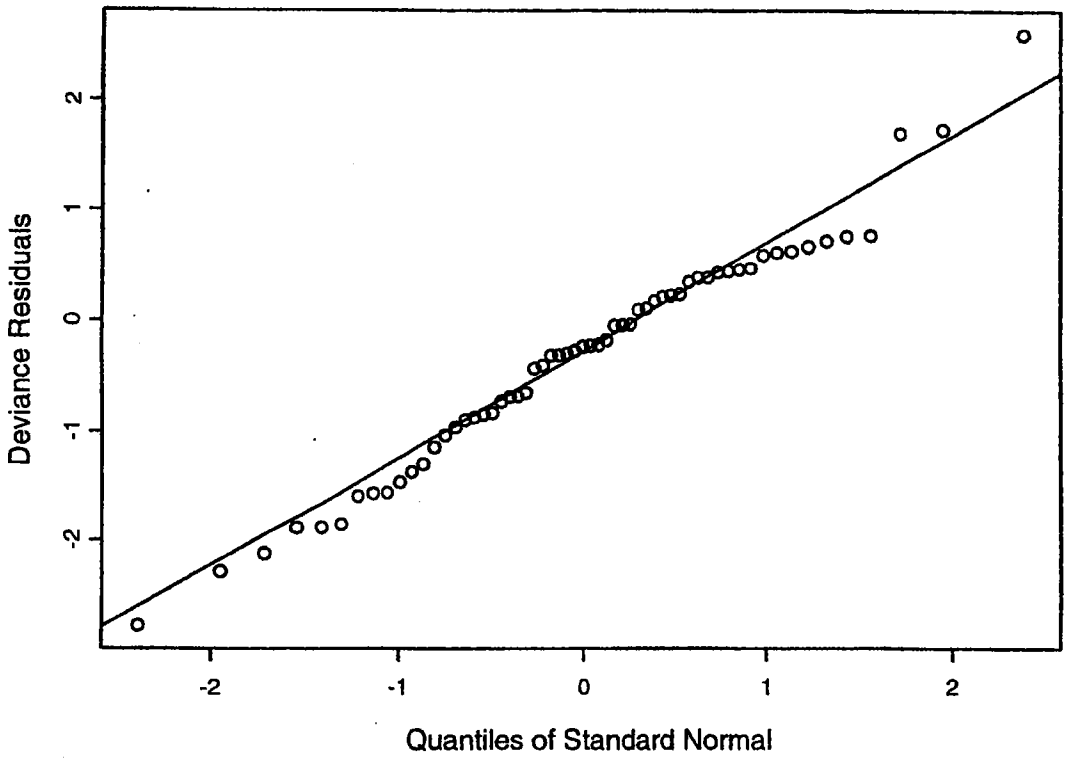


Fig. 20. Normal probability plot of deviance residuals from model in Fig. 19C.

	Predicted density if Hydraulic Mining had .... existed as recorded,	or, not occurred	Predicted change
Althouse Creek (lower)	30	52	71%
Josephine Creek (mouth)	30	45	50%
Days Gulch (mouth)	39	43	12%

Model: Density of Salmonids 1yr-old (#/1000 m^2)
= exp(3.85-5.46*Ag-Urban-Roads + 0.68*Forest>50% - 0.38*Hydraul.Mining)

Fig. 21. Predicted change in salmonid density (older that YOY) in selected streams if hydraulic mining effect had not occurred.

552

EXHIBIT 2
PAGE 37 OF 37

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **REPLY DECLARATION OF JOSEPH GREENE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36J Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49'ers, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

Joseph Greene states:

1. I am an independent environmental consultant and make this Reply Declaration in further support of the Miners' motion for an injunction in this action.

Unregulated Dredging Is Not At Issue.

2. It is my understanding that the motion seeks to facilitate dredging under regulations developed in 1994. A great deal of the testimony submitted in opposition to the motion for an injunction, addresses "the general effects of suction dredging on fish" (e.g., Moyle Decl. ¶ 13), without regard to the dredging sought under the 1994 regulations in the proposed injunction.

3. Some of the testimony concerning impacts even addresses imagined impacts of suction dredging that would involve violations of those regulations. Mr. Soto, for example, complains that "large boulders, stumps and rootwads in the stream may be removed before a site is excavated, which reduces stream channel stability". (Soto Decl. ¶ 6.) In fact, the 1994 regulations prohibited any person from "mov[ing] any anchored, exposed woody debris such as root wads, stumps, or logs (§ 228(f)(4)), as well as imposing significant limitations on moving boulders (§ 228(f)(1)(A)).

4. Mr. Soto also complains that suction dredges may involve "entrainment of fish eggs and yolk sac fry" (Soto Decl. ¶ 15.) This obviously depends upon whether the eggs or sac fry are present (and whether the miners encounter them). The 1994 regulations contained extensive time restrictions forbidding miners from operating when eggs and sac fry were present (§ 228.5), and I am not aware of any evidence to suggest appreciable risks to eggs or sac fry from operating in compliance with the timing restrictions.

5. Mr. Soto's testimony that the "1994 regulations do not provide protections for federally or state listed threatened or endangered species or species of special concern listed subsequent to 1994" is not true. For example, the 1994 regulations restrict operations during times when coho salmon eggs may be in the gravel; the subsequent listing of the salmon under the Endangered Species Act does not vitiate the protections provided by the 1994 regulations.

6. Because the opposing witnesses appear to be offering opinions about suction

dredging in general, or even suction dredging actually conducted in violation of the 1994 regulations, rather than suction dredging under the injunctive relief requested by the Miners, the testimony necessarily fails to address incremental effects of the injunction.

Opponents Do Not Offer Quantitative Testimony Concerning Actual Effects.

7. The testimony of opponents of suction dredging continues to make reference to the *possibility* of harm without regard to its likelihood. (*E.g.,* Moyle Decl. ¶ 11 ("can harm").

8. None of the opponents respond to the facts presented in my opening declaration concerning the comparative insignificance of dredging on the scale of the waterways involved. Even several thousand dredgers operating on thousands of miles of California waterways under the 1994 regulations would necessarily have minimal impact on those waterways. The effects described by suction dredging opponents, if they occur at all, must be placed in this larger context to appreciate their insignificance.

9. One witness who addresses the question of scale is Dr. Duffy, who relies upon the fact that "the scale of dredging is small relative to entire stream" as a reason that "dredge holes could not significantly benefit fish". (Duffy Decl. ¶ 12.) Obviously, precisely the same scale argument shows how the holes could not significantly harm fish either. It is obvious that we are debating extraordinarily small effects, far too small to measure any impact on fish populations, in a context where there is not even any quantification of whether the positive effects outweigh the negative ones.

10. Testimony concerning "chronic disturbance" to fish (Moyle Decl. ¶ 15) offers no guidance as to the significance of such disturbance. A 1986 study by Harvey of tagged rainbow trout demonstrated that no tagged fish moved further than from a pool to one of the adjacent riffles or vice versa in any two-week period, leading to the conclusion that the fish "moved very little in either the dredged or control areas. The fact that fish approach dredges and feed from their discharges, as well as swimming in company with the dredgers underwater, suggests that any "disturbance" is not one of significance.

11. Professor Moyle acknowledges that fish are attracted to invertebrates that may be dredged up and discharged to become available for consumption, but complains that he has only

seen common rainbow trout doing this. The statement that "other native species are almost never seen in such conditions" is misleading, insofar as the rainbow trout are much more common, but the increased food supply benefits all fish, and if other fish are present, they too will feed off the back of the dredge.

12. Research demonstrates that the invertebrates in the streambed recolonize very rapidly, on the order of a month or so. In some sense, the effect of the suction dredgers on the food supply from aquatic organisms in the streambed can be analogized to farmers tilling a field with resultant increased productivity. Mr. Lehr's speculation that adverse effects may arise when one takes this "zoo" feeding away is not support by any data, and is contrary to the complaints of other witnesses (and the general ecological truth) that fish communities are constantly short of food, such that additional food is unquestionably more beneficial than highly abstract and theoretical concerns about "intraspecific competition"[1] from "artificially elevated fish densities brought forth from the artificial forage environment". (Lehr Decl. ¶ 16.) Mr. Lehr's comment is akin to saying that we should not put food in a pasture, and instead let them starve, because they might fight over it. It is confusing mix of second-, third- or higher order effects in the testimony of these witnesses that makes it so vital to understand the effects of scale, and to measure and quantify effects.

13. Mr. Lehr's statement that the dredging "changes the bottom of the streams to an artificially homogeneous condition, without the places to hide and forage that fish (and especially juvenile fish) need to survive and thrive" (Lehr Decl. ¶ 16) is stunningly contra-factual, particularly given the general complaint that dredgers create large holes in the stream bottoms (as well as turbidity plumes in which juvenile fish can hide).

14. Opponents offer no data to support testimony that "turning over the stream bottom, altering the stream channel, and clouding the water" on a temporary basis will "reduce the ability of the stream to support fishes". (Moyle Decl. ¶ 11.) As previously explained, the only study attempting to assess an impact on fish populations—which included assessing with

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[1] Intraspecific competition is a term from population ecology describing an interaction whereby members of the same species compete for limited resources.

effects of illegal conduct with more significant impacts than proposed in the injunction as well as dredging under regulations—found no significant impact.

15. Professor Moyle states that the study concerned only the Illinois River, which was highly modified by historic hydraulic mining. (Moyle Decl. ¶ 19.) However, that statement is also true of the Klamath River and other California rivers where suction dredging typically occurs. Nor did the study concern a single river. In fact it concerned 59 river, stream and creek reaches within the Illinois subbasin that were sampled for fish populations and dredging intensity over time. Professor Moyle also complains that the data were not "sensitive to the local impacts of dredging" (*id.*), but does not explain what this means. The whole point of the study was not to determine if suction dredge adversely affected any single fish in any single dredge hole, but whether the cumulative impacts of a National Forest full of suction dredgers had any measurable impacts on fish populations.

16. Dr. Duffy attacks the Bayley study by quoting the phrase: "The statistical analysis did not indicate that suction dredging has no effect on the three responses measured . . ." without including the balance of the sentence: "but rather than any effect that may exist could not be detected at the commonly used Type 1 error rate of 0.05". This is a way of saying that any effect of suction dredge mining cannot even be measured as statistically-significant, leading to Professor Bayley's conclusion: "Given that this analysis could not detect an effect averaged over good and bad [suction dredge] miners, and that a more powerful study would be very expensive, it would seem that public money would be better spent on encouraging compliance with current guidelines than on further study".

Drought and Temperature.

17. Mr. Soto says "there is no evidence I am aware of that supports the miners' claims that "suction dredge holes" create "thermal refuges". (Soto Decl. ¶ 16.) This phenomenon is easily observable, and in fact has been the subject of a report and testimony by now-former California Department of Fish and Wildlife biologist Dennis Maria (a true copy of which is attached as Exhibit 1 hereto).

18. Mr. Maria's observations that "dredge holes in the riverbed created the only

discernable juvenile rearing habitat" observed in one stretch of the Salmon River, which "likely were providing thermal relief in a stretch of the Salmon River that typically exceeds 70F during July and August, benefitting primarily juvenile steelhead and coho salmon" (Exhibit 1, at 4-5) is consistent with my own understanding, observations, and measurements of summer water temperatures along the Klamath River and its tributaries.

19. Dr. Duffy's complaint that the dredge holes are not associated with "cold water inflow" (Duffy Decl. ¶ 12) ignores flows of cooler water within streambeds that may occur, as well as the phenomenon of stratification that permits cooler water to persist at depth. His real complaint appears to be that the holes are not a "natural hydraulic practice," but they may save the lives of fish in hot temperatures whether they are natural or not.

20. There is a large body of research confirming the benefit of such holes:

- Harvey and Lisle (1998) wrote that, "Dredge holes 3 feet or deeper are considered adequate refugia for fish. Excavating pools could substantially increase their depth and increase cool groundwater inflow. This could reduce pool temperature. If pools were excavated to a depth greater than three feet, salmonid pool habitat could be improved".

- 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.

- 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.

- 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.

- 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.

- Juveniles used dredge holes, and their feeding, growth, and production did not seem to be impacted. 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. U.S. Fish and Wildlife Service, California Cooperative Fishery

Research Unit, Humbolt State University. Cooperative Agreement No. 14-16-0009-1547, Final Report. Arcata, CA.

- Dace, suckers, juvenile steelhead and salmon fed, rested and held in dredge holes. 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. U.S. Fish and Wildlife Service, California Cooperative Fishery Research Unit, Humbolt State University. Cooperative Agreement No. 14-16-0009-1547, Final Report. Arcata, CA.

21. From this perspective, Mr. Lehr's testimony concerning how "habitat alteration could affect the minimal cold water refugia" of particular importance during drought conditions (Lehr Decl. ¶ 12) is a perfect example of how it is important to balance the tiny, asserted negative impact of possibly causing fish to move out of cold water against the creation of additional refugia where the cold water is present. Mr. Lehr may "not know how all these factors will play out in the summer months" (id. ¶ 14), but there is every reason to believe that the dredging will, on balance, *improve* the survival of cold-water-dependent fish.

Turbidity

22. In response to my testimony concerning turbidity, Mr. Soto makes the claim that turbidity will lead to "blocked sun light penetration into the water, disrupting basis food production" (Soto Decl. ¶ 6.) This is a perfect example of why it is vital to consider the effects of scale.

23. There is no research of which I am aware that would show that intermittent turbidity of the type caused by suction dredgers would have any impact whatsoever on juvenile salmon. Mr. Soto's testimony concerning effects on the survival rate, to the extent is true at all, refers to laboratory tests where juvenile fish are exposed to extraordinarily high levels of turbidity from which they cannot simply swim away (as they can in the wild).

24. A leading model of such laboratory effects shows the following:

TSS (mg/L)	Calculated Turbidity (NTU)	
59,874	62,084.2	59,874 mg/l for 1 hour
8,103	8,402.1	8,103 mg/l for 7 hours
2,981	3,091.0	2,981 mg/l for *1 day*
403	417.9	403 mg/l from *6 days to 2 weeks*
148	153.5	148 mg/l for *7 weeks*
55	57.0	55 mg/l for *4 months*
20	20.7	20 mg/l for *11 months*

25. This is yet another textbook example of the importance of measurement and quantification in assessing impact, because the intermittent turbidity plumes that may result from suction dredging (or may not, depending upon the substrate) involve NTU levels far below those that could cause harm:

26. For example, turbidity was 0.5 NTU upstream, 20.5 NTU 13 ft downstream, and 3.4 NTU 160 ft downstream of an active dredge on Canyon Creek (Hassler *et al.* 1986). On Butte Creek and the North Fork of the American River where ambient turbidities were <1 NTU, maximum turbidity 16 ft downstream of active dredges reached 50 NTU but averaged only 5 NTU (Harvey 1986). Wanty *et al.* (1997) reported turbidity values of 19 NTU 100 ft downstream of a 10 inch dredge located below Wilson Creek on the North Fork Fortymile River. Values returned to near background levels (3.7 NTU) within the next 100 ft but remained slightly above background levels (2.2 - 2.3 NTU) as far as 492 ft downstream.

27. In short, the highest level of turbidity reported in the literature, arising from a 10-inch dredge that could not be used under the 1994 regulations, was such that juvenile salmon would have to be confined in the thickest part of the plume for more than four months continuously to experience serious impacts. There is no real-world risk here at all.

28. Mr. Soto's concerns about turbidity interfering with feeding also fail to take account of the localized impacts and intermittent nature of the plumes, fail to account for the protective effect of the plumes from predators, and amount to unsubstantiated speculation. It is undisputed that juvenile fish come to the back of the dredges to feed; Mr. Soto would have the Court believe that they do this even though they must be unable to eat because of the lack of "clear water".

29. Predation effects are very important for juvenile fish survival, and there is every

reason to believe that turbidity's benefits of providing cover from birds outweigh any adverse impacts on prey identification by the fish. Mr. Soto is in some sense making the "deeply seated error" as the biologists criticized long ago by Charles Darwin in the *Origin of Species* for contending that "the physical conditions of a country as the most important for its inhabitants; whereas it cannot, I think, be disputed that the nature of the other inhabitants, with which each has to compete, is at least as important, and generally a far more important element of success".

The Causes of Decline.

30. Professor Moyle cites generally declining fish populations and asserts that this means that "it should be assumed that dredging causes harm, unless it can be proven otherwise". (Moyle Decl. ¶ 18.) This statement again includes an assumption that the quantitative impact of suction dredging is significant in relation to broader causes of decline.

31. Such an assumption is contrary to current scientific knowledge. A report out of the National Center for Public Policy Research (Carlisle, 1999) further addresses the issues of salmonid population declines and steps taken to restore them.

> "Until recently, fish biologists assumed that only changes in the freshwater habitat of salmon could explain the variability in the salmon population. Scientists were thus quick to conclude that human modification of this habitat was the reason for the salmon population decline. Forestry practices have changed in recent years to protect salmon from harm. Buffers mandate that no construction or other development take place within a specified distance from a stream bank to prevent harm to breeding pools or other vital habitat. Other land-use laws have also been implemented to severely restrict development near rivers and wetlands. This is the reason why there have been no new dams built in Washington in the past 35 years. Citizen groups have also organized to clean many streams while agricultural land-use practices and wastewater treatment have steadily improved over the last 25 years (Kaczynski, V., 1998). Together these efforts have helped Pacific Northwest streams become significantly cleaner than they were in the 1970s and thus more ecologically amenable to salmon. A federally funded 1991 study by the Battelle Marine Science's Laboratory, for example, concluded that Puget Sound - home of the Puget Sound chinook salmon that was recently listed by the NMFS - is the cleanest it has been since before World War II (Anderson, R., 1999). Nevertheless, the salmon has not rebounded.

32. In short, despite billions of dollars in expenditures, widespread implementation of policies to aid the salmon and a cleaner environment, the salmon population continues to decline. It is obvious that the drivers of fish decline for oceangoing fish are not primarily associated with freshwater habitat. Rather, broader factors such as ocean conditions and climate are the primary

drivers.

33. For example, it was stated in the NOAA Idaho Suction Dredge Study (NOAA, 2003) that, "Ocean conditions are a key factor in the productivity of Northwest salmonid populations, and appear to have been in a low phase of the cycle for some time and are likely an important contributor to the decline of many stocks".

34. The marked decline in the salmon catch beginning in the mid-1970s corresponded to an increase in the temperature of the Pacific Ocean off the coasts of Washington, Oregon and California. This warming has had a most detrimental impact on salmon survival rates. Dr. Victor Kaczynski (1998), a fish biologist and consultant on fishing issues in the Pacific Northwest, says that "per classical ecological theory, a 70% decline in zooplankton biomass results in a 70% reduction in predators dependent on zooplankton directly and in their food chain (such as coho salmon) while an 80% reduction would result in a food supply that could only support 20% of the prior predator biomass (such as coho salmon)." With a reduction in zooplankton levels by more than 70% in the past two decades, West Coast salmon have declined by at least 70% as well. In addition, the salmon numbers are further reduced because the warmer water attracts predators such as mackerel and Pacific hake. These fish doubly threaten the salmon by consuming the reduced zooplankton food supply and by eating the salmon themselves.

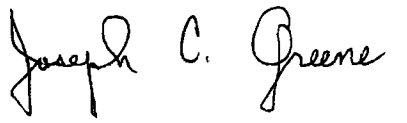
35. Notwithstanding these adverse effects, the Department other fishery agencies continue to authorize salmon and other harvests with direct and adverse impacts on fish. The available data suggest that the actual, quantitative impact of large numbers of suction dredgers operating under the injunction would not injure so much as a single fish, and certainly would involve less impact on fish than a single, successful fisherman might have in a day of fishing.

36. In assessing the impact of suction dredging, it is important to remember that there was an era in California of widespread hydraulic mining that could and did frequently wash entire hillsides into California rivers, and cause widespread problems downstream. These events did not cause the extinction of any of the fish species about which suction dredging opponents testify, and I am not aware of any research even showing an appreciable impact on history harvest levels.

37. The degree of risk to sensitive species imposed by tiny suction dredges, with effects that are in substance non-existent compared to this historical mining, must be evaluated in light of this history and with common sense. A single river rafter wading in to the river "could cause", or "threaten", or "pose a risk to" sensitive fish species because he or she may step upon eggs and kill them, but no one contends that such risks, of even greater magnitude than those caused by suction dredgers (because unlike the dredgers, the rafters are not restricted from operations when eggs are in the gravel), should result in an order that no human being may any longer enter California rivers. Common sense should apply to the assessment of dredging risks as it applies to the impacts of other river users.

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

Executed on June 17, 2015.



Joseph Greene

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UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

OAKLAND DIVISION

KARUK TRIBE OF CALIFORNIA,

Plaintiff,

v.

UNITED STATES FOREST SERVICE, *et al.*,

Defendants.

Case No. 04-4275 (SBA)

DECLARATION OF DENNIS MARIA IN OPPOSITION TO PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT

Date: June 21, 2005
Time: 1:00 p.m.
Ctrm: 3, 3d Floor

Judge: Hon. Saundra B. Armstrong

I, Dennis Maria, declare as follows:

1. I reside in Yreka, California. I am 55 years old and competent to testify.

2. I am a watershed biologist by profession. I obtained my Bachelor of Science degree in wildlife management from Humboldt State University in Arcata, California in June, 1973. I have spent nearly my entire professional life since 1975 working with fish and fisheries management issues with 24 years working specifically on fishery related issues related to the Klamath-Trinity Basin.

EXHIBIT 1
PAGE 1 OF 8

3. Until I retired on April 1, 2005, I was employed full-time by the California Department of Fish and Game as the watershed biologist assigned to the portion of the Klamath River watershed extending upstream from the confluence of the Trinity River to the Oregon border. Including seasonal work, I have worked for the California Department of Fish and Game for thirty-one and-a-half years, with nearly twenty-five of those years in the capacity as a fishery biologist.

4. I have spent a lot of time observing dredging operations on the Scott, Salmon and Klamath Rivers. This included underwater observations of suction dredging operations in order to determine the effects of suction dredging on fish, benthic invertebrates, and other species. I provided key input to the CEQA process described below that created existing dredging regulations, restrictions, and allowances applicable to Siskiyou County and the Klamath National Forest. I have actively monitored existing conditions and dredging activity since the adoption of the existing dredging regulations, and have made recommendations concerning the need for any changes.

5. I have reviewed the declarations of Leaf Hillman and Toz Soto in support of the Plaintiff's Motion for Summary Judgment, as well as the Summary of Fishery Issues Concerning Suction Dredge Mining ("Grunbaum Summary") by Jon Grunbaum dated April 20, 2004 (Administrative Record of Suction Dredging Activities ("A.R.") at 294-99).

6. In my experience and based on my observations, suction dredging in the Klamath National Forest does not cause any significant harm to fish and other wildlife if it is conducted in accordance with California law and regulations. The Hillman and Soto Declarations and the Grunbaum Summary fail to show that suction dredging causes harm to the resources that allegedly support the Karuk Tribe. In fact, during the fall of 2004, I made several requests by e-mail to Mr. Toz Soto asking him for his field data and field notes in order to evaluate his allegations that fish, specifically sturgeon, lamprey and coho, were being irreparably harmed by dredging. My intent was to evaluate his data in order to determine if suction dredge regulation changes were needed on the Salmon River. I never received a response from either e-mail request I made.

7. The Hillman and Soto Declarations and the Grunbaum Summary do not mention that California regulates suction dredging. The statutes controlling suction dredging are Cal. Fish and Game Code §§ 5653-5653.9. These statutes require suction dredgers to obtain an annual permit and

EXHIBIT 1
PAGE 2 OF 8

follow the dredging regulations. The suction dredging statutes give the California Department of Fish and Game the authority to issue regulations concerning suction dredging. The regulations are codified at Cal. Code of Regulations. Title. 14, §§ 228 and 228.5 (1994)(copies are at A.R. 280-293). Failure to obtain a permit before dredging or to follow the dredging regulations is punishable as a misdemeanor. In addition, failure to follow the dredging regulations may subject the dredger to civil penalties under Cal. Fish and Game Code § 1602, as in a case in which I provided testimony concerning river flows and levels at the trial. *People v. Osborn*, 116 Cal. App. 4th 764 (2004). In the Osborn case the defendant suction dredger was alleged to have dredged into the bank and was sued for violation of former Cal. Fish and Game Code § 1603 (now § 1602) which prohibits substantially changing the bed, channel or bank of a river without first providing notification to the California Department of Fish and Game.

8. The Soto Declaration states, for example, at paragraph 9 that "[l]arge boulders, stumps, and rootwads in the stream may be moved before a site is excavated, which reduces stream stability." The dredging regulations prohibit, among other actions, moving anchored, exposed woody debris such as root wads, stumps or logs. Cal. Code Regs. tit. 14, § 228(f)(4)(1994)(A.R. at 286).

9. The Hillman and Soto Declarations and the Grunbaum Summary do not mention that an extensive process was undertaken by the State of California as required by the California Environmental Quality Act (CEQA)), codified at Cal. Pub. Res. Code §§ 21000-21178.1, to finalize an Environmental Impact Report on the effects of suction dredging. A copy of the summary of the Final Environmental Impact Report of April 1994 for "Adoption of Regulations for Suction Dredge Mining," which explains the process and the considerations considered in developing the current dredging regulations, is attached as Exhibit 1 to this declaration. As a result of the CEQA process, regulations were created to mitigate concerns and reduce negative impacts to less than significant. This included regulations to close streams to protect salmon redds (eggs) and juveniles during critical time periods, restrict the size of dredges allowed in different waterways, prevent dredging into the banks of rivers, prevent importation of silt into the waterway, and many other measures to reduce or eliminate impacts that potentially could create a significant impact. I personally

contributed to the CEQA process insofar as Siskyou County (location of the Klamath National Forest) waters are concerned.

10. Mr. Hillman's declaration simply consists of unsupported conclusions concerning the effect of suction dredging on fish and other natural resources. Mr. Grunbaum and Mr. Soto are known to me to work as fisheries biologists working in the Klamath National Forest. Despite having the opportunity to observe and measure the effects of dredging operations in the Klamath National Forest the Soto Declaration and the Grunbaum Summary state only speculations unsupported by data or actual observation. They contain no actual data, observations, or measurements concerning the effects of actual suction dredging operations in the Klamath National Forest or anywhere, apart from the four photographs of showing dredges contained in Exhibit 2 to the Soto Declarations.

11. I have personally observed actual suction dredging sites and determined whether such operations were likely to affect fish species. For example, on September 15, 2003 (the final day of the California dredging season along the Salmon River), the California Department of Fish and Game (DFG) organized an inspection, to which it invited the Karuk Tribe, the U.S. Forest Service, the local environmental activist group called the Salmon River Restoration Council (SRRC), any local residents who might want to attend, and The New 49'ers. Thirteen people participated in the inspection, including Pete Brucker from SRRC, seven people from the Forest Service (including two District Rangers, three minerals officers and one fish biologist), and three representatives of The New 49'ers. I headed up the inspection as the lead California Department of Fish and Game fishery biologist from Yreka, accompanied by my supervisor, Mr. Bob McAllister from Redding. We examined several locations on the main stem of the Salmon River that had experienced dredging during the 2003 dredging season on that river (July 1-September 15).

12. At least three of the photographs in Exhibit 2 of the Soto Declaration show dredges at a part of the Salmon River approximately one mile upstream from the confluence of the Salmon River with the Klamath River. This was the first site we examined on September 15, 2003. I observed that this region was primarily a run with little if any cover associated with the wetted channel. The dredge holes in the riverbed created the only discernable juvenile rearing habitat that I witnessed. My experience also tells me that the dredge holes that were created likely were providing thermal

relief in a reach of the Salmon River that typically exceeds 70F during July and August, benefiting primarily juvenile steelhead and coho salmon. My files indicate that little, if any spawning by coho salmon occurs in this reach of the Salmon River and Mr. Brucker of the SRRC confirmed this was true based on numerous SRRC s surveys conducted over recent years.

13. I wrote a report concerning my observations from this inspection. I concluded as follows: *"I saw nothing that would be considered a violation or that would have a significant impact to the fishery or significantly negatively impact the overall biotic community of the Salmon River."*

14. The California Department of Fish and Game was approached last year by the Karuk Tribe (represented by Mr. Soto), the Six Rivers National Forest, and the Klamath National Forest, with request to restrict suction dredging by persuading the Department to change the dredging regulations to make them more restrictive by closing certain waterways to dredging, further limiting the dredging season, and the like. The Department's position was that it is interested in considering the merits of regulation changes that have demonstrable benefits to fish species, and particularly the andromous fish species. However, any changes to the regulations must be supported by data, such as survey and trapping reports, which clearly confirm that the current regulations result in negative impacts to fish. Furthermore, the data would have to show that the changes would decrease those impacts. The "concerns" rose by the Hillman and Soto Declarations and the Grunbaum Summary are examples of the data-free submissions that cannot support a regulation change at this time.

15. The Administrative Record for this lawsuit contains a good example of a request to change the dredging regulations to make them more restrictive. The supervisors of the Klamath National Forest and the Six Rivers National Forest wrote to the director of the California Department of Fish and Game on November 19, 2004 requesting that the Department consider changes to the dredging seasons (set forth in Section 228.5 of the dredging regulations) because "the current suction dredging regulations create administrative challenges to the Six Rivers and Klamath National Forests" and incidentally "**may cause** direct impacts to several fish species on the Klamath and Six Rivers National Forests." (A.R. at 300-302) The only supporting documentation was a one page chart (A.R. at 302) of alleged life phases of five fish species with respect to the dredging seasons on various rivers. The only support for this chart was said to be "the review that was based on current

literature, field surveys by the Forest Service, Fish and Wildlife Service, and the Karuk Tribe, and a discussion with California Department of Fish and Game biologist Dennis Maria [the undersigned declarant]." (A.R. at 300) The response dated February 24, 2005, by Regional Manager Donald B. Koch of the California Department of Fish and Game, requested the data supporting negative impact of current regulations and decrease of impact due to the requested changes in the regulations. (A.R. at 304-305) The Administrative Record reveals no further correspondence concerning this request.

16. I am familiar with the Klamath National Forest and its watercourses. The "Riparian Reserves" in that Forest, as shown in the Management Area 10 map in the Klamath National Forest Land and Resource Management Plan available at : http://www.fs.fed.us.r5/klmath/publications/pdfs/forest management/managementareamaps2.pdf (accessed May 14, 2005), includes essentially all land in the Klamath National Forest that is near a watercourse or body of water. The Klamath National Forest contains rugged terrain that has many streams and creeks in addition to the rivers. Only the sides of mountains and hills that have no streams and the tops of the mountains and hills are not in "Riparian Reserves."

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

DATED: This 17th day of May, 2005.

/s/ Dennis R. Maria
Dennis R. Maria

CERTIFICATE OF SERVICE

I certify that on May 17th, 2005, I electronically filed the foregoing DECLARATION OF DENNIS MARIA IN OPPOSITION TO PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT, with the Clerk of the Court, using the CM/ECF system, which will send notification of such filing to the following:

Joshua Borger, *srmeredith@envirolaw.org*

James Russell Wheaton, *sarah-rose@thefirstamendment.org*

Roger Flynn, *wmap@igc.org*

Barclay Thomas Sanford, *Clay.Samford@usdoj.gov*

Brian C. Toth, *brian.toth@usdoj.gov*

s/ James L. Buchal
JAMES L. BUCHAL
Attorney for The New 49'ers, Inc. and Raymond W. Koons

ATTESTATION OF SIGNATURE

I hereby attest that I have on file all holograph signatures for any signatures indicated by a "conformed" signature (/S/) within this efiled document.

Executed this 17th day of May, 2005.

s/ James L. Buchal
James L. Buchal

EXHIBIT 1
PAGE 8 OF 8

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On June 17, 2015, I caused the following document to be served:

REPLY DECLARATION OF JOSEPH GREENE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
455 Golden Gate Avenue
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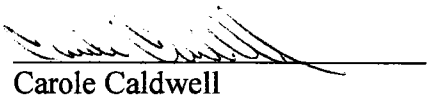

Carole Caldwell
Declarant

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Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **DECLARATION OF CLAUDIA J. WISE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49er's, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

Claudia J. Wise declares:

1. I retired after 32 years of civil service with the United States Environmental Protection Agency as a Physical Scientist/Chemist. I have been a member of many scientific projects over the years starting my federal career in the Fish Toxicology arena and ending it with the Salmon Restoration division. I have worked on projects ranging from urban fish populations and fish avoidance testing to eelgrass habitat and global climate change. I have been and remain a strong proponent of protecting the environment. My Curriculum Vitae is attached to this Declaration as Exhibit 1.

2. I have been involved in temperature surveys on the Klamath River in California in regards to suction dredge activity and existing conditions of refugia. We have found specified natural refugia to be no better in many cases to that of dredge made refugia.

3. I have studied a plethora of peer reviewed papers too numerous to list here regarding effects of suction dredging on the environment. Most have come to the same conclusion of insignificant or *de minimis* environmental impact that is local and temporary in its effect on the streams inhabitants.

4. It appears that although there are many peer reviewed journal articles written that support this conclusion giving the proof already at hand that the dredging community is not significantly harming the environment or the fish this issue is re-surfacing in this Court. My experience regarding suction dredge mining is that the fish are very happy to feed from the dredged spoils presented to them and rest in the dredge holes left much like in natural refugia. I have never seen or heard of any harm that has come to any fish present during suction dredging activities. California Fish and Wildlife currently have rules and regulations that do regulate dredging out of situations that would be harmful to fish, such as, spawning seasons.

Mercury Toxicity Allegedly Associated with Suction Dredge Mining Poses No Real Threat to the Health of Californians.

5. For nearly 50 years there has been a large body of (peer reviewed) evidence published that demonstrates that dietary selenium moderates or counteracts mercury toxicity. Mercury exposures that might otherwise produce toxic effects are counteracted by selenium,

particularly when the Se:Hg molar ratios approach or exceed one to one. This is because selenium has a high affinity to bind with mercury thereby blocking it from binding to other substances, such as brain tissue. This has practical significance because even if fish ingest mercury which then becomes available for human consumption, such mercury may be effectively inert because selenium concentrations in the fish may protect humans who eat them.

6. A group of scientists from USEPA published research in 2009 that included data from fish samples collected in California which, in all cases, contained proportions of mercury to selenium that were adequate to protect fish, wildlife and human health. Results showed that 100% of the freshwater fish surveyed in California had sufficient selenium to protect them and their consumers against mercury toxicity (Peterson et al, 2009). This may be why no one has ever become sick from eating sport fish in California, even though mercury warnings have been issued.

7. A 2011 report by the California Water Board, Contaminants in Fish from California Rivers and Streams[1] showed no significant mercury contamination in areas where suction dredge mining continued for years. Concentrations in the Klamath River, a favored area for suction dredging, were very low. Indeed, in general river and stream locations outside the Delta region all had low or moderate methyl mercury contaminations. And in its SEIR, the Department concluded that mercury mitigation actions were not "believed to be necessary to avoid deleterious effects to fish" (DSEIR at 5-29).

8. In 2010 as a member of the CDFG Suction Dredge Public Advisory Committee, I gave a presentation to the group sharing these and other facts, a true copy of which is attached hereto as Exhibit 2. The California Department of Fish and Game (now CDFW) never offered any response to this information.

9. Since that time research points even more strongly to a beneficial health value obtained from selenium in living organisms being the most crucial factor. Adverse health effects caused from exposure to mercury may not be due to mercury in itself but rather the fact that

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[1] This report is available online at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/rivers_study/rs_rptonly.pdf.

mercury irreversibly binds with selenium, producing a deficiency of this essential micronutrient all living organism require for critical functions (Sørmo et al., 2011), especially in the brain and nervous system. All living organisms require selenium to be healthy however there is no known requirement by the body for mercury. (Ralston, 2014)

10. In personal communications, Dr. Ralston, a well-known ecotoxicologist, recently told me that only 2 percent of waters of the United States have any real need for mercury remediation and nearly all waters of California are not in this category.

11. 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 the Sacramento-San Joaquin Delta and San Francisco Bay (USGS 2000). Mercury does not form the potentially toxic compound methylmercury in areas of high dissolved oxygen such as gold-bearing rivers and streams where suction dredge mining occurs, but more in low-dissolved oxygen areas such as swamps and deltas.

12. Since the cessation of hydraulic mining, accumulated sediment from hydraulic placer mining has been transported to the Delta and Bay by sustained remobilization (James, 1991). The mercury used by early hydraulic miners move downstream with this sediment. If not collected and removed from the environment, mercury in California rivers and streams is guaranteed to end up farther downstream, and eventually in the Delta or the Bay, where methylation is a real environmental problem. In particular, mercury left in place is vulnerable to the next storm event moving it downstream closer to, and eventually into, the Bay and Delta.

Suction Dredges Benefit the Environment by Removing Mercury.

13. I have spent much time over the last decade studying mercury effects on the environment in relation to suction dredging activity. A paper published by the California Water

Board's Water Quality Division (Humphreys, 2005) ("Board") discussed mercury losses and recovery during small-scale suction dredging. He demonstrated that a suction dredge in the American River was able to collect 98 percent of the measured mercury processed through the dredge. The results may have been higher if the investigators had been using a dredge with the modern jet flare design.

14. Removing 98 percent of mercury before it reaches the Delta and Bay is a very significant positive environmental impact and it would be irresponsible to not allow mercury to be removed from the rivers and streams whenever it is found in this fashion.

15. 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 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 relocate back onto the river floor buried in the sediment close to where it was removed while dredging.

16. In my opinion 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. The distance transported would relate to the distance a turbidity plume might extend downstream from a small-scale suction dredge.

17. In fact, according to Humphrey's study in 2005 mercury was seen moving downstream and re-deposited on bedrock already dredged clean. The important fact here is mercury was flowing down stream in a suction-dredge-free zone during lower river flows than take place under high winter river conditions. Whatever incremental contribution suction dredging might make to this process is obviously insignificant compared to the benefit of removing 98% of the mercury.

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The Flouring Issue.

18. Mercury can become floured, i.e., put into small particles like specks of flour. One charge against suction dredges is that they may flour mercury they encounter in larger units. In general, flouring is aggravated by agitation, exposure of mercury to air, and other chemical reactions.

19. In the test described by Humphreys (2005), a small portion of floured mercury was collected in the sediments as they escaped the sluice box. It is unclear from reading the Humphrey's 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 the mercury in the materials was already floured. In any event, because the study was conducted in a seriously contaminated area it is impossible to determine what portion of flouring of mercury was caused by the crash box design of the suction dredge in use. Moreover, because the crash box may also have caused flouring, the results do not demonstrate adverse impacts from using a more modern jet-flare-type suction dredge, which would also probably improve mercury recovery.

20. More study is required to see if reducing the amount of floured mercury would be enhanced by utilizing the modern jet flare style suction dredge. 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 13.53 grams per cubic centimeter (g/cm3) it would be more effective in collecting mercury particles with little disturbance that would result in further breaking the mercury particles down.

21. In either event, floured mercury is still in elemental form, not methylated. Regardless of surface area it would be no more or no less toxic then the 98 percent collected by the dredge.

Suction Dredges Make No Appreciable Contribution to Ambient Mercury Concentrations.

22. The remarkable position of the Department and Water Board is that even though suction dredges may remove over 98% of the mercury they encounter, dredging should be restricted because the process of suction dredging may result in increased mercury

concentrations into the environment. In the SEIR, the Department characterized this as a "significant and unavoidable" impact of permitting dredging, while acknowledging that few studies are available on the issue.

23. However, there was a cumulative impact study using an 8 and 10-inch dredge (actually operating in a flowing river) commissioned by the USEPA (Royer et al., 1999), which demonstrated values of dissolved mercury that were actually greater *upstream* of the dredge, suggesting that any effect of the dredge was likely within the range of natural variation. The operator reported observing deposits of liquid mercury within the sediments he was working. This is the most relevant piece of published scientific evidence, addressing dredging at intensity beyond that typically experienced in California, with real world interceptions of occasional mercury deposits. Neither the Department nor the Water Board has ever offered information to undermine the conclusions of this study.

24. Instead, they have pointed to a report by Fleck et al. (2011). But this report attempted to infer conclusions about the effect of suction dredges with an entirely different mechanism, involving re-circulating water through a hand-dug hole in the most highly mercury contaminated area known to the State of California. To utilize this setup to infer effects for suction dredging is, to put it bluntly, the poorest excuse for science that Mr. Greene and I ~~we~~ have observed in our combined 60+ years of scientific research.

25. A further defect of the Fleck et al. report analysis was to predict the impact of suction dredges by using mining industry data to compare output between differing dredge sizes using 100 percent sand for the dredged material. This type of material is not represented in real world riverbed materials processed by gold suction dredge miners. Materials found in all mining areas are composed of boulders, cobbles, gravel, sand etc. Using only sand, although perfect for comparing dredge size output in a factory, is a misrepresentation of real world conditions.

Suction Dredges Can Also Aid in Targeted Mercury Remediation.

26. 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. It is most important to reduce the total amount of mercury in the streams and

rivers and its transport downstream into the bays and deltas. This is defined as a part of water pollution control regulations goal to reduce the Total Maximum Daily Load ("TMDL") of contaminants such as mercury.

27. Suction dredges are being used by government agencies to remediate stream conditions in some cases. According to the National Oceanic and Atmospheric Administration (2006) ("NOAA"), Duck Creek, a surface water body in Alaska, is impaired by urban runoff from non-point source pollutants including, heavy metals, hydrocarbons, iron flocs and excess nutrients. This small coastal stream originates from a spring that drains runoff from Mendanhall Valley, a relatively high density residential and business area. Historically there were runs of nearly 10,000 chum salmon and Coho runs of about 500 fish in Duck Creek. Currently the chum run is extinct and the Coho run consists of only 20 fish. Restoration at Duck Creek involves the development and implementation of bioremediation methods to restore water quality and anadromous fish habitat in impaired streams. NOAA scientists attempted to correct the degraded conditions by using high-pressure jet pumps and suction dredges to remove fine sediment from the streambed.

28. The suction dredge community could provide the state with a source of help that is willing to do what they do best, prospecting for gold. In the event that suction dredge miners run across a hot spot of mercury, the miners would be willing to hand it over to a collection facility if such a facility existed. The Board's Water Quality Division report (Humphreys, 2005) idea of paying the miners for their efforts would help facilitate this plan. The cost would be much less than what is presently being spent on remediation activity that is less effective.

29. The Water Board has spent a lot of time and money on mercury remediation projects with limited success though 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.

30. During the first EPA, Region 9 mercury "milk run" in 2000 agency personnel were able to collect 230 pounds of mercury from miners. The total amount of mercury collected

was equivalent to the mercury load in 47 years' worth of wastewater discharge from the city of Sacramento's sewage treatment plant or the mercury in a million mercury thermometers. (US EPA, 2001.)

31. Over the past four years, the Resources Coalition and other small-scale miners associations in Washington have turned in 127 pounds of mercury and eight pounds of lead for safe disposal with the help from the Washington Department of Ecology. Ecology staff attended miners' rallies in Oroville and Monroe, explaining the state's program for proper disposal of lead and mercury. (ENS) 2007

32. The mining community of today is, in my opinion, the only group that is in a position with the technology to help out at a very economical price to the public. Any residual mercury remaining after dredging a location is that much less to worry about in our Nation's waterways.

33. In my opinion, suction dredge mining is beneficial to the rivers and streams in California.

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

Executed on May 18, 2015.

Claudia J. Wise

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PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On May 18, 2015, I caused the following document to be served:

DECLARATION OF CLAUDIA J. WISE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **REPLY DECLARATION OF CLAUDIA J. WISE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49'ers, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

Claudia J. Wise declares:

1. I make this Declaration in further support of the Miners' request for an injunction in this action, and specifically to provide additional information on the issue of mercury as it relates to suction dredging.

2. In response to Dr. Monahan's testimony that it is a "myth" that mercury hotspots are not generally prevalent throughout California (Monahan Decl. at 5), there is no reason to believe that Dr. Monahan has any knowledge concerning this issue. I am not aware of any study the purpose of which was to locate hotspots of mercury throughout the State of California, whether or not associated with suction dredge mining areas.

3. In fact, suction dredge miners are the only persons qualified to testify that mercury hotspots are not generally prevalent throughout California, based on extensive experience sampling California waterways. I have experience and expertise both through such direct sampling, and discussions with other miners in the field, and note that few miners report seeing any significant quantity of mercury sufficient to constitute a "hot spot"—that being an area with pools of mercury that will continue to leach into the environment. Most miners report only observing gold amalgamated (stuck to) to very small quantities of mercury, if any.

4. An important suction dredge study (Prussia *et al* 1999), commissioned by the USEPA, looked at cumulative mercury values using an 8 and 10-inch dredge, actually operating in a flowing river. This study should dispel misconceptions concerning the disturbance of mercury hotspots by dredgers. The operator in that study reported observing deposits of liquid mercury within the sediments he was working. This study utilized an extensive sampling grid pattern around the operating dredge, as set forth in this illustration from the study:

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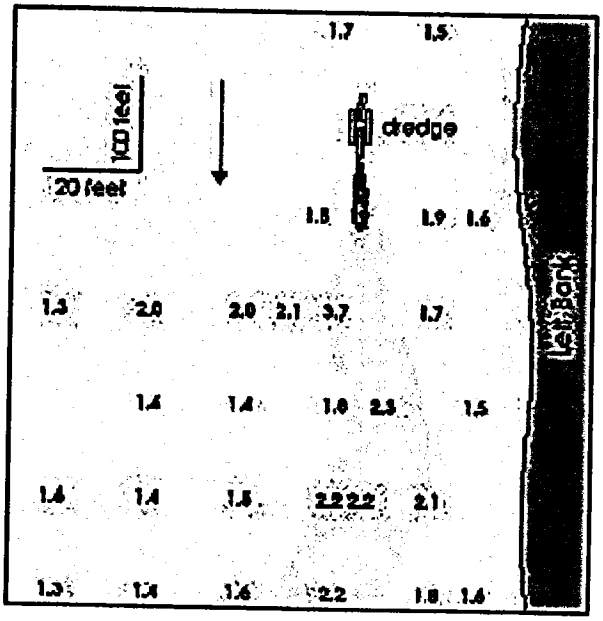

Figure 2. Results of turbidity survey behind an operating 10-inch suction dredge (site #1 on fig. 1). All numbers shown are in NTU, or nephelometric turbidity units: the standard unit of turbidity. The right bank of the river is off the edge of the figure. The approximate shape of the plume is shown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

5. The analysis produced values of dissolved mercury that were actually greater upstream of the dredge, suggesting that any effect of the dredge was likely within the range of natural variation. This is the most relevant piece of scientific evidence addressing dredging at intensity beyond that typically experienced in California.

6. There should be no dispute that mercury continues to move down waterways by natural mechanism, as seen by Humphreys, 2005 and Singer *et al.* 2013. For this reason, it remains obvious that removing 98 percent of the mercury (Humphreys 2005), if located, will significantly reduce the amount of mercury making its way downstream to areas where methylation would occur more readily creating a net benefit to the environment.

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http://www.pnas.org/content/110/46/18436.full

7. It remains true that mercury releases from suction dredging, if any, would not present appreciable harm to human health effects because most fish contain more selenium than mercury and selenium is protective of the health of all living organisms including humans and wildlife. Eating fish containing mercury of any form including methylmercury (Ganther et al.1973) is not harmful if the selenium to mercury molar ratio is greater than 1:1 (Parizek 1978; Peterson et al 2009).

8. Dr. Monahan's attacking of the "myth" that "all fish contain more selenium than mercury" (Monahan Decl. at 9) sets up a "straw man" argument. There are some fish for which this statement is not true, but they are not relevant to the dispute before this Court. This Court is concerned with California fish and California conditions. Peterson *et al.* 2009, found 100% of fish tissue sampled across California to have adequate selenium to be protective.

9. The Water Board's report, Contaminants in Fish from California Rivers and Streams, 2011 (released in 2013 and available at http://www.waterboards.ca.gov/water_issues/programs/swamp/rivers_study.shtml, also concludes that "[r]iver and stream locations outside of the Delta region all had low or moderate methylmercury contaminations". (Report at 2.)

10. With regard to those reservoirs and lakes identified by Ms. Monohan as containing particularly high levels of mercury, it should be noted that under the 1994 regulations(§ 228(d)), no suction dredging was allowed within any lakes or reservoirs without special, additional permits, so the relief sought by the miners herein would not involve such areas. The same is true of most other areas where the California Office of Environmental Health Hazard Assessment (OEHHA) has issued fish consumption advisories for Sierra waterways (OEHHA, 2009).

11. These advisories do not take into account selenium levels, and if based on sound science would take account of the Selenium Health Benefit Value (Se-HBV) that takes the protective role of selenium into account before issuing warnings.

12. Many mercury toxicologists are not up to date on the current science relative to recognizing the benefits of selenium in the food chain. Long ago, at the USEPA, we stopped determining cause and effect based on a single test species or single chemical, in a lab or greenhouse, because we recognized the complex interactions that were occurring in the natural environment. The same is true with mercury interactions in a lab that cannot take into account environmental interactions or sloppy sampling in the field that only analyzes for a single chemical. Other natural chemical constituents present in a waterway will affect the end result. If you do not look at the whole ecosystem you will miss what may really be going on. This is absolutely true with mercury and selenium antagonism.

13. In mercury-contaminated areas fish are taking in mercury but also other constituents such as selenium, which is an extremely good antioxidant that is sequestered to mercury. This chemical interaction is a major game changer. Measuring only mercury eliminates any chances of one getting to the correct answer of how this affects the food chain and those eating the fish.

14. Understanding of the science of mercury:selenium interaction within the food chain continues to move forward. Over the last 40 plus years of researching the antagonistic reaction between mercury and selenium scientists have changed from believing the bond between mercury and selenium protected living biota from mercury toxicity. Today the researchers believe the harm is not due to mercury toxicity at all. Current scientific thought is that mercury binds with selenium causing a lack of bioavailability of selenium which living bodies require for selenoenzyme processes.

15. Sormo (2011) researched the question of "whether or not toxic effects accompany exposure to Hg depends upon the tissue Se:Hg molar ratio of the organism... Selenium has a

prominent protective effect against mercury toxicity. Measuring mercury in animals may therefore provide an inadequate reflection of the potential health risks to humans and wildlife if the protective effects of selenium are not considered."

16. More recently, Ralston *et al.* (2012), found that "Selenoenzymes are required to prevent and reverse oxidative damage in the brain and neuroendocrine system, but these enzymes are vulnerable to irreversible inhibition by methylmercury (MeHg). Selenoenzyme inhibition appears likely to cause most if not all of the pathological effects of mercury toxicity." According to Ralston (2004), "nutritionally relevant amounts of selenium can replace the selenium sequestered by methylmercury (MeHg) and maintain normal selenoenzyme activities, thus preventing oxidative brain damage and other adverse consequences of MeHg toxicity."

17. Dr. Monohan's reference to a lack of significant epidemiological studies proving selenium rich diets counter the negative health effects of eating mercury-contaminated fish is far from correct. Many studies have been completed, but care must be used in their interpretation. Ralston (2008), reviewed a large group of studies with varying results concerning effects of maternal methylmercury (MeHg) exposure from fish consumption on child developmental outcomes in population groups from New Zealand (Crump et al., 1998), Faroe Islands (Grandjean et al., 1997), Seychelle Islands (Myers et al., 1998, 2000), United Kingdom (Hibbeln et al., 2007), United States (Lederman et al., 2008), and most recently, Denmark (Oken et al., 2008).

18. Evidence from these epidemiological studies have variously reported clinically relevant harmful effects on child health outcomes (New Zealand, Faroes), no harmful effects on child outcomes (Seychelles, United Kingdom, United States, Denmark), or substantial beneficial effects on child neurodevelopment and IQ (United Kingdom, United States, Denmark)."

19. To compare these studies, a selenium Human Benefit Value (SE-HBV) was incorporated. The Se-HBV incorporates consideration of both the absolute and the relative amounts of selenium and mercury in the diet to provide an index that is easily interpreted.

20. Seafood consumed in the New Zealand and Faroe Island studies had greater methylmercury to selenium content (shark meat, pilot whale) and thus a negative Se-HBV value in the harmful range. While the Seychelle Islands population consumed on average 12 fish meals per week, no harmful outcome to children tracked prenatal to 9 years old; because the Se-HBV of the MeHg source was in the beneficial range instead of the harmful range. Therefore, benefits instead of harms would have been expected.

21. In the United States, United Kingdom and Denmark they all eat seafood similar to that available in the United States and achieve higher IQ results to show for it. Ralston found that maternal seafood consumption (and greater methylmercury (MeHg) exposure) was associated with improved child outcomes. Again this was because the Se-HBV of the methylmercury (MeHg) source was in the beneficial instead of the harmful range. It is thus apparent that instead of being avoided, ocean fish consumption should be encouraged during pregnancy.

22. Ralston has also looked at freshwater fish data throughout the United States, 98 percent of which had beneficial selenium to mercury ratios. California sportfish have beneficial selenium to mercury values (personal communication with Ralston 2015). Thus instead of being avoided, freshwater fish consumption should be encouraged during pregnancy. It is a health benefit for pregnant women to eat 2-3 fish meals per week.

23. Not only is the protection provided by selenium not controversial, it has been used by the federal government in public relations campaigns to overcome irrational prejudices against eating fish. For example, a selenium and mercury fact sheet prepared to promote public awareness by the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce is available at http://www.undeerc.org/fish/pdfs/Selenium-Mercury.pdf

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Book: Methylmercury and Neurotoxicity

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

Executed on June 17, 2015.

Claudia J. Wise

Claudia J. Wise

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On June 17, 2015, I caused the following document to be served:

REPLY DECLARATION OF CLAUDIA J. WISE IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **DECLARATION OF ERIC MAKSYMYK IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49er's, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

I, Eric Maksymyk declare:

1. I am a plaintiff and make this declaration in support of the Miners' Joint Motion for Injunction against Defendants.

2. I have been deeply involved with the suction dredging issue for over seven years. I am a suction dredge operator on mining claims in Sierra County, California. I have operated suction dredges on my placer mining claims for nearly 15 years prior to the ban.

3. I am a retired U.S. Army Lieutenant Colonel, with a Bachelor of Science degree in Economics; a Master of Science degree in Management; and a Master of Science degree in Systems Acquisition from the Naval Postgraduate School in Monterey, which includes five courses at the Masters level in statistics, reliability and probability.

4. I run a technology company that provides communications solutions and software development and we support the United States Special Operations Command with the Science and Technology advisor in the National Capital Region.

5. My company provides analysis support to a variety of activities, and we have previously provided our analysis expertise to the U.S. Special Operations Command; the U. S. Army Special Operations Command; the Joint Special Operations Command; the U.S. Army Natick Laboratories; the Program Executive Officer for Special Programs; the Program Manager for Special Programs; and, the U.S. Army Program Executive Officer for Soldier Systems.

6. My last assignment prior to retirement was as the Army program manager for the reconstruction of Iraqi armed forces in Baghdad, Iraq where I was awarded the Bronze Star. After retirement, I accepted a position as the lead analyst for a Department of Defense Intelligence Program where I was required to review intelligence products, conduct analysis and provide meaning to a variety of intelligence sources for use by others.

7. I consider myself an expert in suction dredging, and I am extremely familiar with the environmental effects of suction dredges 5" or less. In my experience, I have never seen any lasting effects from the operation of my suction dredges, and I have found it impossible to observe any effects following even a moderate flood.

8. While others will counter the observations of a suction dredger don't equate to the opinions of a PhD level scientist, I disagree. Suction dredge operators spend far more time in the rivers observing the effects than any scientist or theorist, and we read the reports.

9. It is my opinion, after participating in the conduct of the suction dredge EIR, reviewing all relevant reports that were referenced, and evaluating the supporting data; the significant effects are wildly hypothetical, are not supported by the evidence, and appear to be based on the selective use of data. Secondly, the effects are based on a "statewide review" of suction dredging and consequently are so generalized they are overly restrictive.

The Suction Dredge Draft Subsequent Environmental Impact Report Overstates Effects.

10. The suction dredge Draft Subsequent Environmental Impact Report ("DSEIR") was 1,388 pages in length including all appendices. In the 1,388 pages, there is not a single documented instance of a suction dredge harming fish or wildlife; no documented cases of noise complaints; no documented cases of disturbing archaeologic or historical resources or documented evidence of water quality effects.

11. In the DSEIR, the word "may, might or could" is used 1,675 times. The phrase "is proven" occurs 0 times.

12. The rivers we are arguing over have been dredged and re-dredged again and again. The percentage of un-dredged river bottom is unknown, but it is likely a small fraction. Any effect which could occur has occurred, yet the DSEIR evaluates the rivers as if they were in pristine condition, but this is not the case.

13. One of the most detailed estimations made of the quantity of hydraulic tailings which flowed down the tributaries and into the Yuba, Bear and American rivers, was made by Dr. Waldemar Lindgren in 1911[1]. He used surveying equipment to estimate the amount of missing material from the hydraulic pit and estimated 1,295,000,000 cubic yards of debris flowed through the tributaries, into the main rivers, and then down to the valley. This estimate only accounts for the Yuba, Bear and American River districts. As any dredger will verify, the

[1] W. Lindgren, *The Tertiary Gravels of the Sierra Nevada of California*, U.S. Geological Survey Professional Paper 73 (1911).

vast majority of this material has been flushed from the upper reaches, but the evidence of this still exists in the form of hydraulic tailings some thirty feet high on the banks of some these drainages. On the specific river I work, Slate Creek, hydraulic tailings filled the entire length of the river to a depth of 30 feet. The evidence (bathtub ring) of this debris still exists and can be readily observed.

14. Past historical effects must be taken into account. Suction dredging isn't a new activity, and it follows over one hundred years of historical impacts which were both widespread and severe. When talking about irreparable damages, the damage to these rivers has already occurred and the continued activity of a suction dredge is insignificant in relation to past impacts.

15. From 1976 to 2008 the California Department of Fish and Wildlife issued 174,755 suction dredge permits.[2] Section 5653.1 of the Fish and Game code prohibited the Department from issuing a suction dredge permit if issuance would be deleterious to fish. This represents 174,755 separate determinations over a 32-year span suction dredges were not deleterious to fish.

16. The SEIR found nine areas where a suction dredge could potentially cause a significant environmental effect, these areas include[3]:

- Mercury resuspension and discharge;
- Resuspension and discharge of other trace metals;
- Effects on Special Status Passerines;
- Historical Resource Impacts;
- Archaeological Resource Impacts;
- Noise;
- Cumulative Effects on Wildlife Species and their Habitats;
- Cumulative Effects of Turbidity/TSS Discharges; and
- Cumulative Effects of Mercury Resuspension.

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[2] DSEIR at 3-3, Figure 3-1.

[3] DSEIR, Executive Summary, Table ES-2.

The Mercury Question.

17. The fundamental question in regards to mercury is whether the reintroduction of suction dredging would cause irreparable harm to the environment.

18. "The 1994 EIR found that suction dredge mining would have a less than significant impact on water quality as it relates to mercury in streams. At the time of the 1994 report adverse effects related to mercury were cited as those being associated with re-release of mercury after capture in the dredging equipment."[4]

19. No new studies are cited in the DSEIR than the 1994 EIR with one major exception – a report prepared by the U.S. Geological Survey, which was funded by the Bureau of Land Management, and the California State Water Resources Control Board[5]. The findings on mercury were based almost entirely on this study.

20. "...there are very few published studies specifically addressing the effects of suction dredging on Hg fate and transport processes. Since the time the Literature Review (Appendix D) was prepared, USGS scientists and Hg experts provided CDFG with preliminary results of their recent research in the Yuba River which is specifically focused on assessing the potential discharge of elemental Hg and Hg enriched suspended sediment from suction dredging activities. This new information and data from USGS was used in formulating the approach to this assessment of the Program."[6]

21. The conclusions in the SEIR seemed impossible to support and presented the appearance of bias, and the selective use of data. The SEIR states "caution should be used in

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[4] DSEIR at 4.2-18.

[5] Fleck, J.A., Alpers, C.N., Marvin-DiPasquale, M., Hothem, R.L., Wright, S.A., Ellett, K., Beaulieu, E., Agee, J.L., Kakouros, E., Kieu, L.H., Eberl, D.D., Blum, A.E., and May, J.T., 2011, The effects of sediment and mercury mobilization in the South Yuba River and Humbug Creek Confluence Area,, Nevada County, California: Concentrations, speciation, and environmental fate—Part 1: Field characterization: U.S. Geological Survey Open-File Report, 2010-1325A, 104 p.

[6] DSEIR at 4.2-19.

interpreting these results because only [one] year of data is available for the no dredging condition, these are likely the only data available at this time." [7]

22. We submitted a Freedom of Information Act Request[8] to determine if additional data existed. It did, there were in fact an additional five years of data. Although the SEIR stated only one year of dredging data was available, the same scientist, Dr. Charles Alpers, who conducted the dredging test in support of the SEIR, was also commissioned by the Bureau of Land Management to sample biota on the South Yuba River from 1999-2002. Certainly caution should be used when interpreting only one year of data. When the entire data set is evaluated, however, no correlation to suction dredging and mercury can be made, suggesting that selective use of data can present a picture which distorts the truth.

23. When this additional data is plotted, it shows natural variability in mercury levels which appears to be correlated to natural storm events. This correlation is confirmed in the USGS report the SEIR Water Quality section is based on;[9] in a report by Dr. Michael Singer of the University of California Santa Barbara[10], and by Dr. Carrie Monohan[11] of the Sierra Fund who conducted research on Deer Creek in Nevada County and found a strong correlation between spring floods and the level of methylmercury in insects.

24. In 2012 the same USGS scientist, Dr. Alpers, resampled the same locations[12] and the data shows a significant increase in mercury levels since the suction dredging ban was put in place. Despite this increase, no effort was made to correct the record, or amend the study, or the EIR's conclusions.

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[7] DSEIR at 4.2-46.

[8] USGS FOIA 2013-0085.

[9] Fleck Report p.55

[10] Singer, *et al.*, Enduring legacy of toxic fans via episodic redistribution of California gold mining debris. Proceedings of the National Academy of Sciences (PNAS), 110(46): (2013).

[11] Henson, et al., Deer Creek Watershed Mercury Survey, 2007.

[12] USGS FOIA 2013-0085

25. The selective use of data in the Water Quality section presents the appearance of bias and this is confirmed in a Department of Interior Inspector General investigation report.[13] "According to the research chemist [Dr. Charles Alpers], CWB did not want dredging to be the solution to the mercury problem; instead, CWB wanted to ban suction dredging, which it did in 2008".

26. The bias is again evident in the confirmation by the DOI Inspector General the U.S. Geological Survey scientist was a member of the Sierra Fund, which is the environmental group which claims authorship of SB 670, AB 120, SB 1018 and recently SB 637, all anti-dredging legislation. The report also confirms the lead scientist for the mercury study sat on the Board of Advisors of the Sierra Fund. The report went on to state they saw no conflict of interest in the research scientist belonging to the group which lobbied for the ban.

27. Even if we assume there was no bias in the conduct of the studies, the selective use of data again raises its head in the DSEIR.

28. In the 1,388 page document, there is not a single reference to Year 1 of the USGS study which instrumented an actual 3" dredge and measured the water quality effects, specifically for mercury in the effluent. Although this dredge was in an area labeled as a "mercury hotspot" the data showed virtually no mercury in the effluent, and the measurements showed in some cases a drop in mercury levels behind the dredge. In fact, the report shows one hour prior to starting the dredge the mercury measurements in the water column (naturally occurring) were 717 ng/g while measurements taken one hour after the start of dredging the measurements were 510 ng/g showing a significant drop in mercury levels. It's important to note the sensors were measuring in parts per billion, and variance in some cases were measured in parts per trillion. The results of this actual dredge test were very positive towards suction dredging, and they were buried. The DSEIR used only Year 2 of the study which was conducted in 2008.

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[13] Investigative Report of Scientific Misconduct and Conflict of Interest, U.S. Geological Survey Department of the Interior, Inspector General Final Report, (Dec 2014).

29. In 2008, the use of suction dredges was prohibited on the South Yuba River, but legal elsewhere. The part of the study which led to the conclusion suction dredges could have significant impacts on mercury levels in the river is based entirely on the 2008 study which used hand dug pits, on the bank, far above the water line where winter floods didn't scour, and where suction dredges had never operated.

30. In this portion of the study, the research team used a closed circuit device which recirculated mercury-contaminated water from a holding tank, through a pump impeller, onto the bedrock, and then back to the tank again, this recirculation of mercury contaminated water likely occurred thousands of times.

31. The DSEIR relies almost completely[14] on the research using a hand dug hole, well above the water line using recirculated mercury-contaminated water. The excavated material was screened through progressively finer mesh ensuring any mercury would be fragmented and attach to the finest particles of sediment. Once the bedrock was reached they used the water from a closed circuit system, pumped the water into the hole and sucked it back out again.

32. The selective use of data is reflected in the conclusions in the SEIR. In the hand-dug hole study (Year 2) they used the highest measurement of turbidity ever recorded from a 8" suction dredge, then added to that the results from their highly contaminated mercury water and concluded that only a few dredges could contribute significantly to mercury loading. Turbidity is the measure related to how many very fine particles are in a liter of water, a quantity generally expressed as milligrams per liter. The Year 2 study assumes all suction dredges were producing 340 mg/l of suspended sediment, but the Year 1 results, from the same report the SEIR relies on, showed that the highest reading recorded during operations was 3 mg/l.[15] The number used in the SEIR, while not mentioning the actual data, was over 100 times the measured output from a real suction dredge.

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[14] DSEIR at.4-24 ("discharge of Hg from suction dredging was based primarily on field characterization of Hg contaminated sediments. (Fleck et al. 2011)").

[15] Fleck, p.40.

33. There are several major flaws with this approach, but I'll discuss only the ones which fail to represent a suction dredge. First, a suction dredge has a recovery device known as a sluice box, but the experiment had no recovery device.

34. A study by the Water Board of the efficiency of a suction dredge[16] in 2005 showed 98% efficiency in recovering mercury. This test used an older style suction dredge, and new technologies likely push the efficiency over 99%. This means 98% of the mercury which went into the collection tank wouldn't have if a suction dredge were actually employed.

35. Secondly, the experiment recirculated the water through the pump impeller, likely thousands of times ensuring any mercury in the water would be highly fragmented, or what the researchers call "flouring."[17] An actual suction dredge doesn't process material through an impeller; it flows right to the sluice box where it is captured. Finally, the data in the EIR assumed a suction dredger was spending all of his time on the bedrock layer where mercury may exist. My analysis of time spent on the bedrock layer shows it would take an actual suction dredge 19 hours to even reach the layer in question, then only 10 minutes would be spent in this layer. The report assumed all 19 hours were spent in this layer. The actual report the DSEIR is based on provides a strong caution against using this data to project impacts from dredging generally: "Furthermore, this estimate accounts for the dredging of the Hg-rich layers exclusively, a situation that is unlikely given the variable spatial distribution of these Hg-rich layers."[18]

36. Despite the obvious caution in the USGS report, the SEIR makes no mention of this. The DSEIR represents an obvious and selective use of data from the USGS report which appears designed to support a pre-determined conclusion.

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[16] Humphreys, R., 2005, Losses and Recovery During a Suction Dredge Test in the South Fork of the American River. Staff Report, State Water Resources Control Board, Division of Water Quality.

[17] "Flouring" of mercury is not a scientific term, and its use can be found in only two cites, to represent the fragmentation of mercury into fine particles. There is no scientific definition of what constitutes "flouring.

[18] Fleck, p.80

37. Despite the obvious and significant flaws in the experiment design, the SEIR relied on this flawed, highly speculative experiment to conclude suction dredges could discharge sufficient mercury to have a significant impact on the environment.

38. Apart from the study used, there is no other study which has reached the conclusion that suction dredges can contribute "significantly" to a watershed's mercury loading. The evidence, and the facts, indicate suction dredges decrease mercury loading in a watershed by removing the elemental mercury and its potential to move downriver where it could methylate.

39. The California Regional Water Quality Control Board has extensively studied the issue of mercury in the environment in a series of three comprehensive studies from 2005 – 2014.[19] [20] [21] All three studies concluded mercury in the historical gold mining areas isn't an issue. The studies found mercury levels in wildlife in the historic mining areas were well below EPA thresholds for issuing advisories.

40. The most recent Water Board study, published in draft form, February 2014[22], evaluated the correlation between various factors and elevated mercury levels in reservoirs. The conclusion of this study was the lack of nutrients in reservoirs and lakes was the largest contributor to elevated methylmercury levels and recommended the addition of nutrients to the lakes. The report shows there is a greater correlation between elevated methylmercury levels and the number of trees in a watershed than there is between active, or historical mines.

41. A 2012 report[23] published by Dr. Singer, of the University of California Santa Barbara, confirmed mercury is constantly moving down the rivers due to spring floods. With, or without suction dredging, this mercury will continue its march downriver.

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[19] Mercury Contamination in Fish in Northern California Lakes and Reservoirs, California Regional Water Quality Control Board, July 2007.

[20] Contaminants in Fish from California Rivers and Streams, California Water Board, Davis et al, May 22 2013, a Report of the Surface Water Ambient Monitoring Program.

[21] Draft Report, California Regional Water Quality Control Board, Appendix A to Basin Control Plan for mercury, issued March 2014.

[22] Draft Report, California Regional Water Quality Control Board, Appendix A to Basin Control Plan for mercury, issued March 2014.

[23] University of California, Santa Barbara, PNAS 2013.

42. Whether suction dredging increases or decreases levels of mercury is unproven and speculative. The USGS report which the SEIR relies on states "Further monitoring of MeHg in biota where previous data exist during the statewide suction-dredging moratorium that began in 2009 would be helpful in evaluating this possibility."[24]

43. As far as I can tell, based on diligent efforts to obtain data on mercury sampling (including Public Records Act requests and access to government databases that should have contained the information), inexplicably, the California Regional Water Quality Board suspended mercury monitoring in the gold dredging rivers (Yuba, Feather and American) precisely after 2009.[25] By all appearances, the 2009 dredging ban provided a perfect opportunity for testing the hypothesis that dredgers contributed to elevated mercury levels, and the Board ignored the advice of the scientists involved to ensure that the actual impact of the ban would never be known.

44. As to the actual risks to human health posed by mercury, as stated by the California Office of Environmental Hazards and Health Assessment (OEHHA) "No case of mercury poisoning has been reported from eating California sport fish. The levels of mercury in California fish are much lower than those that occurred during the Japanese outbreak. Therefore, overt poisoning resulting from sport fish consumption in California would not be expected. At the levels of mercury found in California fish, symptoms associated with methylmercury are unlikely unless someone eats much more than what is recommended or is particularly sensitive."[26] [27]

45. This general lack of any appreciable risks comes despite the early history of hydraulic mining and sixty years of suction dredging. Given the lack of credible studies on

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[24] Fleck Report, p.87.

[25] Public Records Act Request Response, Central Valley Regional Water Quality Control Board, dated 24 April 2015

[26] OEHHA website accessed July 15, 2012 http://oehha.ca.gov/fish/hg/

[27] Two weeks after we quoted OEHHA in a press release this statement was removed from their website and replaced with dire warnings about mercury and health effects. The above statement no longer exists on their active site, but can still be accessed through archives.

suction dredging and mercury, a sixty year history of no harm to humans, or wildlife, it is improbable the resumption of suction dredging would have any measurable impact on mercury levels in watersheds.

Turbidity

46. The issue of turbidity caused by suction dredging is not supported by studies, or even the SEIR. The resumption of suction dredging will have no significant impact, or cause irreparable harm.

47. "The 1994 EIR found that suction dredge mining would have a less-than-significant impact on water quality related to temporary increased turbidity levels caused by the resuspension of stream bed sediments."[28]

48. "All scientific studies to date suggest that the effects of suction dredging on turbidity and suspended sediment concentrations as it relates to water clarity are limited to the area immediately downstream of the dredging for the duration of active dredging."[29]

49. As shown above, there are no studies which show an impact from turbidity released from a suction dredge, not one.

50. "As noted in the Literature Review, there is very little new dredging-specific data available since the preparation of the 1994 EIR, and no substantial changes in the scientific understanding of the effects of increased turbidity/TSS from suction dredging operations with respect to water clarity."[30]

51. "Generally, suction dredging causes turbidities of between 15 and 50 NTUs immediately downstream of the operation, with background levels returning between 50 and 160 meters downstream, and in some cases in as short as 11 meters (Harvey, 1986; Somer and Hassler, 1992; Thomas, 1985; Griffith and Andrews, 1981; Stern, 1988; Prussian et al., 1999)."

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[28] DSEIR at 4.2-18.

[29] DSEIR at 4.2-19.

[30] DSEIR at 4.2-21.

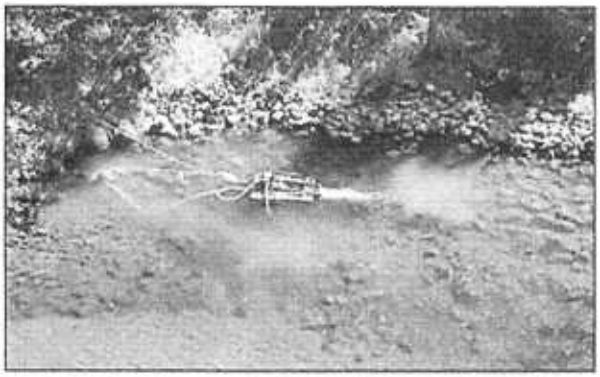

Photo f. Turbidity plume emitting from end of an active dredge, visible on right.

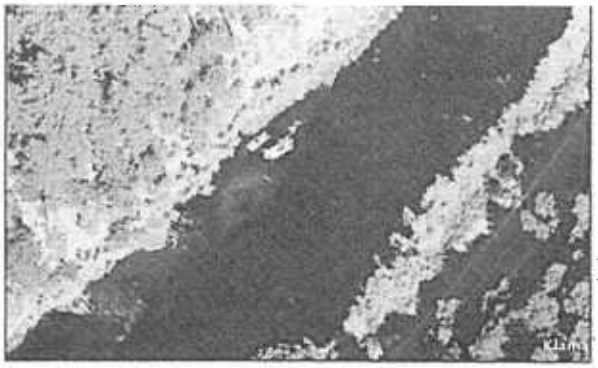

Photo h. Aerial view of an active dredge and resulting turbidity plume, visible on left.

In found turbidity returned to background levels within 30m of the dredge. Thomas (1985) found the majority of sediments deposited within the first 15m downstream from the dredge."[31]

53. The DSEIR provides no justification for the cumulative effects of turbidity being significant. All studies reviewed and cited in the literature supporting the SEIR determined exactly what the pictures above show:

54. No study cited in the DSEIR indicates there could be a cumulative effect. It should also be noted that rivers where dredgers are working in close proximity are the exception, not the general case. Far more common is a wide dispersion of suction dredgers on individual mining claims.

Trace Metals

55. The SEIR acknowledges there is very little information on the release of trace metals from suction dredging and instead of using a quantitative approach, they use a qualitative approach, assuming this could occur.

56. "Generally, discharge of trace metals at typical sites should have less than significant impacts. However, suction dredging at known trace metal hot-spots resulting from

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[31] DSEIR at 4.1-18.

acid mine drainage and characterized by contaminated sediment (*e.g.*, low pH levels and high metal concentrations in the pore water) would remobilize potentially bioavailable forms of metals and has the potential to increase levels of one or more trace metals in water body reaches such that the water body reach would exceed California Toxics Rule metals criteria by frequency, magnitude, and geographic extent that could result in adverse effects to one or more beneficial uses, relative to baseline conditions. This impact is considered to be potentially significant."[32]

57. While the SEIR speculates the release of trace metals at "known trace metal hot-spots" may occur, and may be significant, the SEIR fails to identify a single trace metal hot-spot and doesn't identify a single study where trace metal discharge exceeding water quality standards has occurred.

58. It's just the opposite.

59. "Due to the limited quantitative information, the water quality impact assessment for trace metals is largely qualitative and based on the anticipated level and nature of dredging activity that is projected to occur."[33]

60. "At a typical dredging site (having sediment trace metal concentrations similar to those identified herein for the Yuba and Sacramento river sites and used in the Table 4.2-6 calculations), the dredging activity is not expected to increase the bioavailable concentration of any of the eight metals discussed to levels that would be toxic to aquatic life, on an acute or chronic basis. Moreover, the bioavailable fraction of metal, which could have been elevated by the dredging activity, will rapidly become diluted with increasing distance downstream from the dredging site, and is expected to rapidly return to background levels at most sites as shown in the studies cited above."[34]

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[32] DSEIR ES-12.

[33] DSEIR at 4.2-24.

[34] DSEIR at 4.2-57.

61. The studies cited above include the most comprehensive study of suction dredging and trace metal release ever conducted. This study was conducted by the US EPA on a 8" and 10" suction dredge on the Forty Mile River in Alaska and found.[35] "Although relatively little study of trace metal (other than mercury) mobilization and transport related to suction dredging has occurred, a few studies have been identified. Johnson and Peterschmidt (2005) identified a maximum copper concentration of 9.3 µg/L in suction dredge effluent in a study on the Similkameen River in Washington State. Zinc and lead were both significantly below their respective acute criteria. In a study of dredging in the Fortymile River of Alaska, the maximum near-field copper concentration was 20 µg/L, and the maximum zinc concentration was 43 µg/L (Royer et al., 1999). In both studies, concentrations returned to ambient background levels within a short distance from the dredging site."

62. The Fortymile River study is one of the only known studies to measure trace metals, the weight provided this report should outweigh mere speculation on the Water Board's part that a suction dredge may cause some significant environmental effects. The cold reality is if a suction dredger hasn't hit this trace metal "hotspot" in sixty years, it's not likely a dredger will hit it next year.

Effects on Special Status Passerines.

63. The SEIR claims suction dredging may have a significant effect on special status passerines. These passerines include:

- Southwestern Willow Flycatcher
- Least Bells Vireo
- Western Yellow Billed Cuckoo
- Little Willow Flycatcher
- Willow Flycatcher
- Bank Swallow[36]

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[35] Prussian *et al.*, Impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River, Resurrection Creek and Chatanika River of Alaska, US EPA Region 10, 1999.

[36] DSEIR at Table 4.3-3.

64. When you plot the actual locations of critical habitat, in relation to suction dredging areas there is very little overlap. Shown below is the plot of USFWS data for the Least Bells Vireo and the Southwestern Willow Flycatcher. There is no suction dredging near where this habitat is located. These two species were plotted because the data we downloaded from the USFWS includes these two species. A more extensive evaluation could be conducted for each species to determine areas of overlap, and suitable mitigation could be developed, however, it is improbable an activity which has been ongoing for 60 years would impact these species.

65. Consistent with this data, the FSEIR concluded that the actual "likelihood of disturbance is considered very low".[37] The Department nonetheless found "significance" because of the relative rarity of birds such as the Least Bell's Vireo. As noted above, there is no reason to believe that any suction dredgers would operate remotely near the rare birds. And even if they did, "It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird"

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[37] FSEIR at 4-35.

except as provided by law".[38] Impacts on birds that may nest somewhere near suction dredge miners, but manifestly not in the middle of the rivers and streams where they operate, are manifestly speculative. In the SEIR, the Department presented no evidence concerning impacts of suction dredge mining, but relied upon general statements that human presence "may alter behavior patterns".[39]

Cultural and Archaeological Resources.

66. Perhaps no part of the DSEIR is more speculative than this section. The state fails to identify a single historical or archaeological resource which may be affected by suction dredging, but instead speculates this event may occur in the future.

67. CEQA has very clear guidelines on defining a historical resource.[40] It is wildly speculative to assume a suction dredger could impact a historical, or archaeological resource within the river. For those who operate suction dredges within the river, we know the rivers are nothing more than giant rock tumblers, and during a typical spring flood every rock and boulder in the river is moved. Any historical, or archaeologic resource within the river would be so far removed from its original location and so damaged to be of little value.

68. Again, CEQA has a very clear definition of archaeological resources.[41] The SEIR fails to identify a single archaeological resource which has been impacted, or even may be

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[38] Fish and Game Code § 3503.

[39] DSEIR at 4.3-48.

[40] Public Resources Code § 21084.1 For purposes of this section, an historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources.

[41] Public Resources Code § 21083.2 As used in this section, "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

impacted. There is little precedent for designating the entire geographic area of a project as a possible archaeological resource. Should the state be able to designate a unique archaeological resource it would be fairly easy to work around these areas, but there are no such designations. We are led to believe by the SEIR the probability of this occurring is high, but no evidence is presented this conflict has occurred during the past sixty years of dredging.

69. The State has a public trust responsibility to protect archaeological and historic resources on State land. However, the State has no authority over Federal land. These lands are managed by the Bureau of Land Management. The State has no authority to dictate how either the Federal government or the private person disposes of their lands.[42]

70. Even if archaeological or historic resources are present it still doesn't require a finding of significance.[43]

71. CDFW uses the following justification to support their finding:

> "*The vast majority of these resources are wood-hulled, Gold Rush-era vessels submerged within the Sacramento, American, Feather, Yuba, and San Joaquin rivers in Central California...While many of these resources are concentrated within the rivers and tributaries of the Sacramento-San Joaquin Delta, they may exist anywhere within the state's waterways.*"[44]

72. This is patently untrue and completely unsupported by fact and the administrative record. The state shipwreck database shows there are no shipwrecks in the following counties: Plumas, Sierra, San Bernardino, Siskiyou, Placer, Trinity, Kern, Nevada, El Dorado, Mariposa... We could go on, but simple research from the state's own database www.shipwrecks.slc.ca.gov shows there are no shipwrecks virtually anywhere suction dredging takes place. The SEIR finding is completely unfounded and refuted by the state's own records.

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[42] *San Diego Archaeological Society v. Compadres* (1978) 81 Cal.App.3d 923 "...the public trust doctrine applies only to limited types of real property to which the state holds or held title because it was important the land be available to all. It does not involve private property except where the state has conveyed the land into private hands. It does not cover artifacts located on private property."

[43] *Topanga Association for a Scenic Community v. County of Los Angeles* (1989) 214 Cal.App.3d 1348

[44] DSEIR at 4.5-12

73. Substantial adverse change is defined in § 15064.5 as "*Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.*"

Noise

74. Suction dredges *do* make noise. As the DSEIR notes, "use of a motor boat, ATVs" and even "ringing telephones" may violate these prevailing noise standards, yet the Department found that "suction dredge activities have potential to generate noise in excess of local noise standards" and "the impact cannot be discounted".[45]

75. The presence of noise should not be regarded as significant effect militating against entry of an injunction when county ordinances covers the effect. Local ordinances and jurisdiction do address noise standards. CDFW has presented no evidence that any suction dredger has ever been cited for a violation of a noise ordinance in 60 years, which should serve as firm evidence this is not a substantial adverse change in the environment. Noise is mitigated by local jurisdiction.

76. Mining, and dredging, pre-date the residential areas or the recreational areas, there has been no previous conflict in regards to noise but mining has a legal right to take place. The issue is not the impact of the program on the environment, but rather this is a case of the environment impacting the program. Whether recreationalists such as hikers or rafters are sensitive to the noise of a suction dredge is irrelevant. The miner is operating on a federal mining claim which is located for the express purpose of mining. The miners have a statutory right of possession and right to operate; those objecting to the mining have no such corresponding rights. In fact, most miners seldom see another human being, other than the people they have brought with them, when operating their dredges.

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[45] DSEIR at 4.7-9 to 4.7-10.

77. CDFW considers the effects of noise on a statewide basis and cites a single noise ordinance for Yuba County.[46] The Yuba County ordinance (Ordinance Chapter 8.20) allows a maximum level of 65db in residential areas from 7a.m. to 7p.m (Ordinance 8.20.140). However, suction dredging isn't conducted in residential areas and the Statewide CNEL permissible level for water recreation is 75db, the Yuba County ordinance allows 75db for light industrial activities.[47] CDFW claims, when considered statewide, noise would be a significant and unavoidable impact if it "*Expose[s] persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*"

78. Mining is a light industrial activity. The Yuba County ordinance for light industrial is 75db. The data the State uses actually shows the noise from dredge engines is below threshold standards: Table 4.7-2 on page 4.7-4 of the DSEIR provides the California Land Use Compatibility Standards for Noise. For recreation they provide a permissible noise level of 75db. Table 4.7-3 on page 4.7-5 of the DSEIR provides a recommended noise objective of 70db for active recreation.

Cumulative Effects

79. It is difficult to follow the logic of the SEIR where turbidity on an individual basis is insignificant, but when cumulatively considered it may be significant. As shown previously, every study the SEIR cites shows turbidity as a very localized and short duration event. The implementation of dredge spacing would prevent any cumulative effect.

80. The justifications for mercury and trace metal turbidity is also highly speculative and based upon flawed studies, or qualitative opinions. There is no evidence, or credible studies, which provides the basis for cumulative effects, no more than there is for individual effects, but perhaps to a much lesser degree. Dredging is not conducted statewide. There are 21 counties where no dredging occurs and there are an additional 12 counties where virtually no dredging

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[46] DSEIR at 4.7-4.

[47] DSEIR Table 4.7.

takes place. From a geographic standpoint there is less than 10% of the state where dredging takes place and it is exactly where you would expect: Feather River Basin; Yuba River Basin; American River Basin; Klamath River Basin and some smaller rivers primarily in the Motherlode region.

81. A significant shortcoming of the SEIR is the State has very little knowledge of where dredging and placer claims are located. The miners do. As shown in the suction dredger survey,[48] the concentration of suction dredgers is exactly where you'd expect them. It makes little sense from a time or resource standpoint to evaluate every region of the state under the assumption someone, someday may want to dredge there. The Alameda Court Order[49] required an additional environmental study on three rivers: Klamath; Scott and Salmon and required nothing further. The litigation today is solely due to the Department's discretionary decision to expand the scope statewide.

My Personal Mining Claims and Local Environmental Conditions.

82. I am the owner of multiple mining claims in Sierra County, California. These claims include Kayla Anne; Trillium 16; Bucks Ravine; Freedom 7 and Sawdust. I pay property taxes annually to Sierra County. These claims are located on Slate Creek. I have been suction gold dredging exclusively on my mining claims, in California since 1997.

83. Under the regulations that were in effect when the suction dredging moratorium commenced, this body of water was open from the 4th Saturday in May to the 15th of October. Under the current regulations this river is closed, as a Class A waterbody due to the Mountain Yellow Legged Frog.

84. Based on the elevation of this creek, in a normal year the earliest I could start dredging was around the middle of June and the latest I could dredge was to late September, based largely just on water temperatures, or the amount of snow pack which prevented access. This left the creek completely undisturbed for 10 months of the year.

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[48] DSEIR Appendix F.

[49] Order and Consent Judgment, Alameda County, Case No. RG05-211597.

85. Slate Creek, and the specific portion I'm on has been actively mined since the 1850s. There has never been a period of time where this creek has not had some mining activity in it. In the 1880s hydraulic tailings covered this river to a depth of 30 feet. That gravel has now flushed from the river channel providing very good placer gold which was inaccessible to the early miners.

86. My mining claims are contiguous and I am the sole suction dredger on nearly one mile of the river length. During a typical year, I may work several hundred yards of length, but it is usually in isolated spots, rather than a continuous operation. This is because the gold is not uniformly distributed.

87. I have been suction dredging in California since 1997 and consider myself to be an expert. Based on the likely gold deposits on my claim, I believe I could do it professionally. While it is possible there may be Mountain Yellow Legged Frogs on my claim, I have never seen egg masses. The lack of egg masses and tadpoles is likely due to the non-native trout present in the river, which are prolific and widespread. If there are frogs on this claim, both the frogs and my dredging can coexist.

88. The "significant effects" discussed in the SEIR are not significant on my mining claim. As I said, I am the sole dredger for nearly one mile of river. Noise, in this deep canyon, is of no impact. I have never seen the special status passerines discussed, and my mining claim is far above Bullards Bar dam. There are no salmon, or endangered fish.

89. Since 1997, I have never seen another human being on my mining claims with the exception of my family members. I have never even seen a track from another human being.

90. Turbidity is inconsequential as any turbidity released from my dredge settles out of the water column well before leaving my claim boundaries, and all the studies acknowledge the maximum distance of a turbidity plume is 200 meters, even the SEIR acknowledges this.

91. My mining claims are in a narrow steep canyon. During the gold rush days this area was heavily mined using hydraulic monitors which washed an enormous quantity of gravel into the river channels. Some reports say this area was the most intensely, and profitably- mined area in the motherlode. The annual floods have moved all of this gravel and any accompanying

historic artifacts down to the Yuba River. Regardless, anything which I might encounter is not in-situ and would be of little value from a historical perspective. The items I have found (and left) include square nails and horseshoes.

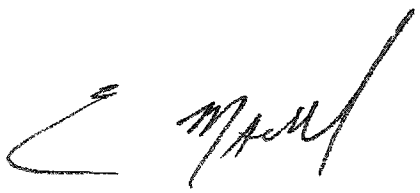
92. It is highly unlikely one person, using a 4" suction dredge, on one mile of river which was buried in hydraulic debris for nearly 75 years, could create any significant impact. The sides of this river are solid rock.

93. With over 150 years of continuous gold mining, and nearly sixty years of suction dredging it is improbable any impact could occur, which hasn't already occurred.

94. In my opinion, a reasonable season for Slate Creek, upstream from Rabbit Creek would be the 1st June to the 30th of September.

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

Executed on May 18, 2015.



Eric Maksymyk

Investigative Report of Scientific Misconduct and Conflict of Interest, U.S. Geological Survey

Date Posted to Web: December 12, 2014

This is a version of the report prepared for public release.

EXHIBIT 1
PAGE 1 OF 4

SYNOPSIS

This office received allegations of scientific misconduct and conflict of interest associated with U.S. Geological Survey (USGS) Open File Report 2010-1325A, titled "The Effects of Sediment and Mercury Mobilization in the South Yuba River and Humbug Creek Confluence Area, Nevada County, California: Concentrations, Speciation, and Environmental Fate—Part 1: Field Characterization."

Our investigation did not disclose any evidence of scientific misconduct or conflict of interest by the scientist in the USGS study.

This investigation is closed with no further action by this office. The allegations have been reviewed by this office, including consultations with the USGS ethics officer and the USGS scientific integrity officer, and determined to be unsubstantiated.

DETAILS OF INVESTIGATION

The U.S. Department of the Interior, Office of Inspector General, received allegations that a USGS research chemist deliberately omitted data while conducting a study and concluding that suction dredge mining could contribute to the increase of methylmercury levels in biota in California waterways. According to the complaint, the research chemist withheld available scientific data from his study, which the complainant alleged would have resulted in a different scientific conclusion. The complainant obtained this additional data via USGS Freedom of Information Act (FOIA) Request 2013-00085.

The complaint also alleged that the research chemist's membership in and support of the Sierra Fund's (TSF) activities presented a conflict of interest and created the appearance that the research chemist used his professional capacity to support a private organization. TSF is a nonprofit organization whose mission is to protect and restore the natural resources and communities of the Sierra Nevada region; one of TSF's primary goals is to stop suction dredging. According to documents in the complaint, the research chemist spoke at several conferences hosted by TSF and was a private donor to the organization.

Coordination with the USGS deputy ethics officer and deputy ethics counselor revealed that the research chemist's membership in TSF was authorized and complemented USGS interests. Private donations to such organizations by USGS employees are not regulated because they do not create a conflict of interest; an ethical question would only arise if an employee were receiving compensation from the organization. The deputy ethics officer's review of the research chemist's file showed that he is in compliance with ethical rules and responsibilities and there were no other complaints against him.

According to the USGS scientific integrity officer (SIO), the research chemist's work on Open File Report 2010-1325A (South Yuba River Study) presented no scientific integrity issues. The SIO explained that there is a growing trend for people to file scientific integrity complaints in an effort to change legislative decisions they do not like; the object is to undermine the scientific

basis for the decision in an effort to have the decision reversed or overturned by the courts. The SIO and the deputy ethics officer discussed the research chemist's activities during his tenure at USGS and concluded that the research chemist's record is "above the board" regarding ethics issues.

An interview of the complainant revealed two primary concerns: whether the research chemist purposefully omitted data from the study and whether his association with TSF biased his scientific work product. The complainant questioned the research chemist's choice to analyze only 1 year of mercury data when many years' worth of mercury data was available. An associate of the complainant consolidated the mercury data received via the USGS FOIA request and the data from the research chemist's study into one graph. According to the complainant, the graph portrays the variation and natural fluctuation in mercury levels in the South Yuba River watershed, which would have led to a different scientific conclusion had the research chemist incorporated the data into his analysis. In addition, the complainant believes the research chemist's association with TSF is inappropriate; the research chemist's attendance at TSF functions created the appearance of a conflict of interest.

The research chemist confirmed that USGS Open File Reports are fully peer reviewed, just like any USGS report would be. Each report is reviewed for quality control purposes by two colleagues, a supervisor, a water specialist, and a data specialist; projects are also reviewed at the proposal level before the study begins. The Bureau of Land Management (BLM) and the California Water Board (CWB) funded the South Yuba River Study to determine mercury characterization and speciation, to characterize mercury levels in biota, and to evaluate the viability of suction dredging as a means to remove mercury from the watershed. In the study, the research chemist conducted a dry run with a 3-inch-diameter suction dredge in a low-mercury-level area, and he found little mercury (as expected). He planned to run another test in 2008 with a larger diameter dredge at a hotspot (a location known to have high levels of mercury), but CWB objected because of concern the test would cause more damage to the environment. According to the research chemist, CWB did not want dredging to be the solution to the mercury problem; instead, CWB wanted to ban suction dredging, which it did in 2008.

The research chemist emphasized that USGS is strictly a science agency with no regulatory function. USGS is concerned only with collecting and providing data while other agencies decide policy. Because the research chemist was precluded from determining whether dredging mobilizes mercury through direct testing (i.e., testing with the large diameter dredge), the second part of the study instead focused on characterizing the sedimentation process in the laboratory. The team also conducted some biological monitoring of mercury levels found in invertebrates within the study sites. The research chemist claimed he did not expect to find conclusive results in the 1 or 2-day invertebrate testing because the methylmercury integration process takes weeks to months, but the team collected what little data it could anyway. Additionally, lab simulations of mercury mobilization using the collected sediment samples were designed to show how mercury would transform (i.e., become methylated and/or reactive) if it was transported and deposited downstream as it would as a result of suction dredging.

The research chemist received the FOIA response containing biological mercury data; BLM paid

for a biological mercury study from 1999 to 2004 with samples taken from over 220 sites. He stated that he did not hide the additional data, but simply did not incorporate it into the South Yuba River Study because the older samples originated from different locations under unknown conditions. He did not know whether the additional data would have changed the conclusions of the report. He admitted to speculating that dredging may impact mercury levels in biota based on the results of his study; however, he also emphasized in the conclusion section of the South Yuba River Study that more study is required to verify the relationship between suction dredging and mercury level increases in biota. He believed the state may have selectively used the data from the South Yuba River Study for its Environmental Impact Report (EIR), but claimed he cannot control how his report is used by other entities (this EIR contributed to the legislative ban on suction dredge mining in California waters).

The research chemist confirmed that he sits on an advisory board for TSF, as do members of many other Federal and State agencies. He described TSF as a non-profit advocacy group in Nevada City, CA, which has completed several projects in the Sierra Nevada region related to mining and the environment. He classified his relationship with TSF as purely professional, and stated he keeps his distance because the chief executive officer of TSF has become a "target" due to her strong anti-mining stance. The research chemist donated his time to TSF by reviewing reports to ensure TSF was citing USGS reports accurately. He also attended TSF meetings, with many other agencies in attendance, to discuss environmental issues associated with mining. He claimed that TSF is trying to change laws and raise money for anti-mining lobbying, but that USGS is not involved in regulation or advocacy and has no bias regarding mining.

SUBJECT

Research chemist, USGS.

DISPOSITION

This investigation is closed with no further action by this office. The allegations have been reviewed by this office, including consultations with the USGS ethics officer and the USGS SIO, and determined to be unsubstantiated.

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On May 18, 2015, I caused the following document to be served:

DECLARATION OF ERIC MAKSYMYK IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
455 Golden Gate Avenue
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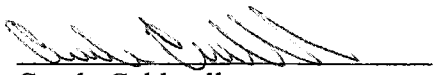

Carole Caldwell
Declarant

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Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **REPLY DECLARATION OF ERIC MAKSYMYK IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49'ers, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

I, Eric Maksymyk declare:

1. I am a plaintiff and make this reply declaration in further support of the Miners' Joint Motion for Injunction against Defendants.

2. Attached as Exhibit 1 is a true copy of the complaint the Western Mining Alliance made to the Department of Interior Inspector General concerning the conduct of Dr. Charles Alpers in the conduct of the study which supported the SEIR. I investigated the circumstances giving rise to the complaint and have personal knowledge, or personal knowledge derived from public records, about these matters.

3. In evaluating the testimony of Dr. Carrie Monahan offered in opposition to the Miners' motion for an injunction, it is important to understand she is employed by the Sierra Fund, an advocacy group dedicated to opposing gold mining in California, and maintains a financial interest in these matters. The Sierra Fund has worked closely with Dr. Alpers, according to the Sierra Fund's public records, in that effort. As acknowledged by the Department of Interior Inspector General Report, Dr. Alpers was a donor to the Sierra Fund and received funding from the California Regional Water Quality Board to conduct the mercury study. Dr. Alpers acknowledges in the DOI report the Water Board communicated to him they desired to ban suction dredging.

4. Dr. Monahan claims in carefully-worded testimony that Dr. Alpers is an "agency advisor" and that the "role of an agency working group advisor is to ensure that their agencies' roles, responsibilities and actions are appropriately characterized". However, public records show his relationship with the Sierra Fund goes much further than a casual advisor. Dr. Alpers has made repeated public appearances with Dr. Monahan and other representatives of the Sierra Fund in support of the group's anti-mining agenda, a role that clearly goes well beyond making sure that U.S. Geological Survey roles, responsibilities and actions are appropriately characterized". Dr. Monahan's testimony does not contradict a finding that Dr. Alpers' activities extend to issue advocacy and not mere agency representation.

5. Dr. Monahan's comment that the Investigative Report did not find any evidence of scientific misconduct or conflict of interest is true and I acknowledged this in my previous

declaration. That the DOI IG made this finding doesn't surprise me, but it doesn't change the fact that a US Geological Survey scientist was a donor and advisor of an anti-mining advocacy group at the same time he was performing perhaps the most critical study in regards to the future of suction dredging. Nor does it change the fact the Water Board, which financed the study communicated to Dr. Alpers they desired to ban suction dredging. The ordinary, non-PhD citizen, may perceive a conflict of interest there, but I will acknowledge again the Department of Interior found no issue with this.

6. Whether this apparent conflict of interest had any bearing on the results is not as important as why data which supported a different conclusion was omitted from the SEIR. It would seem highly significant that the first year of the study used an actual suction dredge, which was instrumented, and data was collected, but wasn't mentioned in the EIR. Instead the EIR chose to selectively use highly speculative information which was achieved by conducting an experiment which didn't simulate a suction dredging in the least.

7. Dr. Monohan's claim (Monahan Decl. at 15) that the previous sampling acknowledged by Dr. Alpers was from different locations and under different circumstances is misleading, but factually correct. The reported sampling locations shows overlap of some sampling sites, and with so few years of data available the additional data set should have been used.

8. For example, the sample site SY-47 used in 1999, 2000 and 2001 sampling was located at the South Yuba River at Edwards crossing (lat/long 39.19.49; 120.59.3), while sampling site SYR-7, 2007-2008, is also shown as the South Yuba River at Edwards crossing (39.19.48; 120.59.7). In these measurements, the third number is "seconds" of latitude or longitude. To give an idea of what it means to have two sites that are different by one second of latitude or longitude, at 38 degrees north latitude, one second of latitude is 101 feet of distance; one second of longitude is 80 feet.

9. All of the sampling sites were within reasonable distance of the South Yuba River to be considered within the South Yuba River study area. The fact remains Dr. Alpers previously collected data from sites which were reasonably the same, but either didn't disclose this

information to the Water Board, or the Water Board chose to ignore it, however, the data did exist and when additional years of data are included the results show a natural variability in methylmercury levels which appear to be correlated to annual flood levels, no causal effect related to suction dredging could be established..

10. When a study, such as that conducted in the EIR, has so very little data on which to base a conclusion, it is reasonable to include prior years sampling of the same insects, within the same general area to evaluate the reasonableness of the conclusions. The failure to disclose additional data existed had a profound impact on the outcome of the water quality section.

11. With respect to Dr. Monahan's claim that work was "peer-reviewed" there is no evidence anyone, anywhere, reviewed the experiment design, the data or how the results were achieved and whether the results accurately simulated a suction dredge. In a personal communication on May 10th, 2010, with Mr. Rick Humphries, lead for the California Regional Water Quality Board for preparing the water quality section, he acknowledged to me "peer-reviewers" were paid by the Water Board under contract to review the DSEIR. There is no evidence that any peer reviewer looked at Dr. Alper's underlying research. Instead, the Water Board sent questionnaires to the reviewers asking them to endorse general conclusions, based on documents provided by the Board, such as "Available evidence suggests that suction dredging has the potential to contribute substantially to . . . watershed mercury loading."[1] Being a paid "peer reviewer" makes them contract employees of the Water Board.

12. Ordinary citizens would also find it remarkable that after speculating suction dredges are a substantial source of mercury loading and then banning their operation, the scientists would then cease nearly all mercury testing that could provide evidence of this theory. The anti-suction dredging witnesses do not explain why mercury sampling in primary dredging rivers ceased the year after the dredging ban.

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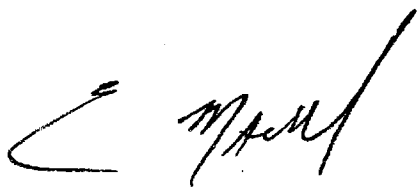
[1] The Water Board's instructions appear on its website at: http://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/dfg_suction_dredging/pr_application_suctiondredging.pdf

13. Finally, Dr. Monahan does not dispute the Water Board communicated to Dr. Alpers they wanted to ban suction dredging, and suction dredges wouldn't be the solution to mercury remediation. Both the Department and Dr. Alpers acknowledge the Water Board contributed the majority of the funding for Dr. Alpers dredging study.

14. I do not hold a Ph.D in chemistry and do not represent myself as an expert in the chemical processes involving mercury, or in the measurement of trace amounts of mercury, but I am qualified to analyze data collected by those who are. Having previously been entrusted with this nation's most sensitive and highly classified intelligence, where mistakes in analysis cost lives, I find the conduct, analysis and conclusions of the mercury study deplorable. Until a few years ago, I believed scientists only sought the truth. I know differently now. After 60 continuous years of suction dredging I would expect the opposition to be able to point to concrete, not theoretical, examples of irreparable harm. If it hasn't happened in 60 years it is unlikely to happen this year.

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

Executed on June 17, 2015.



Eric Maksymyk

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Inspector General
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Washington DC 20240

Department of the Interior
Western Region, Office of the Inspector General
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Suite E-2712
Sacramento CA 95825

28 April 2014

SUBJECT: Alleged Scientific Misconduct of Dr. Charles Alpers of the US Geological Survey
REFERENCE: USGS FOIA Request 2013-00085 dated June 19, 2013 and follow up dated 5 December 2013

Dear DOI Inspector General;

We would like to start this letter out acknowledging we have the utmost respect for the US Geological Survey. They've done some excellent work over the years. However, the conduct of a USGS scientist has led us to question his impartiality and bias in regards to issues which are currently being litigated in California.

Background

There is ongoing controversy in California over the use of suction gold dredges. The State has placed a moratorium on the use of this equipment based on the results of a 2011 Environmental Impact Report, which among other things, focused on the potential of these devices to release mercury into the watershed.

EXHIBIT 1
PAGE 1 OF 11

The moratorium was emplaced in large part because of the findings of a USGS report which evaluated the effects of suction dredges in re-suspending mercury (USGS Open File Report 2010-1325A). The report found, based on the measurements of biota, which included measuring insect larvae in the stream, suction dredges had the potential to increase the levels of methylmercury in biota.

The 2011 EIR stated only two years of data were available for this testing: 2007- 2008. In 2007 suction dredges were operating on the South Yuba River where the test was conducted. In 2008 suction dredges were prohibited from running. Dr. Alpers sampled insects from 2007 and then from 2008. He concluded 2008 measurements were 20% higher than 2007 and these results could be attributed to suction dredges, however, he qualified the statement with more data would need to be examined to establish the link.

Based largely on this conclusion, that suction dredges could be contributing increases in methylmercury to biota, the State banned the use of these dredges and we are now in litigation which has cost California over $2.5 million, and has cost us hundreds of thousands of dollars as well as prohibiting over 3,600 suction dredge miners from working their federal mining claims.

The statement there were only two years of data available is false. We submitted a Freedom of Information (FOIA) to the USGS in June 2013 and we received data for 1999, 2000, 2001, 2002 and 2012. The FOIA request was forwarded from USGS to Dr. Alpers. It appears Dr. Alpers had sufficient data to have led to a completely different conclusion. A visual representation of this data is provided in Attachment C.

Withholding this data has resulted in serious harm to suction dredge miners, and cost millions in litigation. He should have been forthcoming with all the data in support of the EIR.

We alleged bias. In 2007 a Charles Alpers is listed as a member/donor of the environmental group The Sierra Fund, which has acknowledged authoring the legislation which banned suction dredges (See Exhibit B). In 2007 Dr. Alpers was conducting the mercury testing to determine if suction dredges would be allowed to operate.

Further, Dr. Alpers has spent a considerable amount of time supporting The Sierra Funds efforts to ban various types of mining, and receive state and federal funds in grants. As a matter of public record Dr. Alpers most recently supported a 24 March 2014 briefing by the Sierra Fund to the California State legislature. (See Exhibit A)

In fact, there are few Sierra Fund events where Dr. Alpers is not present in a professional capacity.

Our concern isn't who Dr. Alpers associates with, but when he is the author of a study on suction dredging, and allegedly belongs to an environmental group whose express purpose is to ban dredging it appears to be a conflict of interest.

We believe the withholding of data to support the conclusions is a serious matter. We've spent thousands of hours preparing for litigation and one fact keeps returning to us. The mercury study was biased.

We request you review Dr. Alpers work in the cited report and determine whether he intentionally held this data back. We respectfully request you examine his professional relationship with the Sierra Fund which presents a conflict of interest. We would appreciate it if you would provide the report, USGS Open File Report 2010-1325A, to independent USGS scientists, who have no association with Dr. Alpers, to review the experiment design and the analysis which led to the conclusions. We believe scientific scrutiny of this work would be warranted. If you set out to prove mercury is a problem, you certainly can, but we believe he is so deeply immersed in the environmental issues he has lost his objectivity as a scientist.

We have a great deal of respect for the work of USGS, and we've never had cause to question their motives or science. Dr. Alpers repeated support of the objectives of the Sierra Fund leads us to conclude he is using his professional capacity to support a private organization.

Thank you for your attention to this.

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Respectfully,

Craig Lindsay
President, Western Mining Alliance

Copies Furnished

EXHIBIT 1
PAGE 3 OF 11

Congressman Doug LaMalfa
506 Cannon HOB
Washington, DC 20515

Congressman Tom McClintock
333 Cannon HOB
Washington, DC 20515

Congressman John Campbell
2331 Rayburn Building
Washington, DC 20515

MS Kathleen Benedetto
House Subcommittee on Energy and Mineral Resources
1333 Longworth HOB
Washington, DC 20515

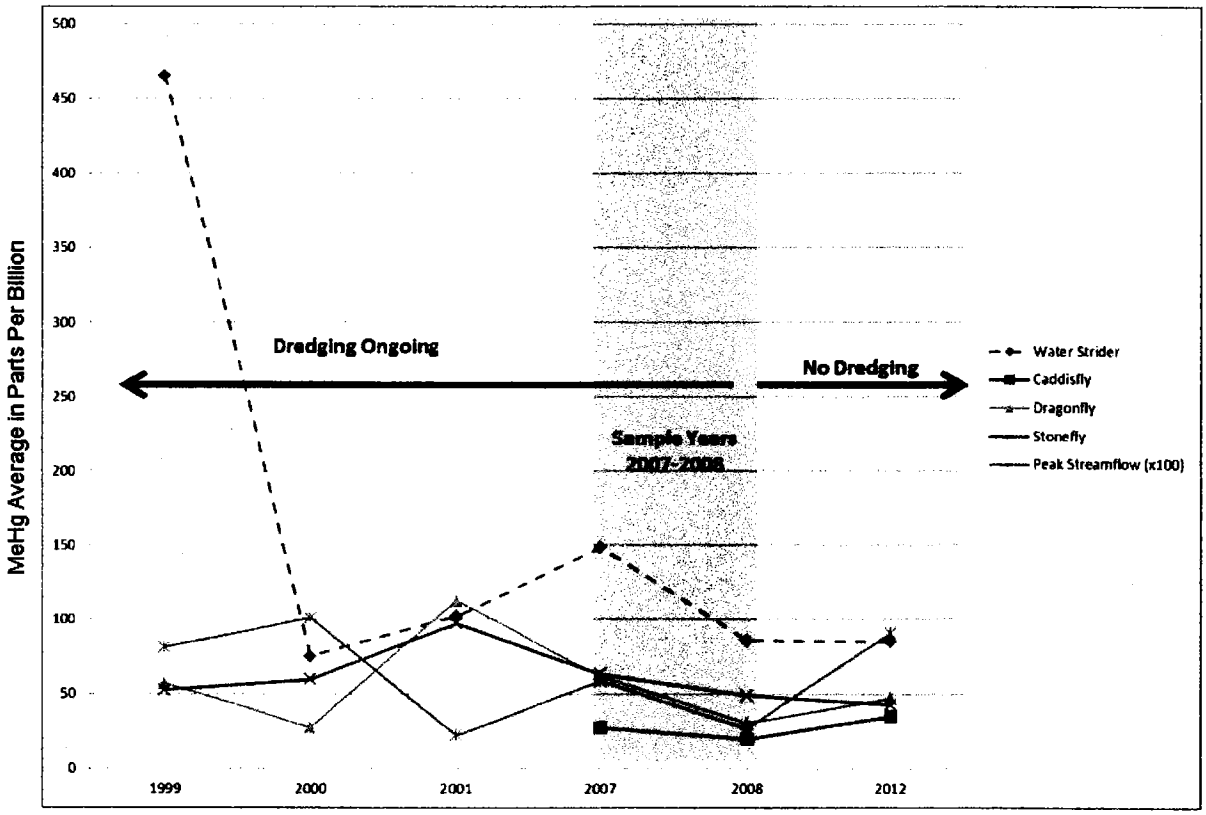
Senator Ted Gaines
State Capitol, Room 3070
Sacramento, CA 95814

Assembly Member Dan Logue
PO Box 942849, Room 4158
Sacramento, CA 94249

Pacific Legal Foundation
930 G Street
Sacramento, CA 95814

Mountain States Legal Foundation
2596 South Lewis Way
Lakewood, CO 80227

Mercury Measurements of Insects in S. Yuba River Over Time



The above data shows three things. First, the pink highlighted area provides the two years of data which Dr. Alpers provided as "the only existing data" which led to the conclusion the drop in methylmercury levels between 2007 – 2008 was attributed to the dredging prohibition.

However, at the same time Dr. Alpers possessed data from multiple years prior which clearly show there is significant variability in methylmercury levels within the South Yuba River. Additionally the recently released data shows this variability continues in the measurements recorded in 2012. In fact the measured levels of MeHg have increased from the point where dredging was prohibited.

The suction dredge miners have spent hundreds of thousands of dollars litigating this matter. It is not insignificant to be responsible for a moratorium on the methods which over 3,600 people use to derive money. It is especially troubling when the complete data was available, but the selective use of data served to distort the facts. It is deceptive to use only two years of data when he clearly knew there was wide variability in readings from year to year. This failure to disclose has led to a five year moratorium, legal costs by the state of California of over $2.5 million and legal costs by the miners in the hundreds of thousands.

The Sierra Fund
2007 Organizational Report

The Sierra Fund's mission is to save the Sierra Nevada by increasing public and private investment in the natural resources and communities of the range. We pursue this mission through philanthropy, advocacy and strategic campaigns.

Our activities in 2007 have positioned us with increased capacity and a clear vision of our goals and objectives for years to come.

STRATEGIC CAMPAIGNS

Throughout 2007, The Sierra Fund worked closely with the Sierra Nevada Conservancy (SNC) and Velocity7 marketing firm to develop the Conservancy's SPECIALTY LICENSE PLATE PROGRAM. In the spring, The Sierra Fund sponsored the SNC Logo Design Competition, attracting more than 234 entries from school age kids throughout the Sierra region. We awarded $10,500 in grants to the winning designers and their schools. Over the rest of the year, we developed a Memorandum of Understanding between The Sierra Fund and the SNC outlining leadership roles in the campaign to sell 7,500 specialty SNC license plates, and hired Velocity7 again to formulate a marketing strategy. These activities left us in an excellent position to launch the license plate campaign with the goal of securing ongoing, sustainable funding for the Conservancy's grant programs.

Our GOLD MINING'S TOXIC LEGACY INITIATIVE, now in its second year, has developed the first-ever comprehensive report describing the impacts of toxins from the Gold Rush on the human and environmental health of the Sierra, and presenting recommendations for action to address this enormous, neglected issue. This report outlines a plan of action for decades to come, and calls on state and federal governments and philanthropic partners to join the effort. Scientists, native tribes, conservation organizations, health professionals, legislators and government agencies have all participated in the success of this crucial new environmental justice initiative.

ADVOCACY

The Sierra Fund maintained a voice in the Capital for Sierra investment throughout the year. While statewide budgets suffered cuts, the Governor approved full funding for the 2007/08 SNC budget, and in early 2008 proposed an increase in funding for the 2008/09 year. Participants in our 2007 Sierra Day in the Capitol, co-sponsored by the Sierra Nevada Alliance, thanked legislators for supporting the SNC budget, and distributed a portfolio of "Sierra Conservation Projects" demonstrating Sierra funding needs. We also brought government attention to the issue of historic mining toxins, including the impact of suction dredging for gold in riverbeds contaminated by mercury.

PHILANTHROPY

Our philanthropic services program has invested funds and technical support in organizations tackling climate change, land use, development, and public access. We distributed $274,498 in grants and loans to organizations committed to the future of the Sierra, and other interests as directed by our donors.

We are grateful for the participation and support of our many partners, allies and donors. They have made 2007 a successful year, and we look forward to pursuing these activities for years to come.

For the Sierra,

Elizabeth "Izzy" Martin, Chief Executive Officer

432 Broad Street, Nevada City, CA 95959
530.265.8454 ~ www.sierrafund.org

EXHIBIT 1
PAGE 60 OF 11

DONORS ~ 20

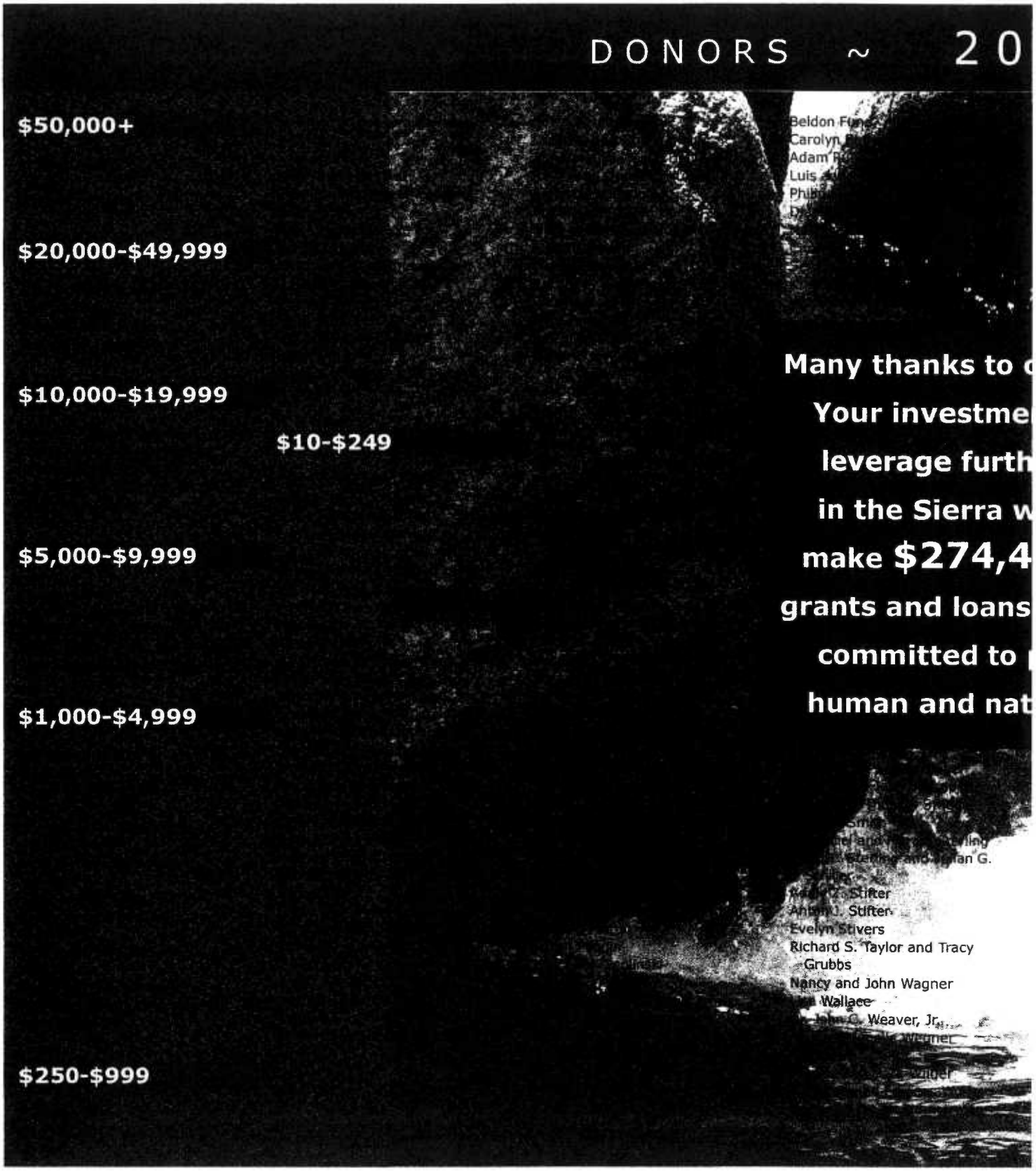


EXHIBIT 1
PAGE 7 OF 11

ATTACHMENT A: Sampling of Sierra Fund/Alpers Collaboration

MARCH 2014

Monday, March 24, 2014, 1:30 p.m. State Capitol, Room 447

I. Impact on Public Health and the Environment

- The Sierra Fund – Carrie Monohan, Science Director
- California Indian Environmental Alliance – Sherri Norris, Executive Director
- Habematolel Pomo of Upper Lake – Paula Britton, Environmental Director
- Elem Indian Colony – Thomas Brown

II. Defining the Problem and Effective Solutions

- U.S. Geological Survey – Charles Alpers, Research Chemist, California Water Science Center
- U.C. Davis – Dr. Fraser Shilling, Department of Environmental Science and Policy
- June 21, 2012
- Tags: brownfields, conference, Deer Creek, media coverage, Nevada City

- **Kathleen Masterson, environmental reporter for Capital Public Radio, attended The Sierra Fund's tour of Deer Creek as part of our Reclaiming the Sierra conference. She put together an excellent story on mining impacts in this watershed, which aired on May 21 and features our conference speakers including Shelly Covert of Nevada City Rancheria, Jason Muir of Holdrege and Kull, Kyle Leach of Sierra Streams Institute, and Dr. Charlie Alpers and Jacob Fleck of USGS.**

NOVEMBER 2011

NEVADA CITY, 7 November 2011 – The Sierra Fund made a big splash at the recent National Association of Abandoned Mine Lands Programs Conference held in Squaw Valley, CA. The Conference was cosponsored by the states of California and Nevada, and brought together participants in 35 federally funded state and tribal government remediation programs from around the country to talk about challenges and opportunities in abandoned mine remediation activities.

TSF staff was invited to make four separate presentations at the conference, and we had a booth to distribute our materials and Summit announcements all three days of the event. We were astonished to learn that we were the first non-profit organization to ever attend the conference, much less speak at the event or have a table.

Our presentations were enthusiastically received, especially the tour of the Humbug Creek watershed project that our Science Director, Dr. Carrie Monohan, led alongside US Geological Survey scientist Dr. Charles Alpers.

SEPTEMBER 2010

Reclaiming the Sierra: Summit on Nov. 8 & 9

Gold Country Community Summit on Historic Mining Impacts November 8 & 9, 2010 - Miners Foundry - Nevada City California
Published on Sep 27, 2010 - 11:56:27 AM

By: Sierra Fund

Nevada City CA, September 27, 2010 - The Sierra Fund (www.sierrafund.org) announced today that it will be hosting the first annual public conference on how to address the ongoing human health, environmental and cultural impacts of over a century of mining in the Sierra Nevada.

For detailed information and to register for the Summit, visit www.sierrafund.org/MiningSummit.

"The Sierra Fund has been working for five years now on our Mining's Toxic Legacy Initiative," says CEO Elizabeth "Izzy" Martin, "bringing together scientists, regulators, healthcare providers, elected officials and decision makers at the local State and Federal level to address these issues. With Reclaiming the Sierra we will bring the public and experts from a broad array of disciplines together to discuss the past, the present, and more importantly what we can do moving forward in dealing with California's oldest and longest neglected environmental disaster."

The Conference program covers a spectrum of topics including:

Stimulating Gold Country Economies
Tribal Peoples Leading Cultural & Environmental Healing
Remediation Case Studies & Technologies
Green Mining
Smart Growth & Building a Remediation Workforce
Identifying Human Exposure
Encouraging Voluntary Cleanups
Financing Remediation
Federal 1872 Law Mining Reform to Clean up the West's Oldest "Brownfields"

Confirmed Keynote Speakers for Reclaiming the Sierra are:

Jane Hightower, M.D.
Dr. Hightower is widely acknowledged as the first U.S. physician to recognize low-level mercury poisoning in patients who regularly consume certain types of fish. Dr. Hightower's book, Diagnosis: Mercury: Money, Politics, and Poison, has been widely acclaimed and has brought the issue of mercury

in fish to national attention.

Gray Brechin, Ph.D.
Dr. Brechin is a historical geographer, frequent radio and television guest, and a popular public speaker. He is currently a visiting scholar in the U.C. Berkeley Department of Geography. His book, Imperial San Francisco: Urban Power, Earthly Ruin, is a celebrated history of those who gained power through Sierra resources including mining, ranching, water and energy.

Other Speakers Include: Steve Wilensky, Calaveras County Supervisor; Don Ryberg, Tsi-Akim Maidu Tribe; John Lane, Teichert Aggregates; Randy Adams, Department of Toxic Substances Control; Elizabeth Russell, Trout Unlimited; Tim Vendlinski, Sustainable Conservation; Reinette Senum, City Council Nevada City; Jason Rainey, SYRCL; Fran Spivy-Weber, State Water Resources Control Board; Dr. Charles Alpers, US Geological Survey; Lauren Pagel, EARTHWORKS; William Finley, Private Industry Council, Elizabeth Martin, The Sierra Fund

The Sierra Fund's Mining Project Organizer, Mike Thornton states: "We have an impressive array of speakers coming to Nevada City for this conference, and we're excited to offer the public an important role in this process as we work to craft solutions and move forward on these important issues. In addition, holding Reclaiming the Sierra at the historic Miners Foundry (www.minersfoundry.org) is a fitting symbol of where we've come from and where we are today."

Founded in 2001, The Sierra Fund is the only nonprofit community foundation dedicated to the Sierra Nevada. Our mission is to increase public and private investment in the natural and human resources of the region.

AUGUST 2010

Delta Tributaries Mercury Council, Minutes August 24th, 2010

BLM mine site clean ups (Carrie Monohan, The Sierra Fund; Jacob Fleck, USGS)—BLM has selected a site on Deer Creek called Stocking Flat to assess for mercury contamination from hydraulic mining debris deposits. BLM has partnered with USGS scientists Charlie Alpers, Jacob Fleck, and Rodger Hothum. BLM received ARRA funds to assess their lands in the Deer Creek watershed. They have completed an RSI with Westin Solutions. And contracted the EE/CA to URS, Holdrich and Kull and The Sierra Fund. The Sierra Fund will be assisting with community relations.

MARCH 2008

Mining's Toxic Legacy Report from the Sierra Fund
March 9, 2008

EXHIBIT 1
PAGE 10 OF 11

The Hearing

At the hearing, Martin presented a summary of the report to members of the three Assembly Committees, highlighting top priorities for the state legislature to address this year, calling for the state to do a thorough assessment of state owned lands for mining toxins, and to prepare and fund a plan for remediation in collaboration with area residents and tribes. She also called for development of a new Mining Toxin Working Group with university and agency scientists, tribes and other community leaders to learn more about human health impacts, distribution and behavior of toxins, and how to remediate mining toxins. Other top recommendations for action this year include directing the Sierra Nevada Conservancy to coordinate these efforts among local, state and federal agencies, and calling for reform of suction dredging for gold mining regulations.

Speakers at the hearing included Don Ryberg of the Tsi-Akim Maidu Tribe, Dr. Charles Alpers of USGS, Rick Humphreys from the State Water Resources Control Board, Cy Oggins from California Department of Conservation Abandoned Mine Lands Unit, scientists from CALFED, Kathryn Tobias from California State Parks, and Dr. Carrie Monohan from the Sierra Nevada Science Institute. All speakers presented information about the health, environmental or cultural impacts of the Gold Rush. In addition, more than a dozen members of the public spoke at the conclusion of the hearing, urging the Assembly to take action to address mining's toxic legacy.

MARCH 2008

Minings Toxic Legacy, published by the Sierra Fund in March 2008

Agency Science and Policy Advisors:
Several local, state and federal agencies participated as resources to the project, working with The Sierra Fund to ensure that this report accurately characterizes their
agencies' roles, responsibilities and actions.

Dr. Charles Alpers
US Geological Survey
Diane Colborn
CA State Assembly Water, Parks & Wildlife Committee
Rick Humphreys
State Water Resources Control Board
David Lawler
US Bureau of Land Management
Caroll Mortensen
CA State Assembly Environmental Safety & Toxic Substances Committee
Cy Oggins
CA Department of Conservation

EXHIBIT 1
PAGE 11 OF 11

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On June 17, 2015, I caused the following document to be served:

REPLY DECLARATION OF ERIC MAKSYMYK IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
455 Golden Gate Avenue
San Francisco, CA 94102
Via U.S. Mail

Bradley Solomon
Deputy Attorney General
455 Golden Gate Avenue, Suite 11000
San Francisco, CA 94102-7004
E-mail: Bradley.Solomon@doj.ca.gov
Via E-mail

Marc Melnick
Office of the Attorney General
1515 Clay Street, Suite 2000
Oakland, CA 94612
E-mail: Marc.Melnick@doj.ca.gov
Via E-mail

John Mattox
Department of Fish & Game
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E-mail: jmattox@dfg.ca.gov
Via E-mail

James R. Wheaton
Environmental Law Foundation
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Oakland, CA 94612
E-mail: wheaton@envirolaw.org
E-mail: elfservice@envirolaw.org
Via E-mail

Glen Spain
Pacific Coast Federation of Fisherman's Association
Southwest Regional Office
P.O Box 11170
Eugene, OR 97440
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Jonathan Evans
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E. Robert Wright
Friends of the River
1418 20th St., Suite 100
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912 Cole Street, #140
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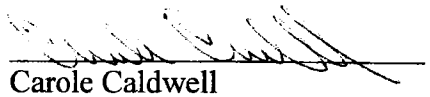
Keith Robert Walker
9646 Mormon Creek Road
Sonora, CA 95370
Via U.S. Mail



Carole Caldwell
Declarant

LAW OFFICES OF DAVID YOUNG
David Young, SBN 55341
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Telephone: (310) 575-0308
Facsimile: (310) 575-0311
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Attorney for Plaintiffs/Petitioners Kimble et al. and PLP et al.

JAMES L. BUCHAL (SBN 258128)
MURPHY & BUCHAL LLP
3425 SE Yamhill Street, Suite 100
Portland, OR 97214
Telephone: (503) 227-1011
Facsimile: (503) 573-1939

Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **DECLARATION OF DAVID MCCRACKEN IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49er's, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

David McCracken states:

1. I am the President of plaintiff The New 49'ers, Inc. and make this Declaration in support of the Miners' Joint Motion for Injunction Against Defendants.

2. I have been active in suction dredging since 1979 and am generally considered an authority on the subject. I have consulted for companies and governments all over the world concerning suction dredging, including, Borneo, India, Sumatra, Cambodia, Thailand, Philippines, Papua New Guinea, Madagascar, South Africa, Guinea, Venezuela, Costa Rica and elsewhere. I have published and produced most of the authoritative books and video material on the subject of suction dredging. As I have devoted most of my adult-life to activities related to suction dredging, I am very qualified to speak on the subject.

3. I also have extensive experience in utilizing gravity methods to recover fine gold, mercury and gemstones – especially in recovery systems used by suction dredges. More background about my experiences concerning suction dredges and recovery systems can be found on my consulting web site at http://www.promackmining.com/. I have written extensively on the subject of recovering fine particles of heavy metals and gem stones with the use of suction dredges. One excellent article on the subject can be found at http://www.promackmining.com/differentsampling.htm.

Background Concerning The New 49'ers.

4. I founded The New 49'er Gold Prospecting Association in Siskiyou County 30 years ago, and have managed the program since the beginning. The company is a California corporation. Its purpose is to provide abundant, hassle-free mining opportunities for our members. In turn, our members pay dues to belong and gain access to over 60 miles of gold bearing streams and rivers within Siskiyou County. Most of our mining property is located within the Klamath National Forest along the Klamath River. This is because the earlier generations of gold miners, to a very large degree, had difficulty reaching out into the larger, deeper river where substantial reaches of original river bottom gold deposits still exist today.

5. We have around 2,000 active members in The New 49'ers, though usually not more than 100 or so are around at any given time. Weather conditions, winter flows and ice cold water, for the most part, prevents underwater mining except during the more mild months of the year. Having said that, I believe it is a fair statement for me to say that our activity draws more visitors into Siskiyou County than any other private enterprise.

6. The *only* effective way of recovering submerged river bottom gold deposits is with the use of modern suction dredges. These are portable machines which float on pontoons and use a motor and pump to suck up mostly gravel material from the river bottom and pass it over a recovery system where the gold drops out because it is heavy. The gravel flows directly back into river near where it came from on the river bottom. For deeper dredging, a hookah compressor is also attached to the motor and directs breathing air down to the diver(s) through an extended airline.

7. Our office and headquarters are located next to the post office in Happy Camp. We employ 5 full time administrative staff, and bring in extra help when necessary. In addition, we have a Director of Internal Affairs (a retired deputy sheriff), whose Declaration is being filed along with mine. We have always coordinated with the several government agencies which possess some level of jurisdiction over our activities in the National Forest, chiefly the U.S. Forest Service and California Department of Fish & Wildlife ("DFW"). Though we sometimes have civilized differences of opinion over how laws and regulations properly apply to small-scale mining activity, our overall relationship with these agencies has been cooperative and productive since we began 30 years ago.

8. All of our members sign a Mining License when they join our organization. The license allows members to keep the gold they recover from the properties that we manage. The license also requires each member to abide by our published Rules and other site specific restrictions that are outlined in our published Claims Guide. A true copy of our Claims Guide is available at http://www.goldgold.com/master-list.html.

9. Our Claims Guide defines the boundaries of all the properties which we manage, provides useful information about the property, and outlines any site specific areas that are off limits to mining or suction dredging. These off-limit areas have been established through working relationships with the U.S. Forest Service, the Karuk Tribe and local communities. They include popular swimming or recreation areas, areas of cultural concern and locations along the Klamath River where cooler water enters from side tributaries during the hot summer months.

10. Some fish biologists believe dredging activity might frighten fish away from these cool water "refugias," but we have extensive experience underwater with the fish and see how they are substantially attracted to the material which flows off the back of our dredges. This is because our dredges penetrate otherwise armored stream bottom where smaller critters live which the fish feed on. Even though our dredge holes are so small as to have no impact on the larger waterway, the fish are certainly glad to be around the discharges of our dredges. In addition, they like to take refuge in our dredge holes when we are not actively mining. This is because larger rocks and boulders must be moved around by hand, which creates protected habitat. Cooler ground water also flows into our dredge holes which the fish seem to be attracted to during the hot summer months. All of the holes we make in the waterways are erased by Mother Nature during winter storm flows.

11. Because we have a *very* attentive internal affairs staff, our management approach has always been to resolve any and all problems internally, rather than have the authorities involved. Since our beginnings, our relationship with the U.S. Forest Service has been such that their Minerals Officer or District Ranger simply has to make a phone call to our office if there is a concern about any activities associated with our program. Then we go out and immediately resolve any problem if it exists. To a large extent, we have enjoyed a similar relationship with the DFW.

12. The Miners License each of our members signs allows The New 49'ers to suspend the mining privileges of any member who is not following our Rules or is breaking the law. The truth is that we have more leverage to bring members into compliance than any of the agencies. Not that we have many troublemakers, but there are occasional things that come up. When they do, we are all over it. In 30 years of operation in Siskiyou County, there has never been a single citation or reprimand against The New 49'ers by any agency, even though our membership is in the thousands.

13. During 1993 and 1994, representing The New 49'ers and the larger mining community of Siskiyou County, I devoted countless hours to hammering out a reasonable set of suction dredge regulations with DFW. Others from the mining community were also involved, representing other parts of the state. The process was very contentious, and actually took three full attempts (three full EIR's) before we finally arrived at a balanced regulatory scheme that allowed suction dredging while protecting fishery resources. Those set of regulations served our industry and the State very well until the unlawful moratorium was imposed by the California legislature in 2009.

14. In addition to the California regulations, to resolve protests by the Karuk Tribe about our activity, in concert with the U.S. Forest Service, we mitigated to their satisfaction *every single concern* the Tribe expressed. The concerns and mitigation solutions are well documented. We still honor those agreements today.

15. It was shortly after making all these agreements with the Karuk Tribe more than 10 years ago, that we discovered that attorneys from the DFW and the Karuk Tribe had made a secret agreement to impose substantial changes to our suction dredge regulations without any notice whatsoever to our industry. This was a gross violation of CEQA and other California administrative laws. How can an industry reinvest in business and plan for the future when a State agency can secretly collude with special interest groups to completely change the regulations which largely control your industry? The changes they agreed to proposed to make

massive reductions in our mining seasons and closed suction dredging altogether on productive waterways that have been worked by prospectors even before California became a State!

16. We intervened on the State litigation before the judge approved the secret agreement, and the judge agreed that the DFW was not proceeding in accordance with law. That litigation eventually evolved into a Consent Decree entered by the Court to update the suction dredge regulations which were adopted during 1994. Determined to get their way, DFW went through all the steps of a CEQA process to arrive at nearly the very same outcome as their original Agreement with the Tribe. DFW's outcome-based CEQA was a corruption of the CEQA process. Consequently, the ongoing litigation was expanded into objections of unreasonable over-regulation by the miners, and unreasonable under-regulation by the Karuk Tribe and their anti-mining allies, the litigation coordinated before this Court. The mining community has spent in excess of a million dollars in legal fees. While this might not sound like much in this day and age, coming up with the money to pay competent attorneys to represent our industry has been more difficult than mining activity itself – which is brutally difficult.

17. As the CEQA process evolved with very oppressive draft regulations that at least would have allowed some of our activity to resume, the State legislature passed a moratorium in 2009 that basically made it impossible for DFW to ever issue suction dredge permits again. So even after selling us suction dredge permits for 2009, the State shut us down mid-season under threat of criminal prosecution. No refunds were offered or provided. There were substantial losses to the millions upon millions of dollars in capital expenditures the prospecting community invested into mining property and equipment. Entire rural business communities which provide services to the mining community across California had their business plans undermined. How can you make business plans in an environment where special interests have the influence to get the legislature to just shut you down?

18. This Court has found the permit moratorium and 2012 suction dredge regulations an unlawful scheme by the State of California to defeat the intention of Congress. Yet DFW

continues to enforce the illegal moratorium. Taking the Court's ruling to heart, after ten years of active litigation, and having our dredges shut down for the past six years, the California mining community has been gearing up for the fast-approaching 2015 season. Some of our members are already dredging on the Klamath River.

19. At present, DFW wardens are coming out to the river and instructing our suction dredging members that they are breaking the law. Sometimes they are seizing equipment, sometimes issuing citations, and sometimes even arresting them. Some members, confident that this Court's ruling protects them, even insisted upon being arrested for breaking the law so the matter could be immediately resolved in front of a judge. However, the Siskiyou County District Attorney has declined to cooperate in securing such a resolution.

20. In the wake of this Court's ruling on April 30th granting DFW's ex parte petition, our members appear to have no access to due process of law (in the sense of a timely judicial ruling on the lawfulness of their activities) other than to the extent we can represent them indirectly before this Court in seeking the relief now sought.

21. Without such relief, DFW will continue to seize mining equipment and may never get around to a prosecution. DFW wardens seized dredging equipment from one of our members, Derek Eimer last fall, and have yet to charge him with a crime or return his gear. Even if a citation is issued, the case may never be prosecuted.

22. In substance, the State of California is doing everything it can to use badges of authority to frighten prospectors ("you will be prosecuted later"), and running off with their mining gear, thereby imposing punishment upon them while refusing to provide them an immediate hearing in front of an impartial judge. This misuse of authority has a very chilling effect on business. It is particularly difficult in that we devoted 10 years of litigation, and already lost six mining seasons, to finally arrive at a ruling—which the State will not honor.

Emergency Regulations for The New 49'ers Claims.

23. Since it is unclear which, if any, suction dredge regulations the State has the authority to enforce, in light of this Court's ruling, which we understand to mean that the State cannot legally demand permits it refuses to issue, The New 49'ers have adopted a reasonable set of Emergency Dredging Rules which only apply to the properties which we manage.

24. These Rules, operating in conjunction with claim-specific restrictions in the Claims Guide, are more restrictive than what was allowed under the regulations which were in affect during 2009 when the unlawful moratorium was imposed. For example, the 2009 regulations allowed up to 6-inch suction nozzles on all of our creek properties in Siskiyou County, 8-inch nozzles on the Klamath and Scott Rivers and 6-inch nozzles on our Salmon River properties. Our Emergency Rules have reduced all of our waterways down to a 4-inch intake except the much larger Klamath River, which was reduced to 6-inches. Since we control long stretches of waterway, we reduced the number of operating dredges to no more than 10 per mile on the Klamath, no more than 3 per mile on any of the creeks, and no more than 5 dredges per mile on the Scott and Salmon Rivers. There were no restrictions on dredge concentration in DFW's 2009 regulations. We also made off limits to dredging during the warm summer months every cool water refugia that was identified to exist on our properties exactly according to our agreements with the Karuk Tribe and U.S. Forest Service in 2004. No such restrictions were in DFW's 2009 regulations.

25. The reason we did this was because, with the uncertainty over DFW existing authority, we do not want unregulated suction dredging to occur on our properties. Through this motion, plaintiffs are seeking general relief that would limit DFW enforcement on federal lands to circumstances where miners may be operating out of compliance with the 2009 regulations. However, as part of our continuing effort to reach an accommodation with the Karuk Tribe, we propose to continue to enforce our more restrictive Emergency Regulations on our properties in

the event the Court believes more restrictions are necessary until such time as formal regulations are adopted.

The Mercury Issue.

26. As time has passed without any evidence that any dredger anywhere has ever injured so much as a single fish or frog, suction dredge opponents have seized upon the mercury issue as a primary point of attack against suction dredgers. We do not use mercury in our dredges, but some hydraulic miners early in California history did, and in some places, the mercury they lost persists in isolated spots within some goldmining areas. Because the mercury is very heavy, in those few places where it was used abundantly, some of the mercury sank and collected in pools along the bedrock. In my more than thirty-five years of suction dredging, the only place I ever saw a pool of mercury was on the South Fork of the Yuba River during a cooperative program with several government agencies to work out a method to mitigate the contaminated area. I would add that the contaminated area was discovered by suction dredgers who reported it to State and federal agencies.

27. As far as I know, there have been no studies to characterize the levels of mercury within California's waterways outside of just a few identified hot spots. The vast majority of California's waterways do not contain mercury hot spots (we know, because dredgers are not finding mercury in most places). Simply because there may be occasional, isolated areas of concern, shutting down the entire State to suction dredging is not a reasonable approach to regulation.

28. The State's conclusions concerning mercury are based upon studies that have been conducted in known mercury problem areas. These areas are not typical of the mining claims on which suction dredgers operate, and certainly do not represent conditions on mining claims owned or controlled by The New 49'ers. Our members rarely find any mercury beyond an occasional trace that may adhere to a gold nugget.

29. One researcher, Humphreys (2005), has measured the percentage of mercury recovered out of a contaminated hot spot with the use of a suction dredge as 98%. It has at all times been obvious that removing 98% of the mercury encountered is a net environmental benefit, but the State has contended that the net effect is negative because of the release of the remaining 2% from the dredge, most of which would sink back into the streambed. In particular, the State has suggested that Humphreys (2005) observed that suction dredges would "flour" mercury, that is, break it into vastly smaller pieces. The State's theory is that this floured mercury would then travel further downstream than otherwise would have been the case.

30. As set forth below, this is not true, but even it were, mercury is continuously migrating downstream, particularly during flood events. The State has never attempted to balance asserted negative effects from making some unknown fraction of the 2% of mercury not recovered more mobile against the benefits of removing 98% in the first place.

31. In my very informed opinion, the dredge Mr. Humphries used in his experiment, even though of an older design which created more turbulence in a "crash box," did not flour the very small percentage of mercury that he discovered in the dredge tailings. The period of time it takes for dredged material to pass through a dredge's sluice box is only a few seconds. While that could potentially break mercury down into smaller-sized goblets (which Mr. Humphries did not find in the dredge tailings), it requires a prolonged period of violence to succeed in breaking mercury down into particles so small as to become the size of flour.

32. Since Mr. Humphries neglected to test the raw material (the material that was fed into the dredge), he was not able to determine if the floured mercury already existed prior to the dredging. That such mercury was just too small in size to receive a 100% recovery rate in the dredge's recovery system in no way proves that dredges flour mercury. Mr. Humphries in his report showed an image of mercury (partially floured) that he panned out of a waterway without the use of a dredge, and the report also acknowledged that he returned later to the very same

place he dredged during the test and found more mercury there, showing that the floured mercury was surely present before entering the dredge.

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

Executed on May 17, 2015.

Dave McCracken

David McCracken

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On May 18, 2015, I caused the following document to be served:

DECLARATION OF DAVID MCCRACKEN IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

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County of San Bernardino
San Bernardino Justice Center
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San Bernardino, CA 92415-0210
Via U.S. Mail

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Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
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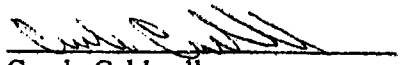

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **REPLY DECLARATION OF DAVID MCCRACKEN IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49'ers, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

David McCracken states:

1. I am the President of plaintiff The New 49'ers, Inc. and make this Declaration in support of the Miners' Joint Motion for Injunction against Defendants.

Mercury Is Not an Issue for New 49'ers Mining.

2. A large portion of both the Department of Fish and Wildlife (DFW) and Karuk Opposition filings to the Miners' Motion for an Injunction are based upon concerns about the resuspension of mercury and the perceived harmful effects upon fish from reduced water quality as a result of the tailings discharges from suction dredges. The effects of mild turbidity on fish have been addressed time and time again with the same result, so I am not going to engage in the same old, tired debate here. DFW's conclusion in both the 1994 and 2012 EIR's was that turbidity effects are less than significant upon fish. End of story.

3. As to mercury, I can assure this court that nobody else in the history of the earth has observed more area along the bottom of the Klamath River streambed than I have. For the past 30 years, I have devoted a large portion of my time either dredging the Klamath, teaching others how to dredge the Klamath, or overseeing the suction dredging activities of thousands of New 49'er members along the Klamath who have come and gone over this period of time. If there were any mercury hot spots along the mid-Klamath River, I would certainly know about them. They do not exist. The injunction we are seeking, insofar as it relates to dredging by members of The New 49'ers, has no chance of significantly increasing mercury concentrations not merely because the dredges would catch 98% of the mercury, but also because there is no problem to begin with.

Response to Concern about Drought Conditions.

4. Our opponents express concern that fish will not survive if we return to the dredge regulations which were in effect during 2009 when the unlawful moratorium was imposed upon our industry in light of the drought conditions California is experiencing. The Klamath is California's second largest river. Past history is full of stories about the Klamath being so low

during the summer months before the dams were constructed, that people could walk all the way across the River, something that would be completely impossible in the present day of flood control. Somehow, the salmon and other fish survived those days of extreme low flows compared to what we will encounter during the present drought.

5. As set forth in my opening Declaration, The New 49'ers have recently adopted internal Rules for properties we control that reduce the sizes of dredges allowed on our properties, and also limit their numbers, in order to do our part to mitigate concerns expressed by DFW and the Karuk Tribe.

6. At the same time DFW and the Karuk are seeking to limit dredging activities on account of drought conditions, there is no evidence that DFW is imposing any drought-related limitations on fishing by the Karuk Tribe and others. For example, the unregulated dipnet fishery at Ishi-Pishi Falls for members of the Karuk Tribe remains in the current California fishing regulations. Sports fishermen continue to be allowed to keep up to nine chinook salmon caught from the Klamath River. (California Supplement, Sport Fishing Regulations, Klamath River Basin Regulations, 91.1(C)(2)(b)(i).[1]). We would ask this Court to watch what DFW is *doing* with respect to direct killing of fish in the Klamath River, rather than what it is *saying* with respect to the almost-entirely-theoretical impacts of suction dredging on fish.

Economic Losses.

7. The Foley *et al.* litigation which has been consolidated coordinated by this court was originally filed in Siskiyou County by business owners from Happy Camp who are being crushed by the unconstitutional moratorium. Happy Camp is the location of our New 49'er headquarters. It is also the location of most of the Karuk administrative offices and housing developments, all paid for by those of us in the private sector who must work hard to make ends meet. That litigation was filed two years ago with an overflowing courtroom of Americans who

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[1] Available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=100968&inline

must produce something to make an honest living, pleading with the Superior Court for relief – which they still have not obtained.

8. Instead of addressing losses to the Happy Camp community, the Karuks file a Declaration from Chris Hatton who has owned the Salmon River Outpost since 2003. That was the year that The New 49'ers acquired mineral right access to a substantial amount of the Salmon River, one of California's richest rivers for gold. Hundreds of our members visited the Salmon River that season. I am certain many of them, including myself, purchased food and other items from Mr. Hatton's store. With all due respect, miners do not look any different than any other people, and I am challenging how Mr. Hattan was able to distinguish the difference between a prospector and a rafter when they were paying for items at his cash register.

9. In any event, between the Karuks, the anti-mining activists and the very well-established illegal marijuana-growing community along the Salmon River, the continuous harassment of our members was so painful that we completely withdrew from the Salmon River in 2004. By harassment, I mean threats of violence, gunshots fired over our campsites in the middle of the night, dredges being sunk on the river, cut loose from their anchor ropes or stolen, vehicles with their tires slashed, their radiator hoses cut, and their windows smashed.

10. Since our organization promotes "hassle free mining opportunities," it became clear during the 2003 season that, as good as the gold was, the Salmon River was not for us. Those mining claims eventually ended up in the hands of just a few independent miners. So it is not surprising that Mr. Hattan has not endured a loss of business since the moratorium was imposed in 2009. The bulk of gold miners exited his area in 2004.

11. Mr. Hattan is well known as an outspoken anti-mining activist. I challenge the Karuks to find a business owner in Happy Camp who has not suffered heavy losses from the suction dredging moratorium!

12. The Karuks continue to push their notion that suction dredging, for the most part, is nothing more than any other type of recreational activity. This demonstrates a perpetual

misunderstanding or disagreement with the federal mining law – which allows free access for all Americans to search the public lands for valuable gold deposits. The law also triggers a real ownership interest in the event that a valuable deposit is found.

13. Just the possibility of finding real gold makes the activity of prospecting enjoyable and exciting. This is especially true with beginners. Because of this, it is not unusual for those who are uninformed to assume prospecting is just another form of recreation. But I can say with authority, from 30 years of managing America's most active gold mining association, that once a valuable discovery is made, the program becomes deadly serious. This is at least half the reason why The New 49'ers employ a very active Internal Affairs staff.

14. America's mining law does not disqualify a prospector if he is enjoying the activity. The law even goes so far as to guarantee a property right to every member of the Karuk Tribe, to Ms. Saxton, or any anti-mining activist who might stumble upon a valuable gold deposit while taking a walk or swim on the public lands, even if prospecting is the last thing on their minds.

Alternative Mining Methods.

15. Ms. Saxton's Declaration goes to great lengths to prove that gold can still be found on the riverbanks by making references to stories which I have published on our web site about our weekend group outings. It's true that there is some gold to be found along the banks of most gold-bearing waterways in California. Since these very same areas were also accessible to previous generations of miners, for the most part, the gold we find there is either what was overlooked during earlier times, or small amounts that were washed there by more recent storm events. I can say with authority that it is a very rare exception when a pick & shovel mining program can recover enough gold to sustain the most basic poverty-level livelihood.

16. These weekend projects which The New 49'ers sponsor are primarily to help beginners off to a good start on their learning curve. Many or most find their first gold on our projects. This is quite exciting for them. And once again, because of the enjoyment people

experience on our weekend projects, Ms. Saxton mistakes gold prospecting as a recreational activity, "You see? Dave has demonstrated that people can have just as much fun sluicing and panning up on the bank!" But if you follow these stories to the end, while everyone goes away with some gold, nobody ever goes away with enough gold to justify the hard labor as a money-making proposition.

17. To make a living at commercial gold mining, as many suction dredgers did before 2009, you have to look for and develop the high-grade gold deposits where they are located. For small-scale gold miners, this nearly always requires gaining access to where the earlier generations of miners were not able to reach. This means the bottom of the waterways, especially the larger and deeper waterways, or even smaller waterways where terrain conditions did not allow the waterway to be diverted.

18. From 30 years of experience in overseeing thousands of suction dredgers over the many years, I can say with authority that most of the deeper and faster parts of the Klamath River are covered with original streambed that has never been mined. This is where the important discoveries are made that trigger a property right. My own best day dredging on the Klamath River was 24 ounces of gold.

19. In sum, while it is true that some people can enjoy themselves early on the learning curve by recovering pieces of gold that still exist alongside California's waterways, nearly all of the commercial-grade deposits exist out in the deeper water where only a suction dredge can be used to discover and develop them. The prohibition on suction dredging is in substance a ban on mining the remaining commercially valuable placer gold deposits.

The Harm of DFW Criminal Enforcement.

20. DFW makes the point in its Opposition brief that we have presented evidence that only a small number of suction dredgers have been criminally cited, arrested or have had their mining gear seized, suggesting that it is only a very small number of people who want to suction dredge. Therefore, they argue that the existing situation does not justify injunction relief by this

court. DFW is in a position to know the actual number of enforcement actions, which is almost certainly far higher.

21. Since this Court has granted ex parte relief concerning a civil remedy available for suction dredgers in Siskiyou County, DFW has stepped up its ongoing harassment of suction dredgers. They are seizing all of the suction dredging equipment they can find on the river, sometimes without even writing a criminal citation. They have executed at least one criminal search warrant to take the dredging equipment out of someone's back yard, without even issuing a criminal citation!

22. I personally was present in the Siskiyou County Courthouse on June 9th when the judge pro tem informed Steve Jones and Dyton Gilliland that even though they had been arrested by DFW wardens, with tens of thousands of dollars of their equipment taken from them, that until the State filed a case against them, there was nothing that the court could do. The judge pro tem also informed these two hard-working men that the State has up to a full year to file a misdemeanor case, which he believed they were unlikely to do. Yes; he actually said that! "Meanwhile," the Judge pro tem said, "you guys are in a state of limbo."

23. This situation allows DFW a very unreasonable opportunity to impose irreparable harm upon suction dredgers with no due process whatsoever. The situation creates a chilling effect upon other dredgers who would like to get started in view of this court's Ruling and Order.

24. Most suction dredgers, especially those who belong to our Association, are normal everyday people who work hard for a living just to make ends meet. They own homes and cars and have families to support. Some have children they hope to put through college one day. Many of our members are on a retirement income.

25. The average American cannot afford to be in criminal trouble! Criminal trouble under their circumstances would most certainly create irreparable harm. Nowadays it is difficult to get or keep many types of jobs if you have any criminal record at all.

26. My staff and I receive phone calls and emails every day from frustrated members who have already lost the beginning of the 2015 season, along with perspective members who are waiting in the wings for this court to issue an Order instructing DFW to stop misusing the criminal process to punish gold dredgers.

Cultural Resources.

27. Mr. Hillman's Declaration could be read to express concerns about the possibility of suction dredgers excavating human remains and/or cultural artifacts from the bottom of active waterways, particularly along the Klamath and Salmon Rivers.

28. All of our mining and prospecting activities take place within the high-water line of the active rivers and creeks. This is within the active flood zone where hundreds of years of storm events have scoured the river bottom time and time again. Hundred-year storm events occur from time to time which nearly clear all of the streambed from the bottom of waterways, only to deposit new streambed as the storms taper off. I know this to be true, because through thousands of hours of dredging time, I have learned to recognize the different streambed layers which were formed by different storm events.

29. I can generally recognize the time period within the streambed when American miners and settlers arrived, because those flood layers contain a concentration of manmade iron, lead and other objects. Out in the center of the Klamath River, those particular layers rest upon ancient streambed that has perhaps been in place for many thousands of years. The richest gold deposits are found in these extremely old streambed deposits.

30. It is my expert opinion that if any nonmetallic historical, cultural objects or human remains ever ended up within the active river systems, they would in most cases be washed away by flood events. Indeed, there has never been a single time during my 30 years of managing The New 49'ers that any member has reported finding a single native American artifact or the remains of a human being while suction dredging.

31. I am personally sympathetic to more general concerns about spiritual and cultural values of the Karuk and other Tribes. This was the reason why myself and others within New 49'er management went to extraordinary lengths during 2003 and 2004 to cooperate with Mr. Hillman, other Tribal leaders and the U.S. Forest Service to identify every sensitive cultural area, and every fishery concern which our program could possibly impact in a negative way. Mr. Hillman does not deny that we have honored those agreements to the present time.

32. The U.S. Forest Service publishes the dates and locations of all scheduled Karuk ceremonies at the beginning of every summer season. In turn, our Internal Affairs staff work in concert with the U.S. Forest Service to persuade our members and other prospectors not to pursue gold prospecting activities in those areas and during those time periods. In addition, we have withdrawn completely from all of the mining properties we controlled during 2004 which were located in the culturally sensitive areas identified by the Tribe. Mr. Hillman notes ceremonies that he says occur "at various locations along the Klamath and Salmon Rivers." While I am not familiar with all of the ceremonies he mentions, I do know that the annual World Renewal Ceremony, which I was very honored to attend during 2003, occurs in Somes Bar, approximately twenty-five miles below our most downstream mining claim.

33. The Karuks have more recently redrawn their Cultural Management Area map to overlay some of our most productive mining properties, properties which they expressed no interest in during 2004, and where they do not perform any spiritual ceremonies which any of us have ever observed. Mr. Hillman and other tribal leaders are now objecting to our presence in areas which we have been actively prospecting for 30 years without any previous objections from the Tribe.

34. While we strive to be careful to not interfere with the true cultural values of the tribe, and attempt to prevent our members from disturbing religious ceremonies, we are not the only non-Tribal members present in the area. There are numerous rafting companies which float

the river, motorcycle and bicycle groups that cruise the river road and independent campers and other recreationalists that frequent the area.

35. Because Mr. Hillman provides no specific testimony concerning any adverse encounters with non-Tribal members, it is entirely possible that he or others are mistaking someone else as a gold prospector when he says there have been violent encounters. Mr. Hillman and I made a firm agreement in 1994 that we would not allow our conflicts to reach the level of violence. To my knowledge, this agreement has not been broken on either side.

36. If there was any violence between The New 49'er members and local tribal members, I am positive I would have heard about it from our very active Internal Affairs staff. I have heard of no such events.

37. "Cultural Management Areas" do not eliminate the property interests which private land owners possess, or where prospectors have located an important mineral discovery. During our cooperative period in 2003, in good faith, I personally made an offer to acquire, at my own expense, the mining rights for each of the important cultural areas of the Karuk Tribe, and either turn the rights over to them or hold them in trust so that mining would not interfere with their historical and spiritual values. The leaders of the Karuk Tribe gracefully rejected my offer.

The Breadth of the Injunction Sought.

38. DFW resists the idea that it should be limited to enforcing mining regulations set forth in the 1994 regulations on the theory that such an injunction would be overbroad and that the 1994 regulations are not adequately protective. I think it would be useful for the Court to understand how those regulations were developed. I was intimately involved in a long and contentious process during 1993 and 1994 wherein DFW sought to conduct a prior EIR and enact regulations.

39. Indeed, DFW was required to prepare three separate environmental impact reports (EIRs) to consider the effects of suction dredging during 1993 and 1994, because Governor Pete

Wilson fully rejected the first two attempts as outcome-based documents. By that, I mean to say that DFW had predetermined the outcome even before they began the process, and abused the process only to support the outcome which they desired. The first EIR produced an outcome where the preferred alternative was to end suction dredging altogether in California – which was the objective, and remains the objective, of our opponents and elements within DFW. The second EIR resulted in a predetermined outcome which restricted suction dredging so severely, that the proposed regulations would have eliminated all or most of the commercial underwater mining potential in California, very similar to the regulations adopted in 2012.

40. During the first two attempted EIR's in 1993 and 1994, the DFW officials who were in charge of the process completely ignored all or most of the comments and concerns expressed by California's small-scale mining industry. For the most part, they only gave weight to the comments and concerns which were expressed by anti-mining activists. From my perspective, DFW was pursuing a sort of predetermined outcome in the very same manner as in the 2012 process.

41. It was only during the third EIR process in 1994 that DFW finally changed its direction, listened to the comments and concerns voiced by the mining community, and made a good faith effort to balance environmental concerns with the concerns of our industry, and produced a more balanced regulatory result which mitigated genuine environmental concerns while allowing our industry, in most cases, to survive and flourish. That process evolved into the 1994 regulations which served the State and our industry all the way until 2009 when the unlawful Moratorium was imposed.

42. DFW's complaints about the 1994 regulations should be viewed in light of this history, the history of these coordinated cases (involving, among other things, a secretly-negotiated consent decree with the Karuk Tribe to severely restrict our suction dredging regulations), DFW's failure to abide by the consent decree, triggering an injunction, and the legislative efforts involving DFW and the Tribe. Simply put, DFW and the Tribe will never be

satisfied with any regulations which are not unreasonably prohibitory in character, based on their longstanding opposition to suction dredge and other small-scale mining.

43. The more recently proposed legislation by the Water Quality Board seeks, once again, to dramatically change and expand the definition of "suction dredge," now to also include hand sluicing up on the stream bank if the sluice is fed water by a motorized pump. Said another way, a motorized pump can be used to fill a water truck, for agriculture, for fire-fighting or nearly any other purpose; but if a pump is used to supply water to a sluice box that supports a pick and shovel gold mining program, the State of California would classify it as a "suction dredge" subject to all the prohibitions the State is able to impose.

44. In short, DFW and the Tribe have an overriding desire to put an end to small-scale mining in California, which colors their views as to what might constitute a reasonable injunction in this matter. We had hopes, based on the settlement process, that DFW and the Tribe might work to craft reasonable injunctive provisions, but it now seems clear that they do not accept any operation of federal mining law on federal lands and will say or do anything necessary to destroy our industry, without regard to objective environmental facts.

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

Executed on June 16, 2015.

Dave McCracken

David McCracken

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On June 17, 2015, I caused the following document to be served:

REPLY DECLARATION OF DAVID MCCRACKEN IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
(Civil Case Coordination)
455 Golden Gate Avenue
San Francisco, CA 94102
Via U.S. Mail

Bradley Solomon
Deputy Attorney General
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San Francisco, CA 94102-7004
E-mail: Bradley.Solomon@doj.ca.gov
Via E-mail & U.S. Mail

David Young, Esq.
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Los Angeles, CA 90064
E-mail: dyounglaw@verizon.net
Via E-mail & U.S. Mail

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Department of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814
E-mail: jmattox@dfg.ca.gov
Via E-mail & U.S. Mail

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Keith Robert Walker
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Via U.S. Mail

Carole Caldwell
Declarant

LAW OFFICES OF DAVID YOUNG
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Los Angeles, CA 90064
Telephone: (310) 575-0308
Facsimile: (310) 575-0311
Email: dyounglaw@verizon.net

Attorney for Kimble and PLP Plaintiffs/Petitioners

JAMES L. BUCHAL, SBN 258128
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3425 SE Yamhill Street, Suite 100
Portland, OR 97214
Telephone: (503) 227-1011
Facsimile: (503) 573-1939

Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **DECLARATION OF THOM SEAL IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49er's, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

I, Thom Seal, declare:

1. I am a professor in the Mining and Metallurgical Engineering Department at the University of Nevada. I have a Ph.D in Mining and Metallurgical Engineering, and am a Registered Professional Engineer and a Mineral "Qualified Person". A copy of my curriculum vitae is attached hereto as Exhibit 1.

2. I am familiar with the environmental issues opponents have raised with regard to suction dredge mining, and served as a member of a task force in Oregon appointed to advise the Governor concerning proposed legislation on the subject.

3. I make this Declaration in support of the motion by suction dredge mining interests for an injunction to bar the California Department of Fish and Wildlife from prohibiting suction dredging on federal lands where operators comply with the California regulations prevailing in 2009 when the Department stopped issuing permits.

4. In my opinion, such an injunction will have no appreciable adverse environmental effects.

5. With respect to the issue of mercury that may be released if suction dredge operators encounter mercury in California rivers and streams, suction dredges efficiently collect approximately 98% of the mercury they encounter. This is an obvious benefit to the environment notwithstanding the remaining 2% that may fall back into the water.

6. The Department's refusal to issue permits since 2009 has the potential to provide a useful experiment to determine whether the release of that 2% has any measurable impact on mercury levels prevailing in the streams where suction dredgers operate.

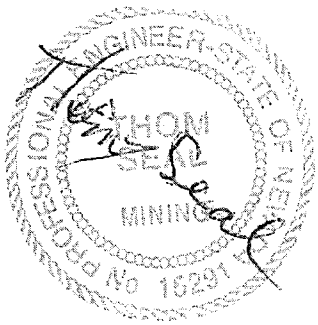
7. I attempted to collect data concerning for periodic water sampling for mercury (Hg) data from 2005-2010+ on the Yuba, Feather and/or Feather River where there are known issues with respect to isolated pockets of mercury left behind by hydraulic miners long ago. Oddly, it seemed as if much of the effort to gather data in these areas ceased when the Department stopped issuing suction dredge mining permits.

8. I was able to obtain some measurements from the input waters for the Nimbus Fish Hatchery on the American River near Folsum, California. The highest mercury reading was

less than 1/100th of the mercury levels required under drinking water standards (US-EPA), and the very limited data available did not demonstrate any relationship between mercury levels and the general cessation of suction dredge mining activity.

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

Executed on May 18, 2015.



Thom Seal

Thom Seal, Ph.D, P.E.

SME
Society for Mining, Metallurgy & Exploration
Dr. Thom J. Seal
SME Registered Member No. 2888660
Signature Thom Seal
Date Signed 5/19/15
Expiration date 12/31/15

Thom Seal, PhD, PE
Mining Engineering/MS 173
University of Nevada, Reno
Reno, Nevada 89557
tseal@unr.edu (775) 682-8813

Education:

University of Idaho,
Moscow, Idaho, 2004, Ph.D. in Mining and Metallurgical Engineering
Dissertation: *Enhanced Gold Extraction in Cyanide Heap Leaching Using Hydro-Jex Technology*

University of Idaho
Moscow, Idaho, 1988, M.S. in Metallurgical Engineering
Thesis: *The Extraction of Silver Using Thiourea, a Rotating Disk Study*

Oregon State University
Corvallis, Oregon, 1975, B.S. in General Science Major: Environmental Chemistry

Academic Experience:

2012 – Present	Founding Director for the Institute of Mineral Resource Studies, UNR
2010 – Present	Barrick Gold Corp. Professor, Mining Engineering Dept., University of Nevada, Reno, Nevada
2009 – 2010	Newmont Associate Professor, Mining Engineering Dept., University of Nevada, Reno, Nevada
2003 – 2005	Chair of Land Survey Advisory Committee at Great Basin College, Elko Nevada
1996 - 1998	Adjunct professor at Great Basin College, Elko Nevada

Non-academic Experience:

1980 – Present	Principal Engineer and President of Differential Engineering Inc. a Nevada and Oregon corporation, Spring Creek, NV.
2009 – Present	Chief Operating and Technology Officer for Metal Recovery Solutions, Inc. a Nevada corporation, Spring Creek, NV.
2008 – 2009	Chief Technology Officer for Everclear Solutions, Inc. a California corporation, Emeryville, CA.
1995 – 2008	Manager of Metallurgical Technology and Senior Metallurgist for Newmont Mining Corp, Carlin NV.
1994 – 1995	Chief Metallurgical Engineer for Kinross Gold Corp. at the DeLamar Silver Min outside Jordan Valley, OR.
1987 – 1987	Summer Intern Metallurgical Engineer for Asamera Minerals Inc. of Wenatchee, WA.
1977 – 1983	Journeyman Carpenter and Millwright for Local 555 Portland and 6415 Corvallis, OR on various jobs.

Current Memberships:

- Nevada Mining Association (Member since 2010)
- Northern Nevada Chapter of SME (Member since 2009)
- SME National Association (Member since 1986, Registered Member since 2006)
- SME Professional Engineering Committee (Member since 2006)
- SME Foundation Trustee (Board Member since 2012)

EXHIBIT 1
PAGE 1 OF 2

- Eastern Oregon Mining Association (Member since 1978, Past Vice President and current Board Member)
- Professional Engineer in Mining – Mineral Processing, Nevada #15921, since 2002

Honors and Awards:

- 13 year Service Award from Newmont Mining Corp.

Service Activities:

- Professional Engineering Committee, Foundation Trustee for SME
- Evaluate and comment on Federal EA & EIS for mining in the western USA.
- Oregon Governor's task force on small mining - 2014
- Curriculum Initiation Committee for Reintroduction of BS and MS in Metallurgical Engineering at UNR

List of Relevant Publications and Presentations:

1. In-Progress: Reduction of Hg(II) in Au Elution at Elevated Temperatures
2. In-Progress: Investigation of Mercury Reduction in Gold Stripping Process at Elevated Temperatures, Irawan Pramudya MS Thesis, **T. Seal** Thesis Advisor
3. Fuerstenau, M., Zhong, K., Misra, M., **Seal, T.**, and Nesbitt, C., "Minimizing Mercury Pollution during Gold Ore Processing" SME Annual Meeting and Exhibit 2011
4. **Seal, T.**, "Operational techniques to recover metal values from heap inventory and in situ chemical alteration prior to closure" First International Heap Leach Conference, Vancouver, Canada, Sept. 22-25, 2013.
5. **Seal, T.**, Rucker, D.F, and Winterton, J. "Enhancing Gold Recovery using Hydro-Jex© at Cripple Creek and Victor Gold Mine Co." Advanced Separation Processes, Symposium Honoring Dr. Roe-Hoan Yoon, SME Annual Meeting and Exhibit 2011
6. **Seal, T.**, Winterton, J., and Rucker, D.F., 2011. "Hydro-Jex© operations at the AngloGold Ashanti's Cripple Creek and Victor Gold Mine" SME Annual Meeting and Exhibit 2011.
7. **Seal, T.**, Fink, J., "Integrating Hydro-Fracturing Technology and Geophysics into 3-D mapping and Extraction of Metals in Heap Leaching; Hydro-Jex© and High Resolution Resistivity" SME Annual Meeting and Exhibit 2008, paper number 08-01
8. Brierley, J., Logan, T., **Seal, T.**, "Whole-Ore Heap Biooxidation of Sulfidic Gold-Bearing Ores", Chapter 6, pages 113-137. Biomining, Springer Press 2007

Professional Development Activities:

- **Research and development of technology to mitigate mercury's release into the food chain.**
- **Research, development and improvement of the Hydro-Jex technology for extraction of inventory metals from heap leach operations. Inventor of patent-pending technology.**
- **Research and development of technology to mitigate acid rock drainage and improve heap, dump and waste rock facility reclamation and closure.**
- **Support the US mining industry in developing processes for metals recovery and sale.**

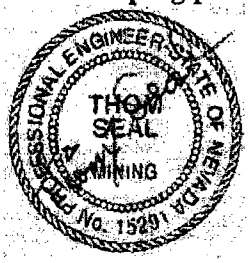


EXHIBIT 1

PAGE 2 OF 2

PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On May 18, 2015, I caused the following document to be served:

DECLARATION OF THOM SEAL IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

Honorable Gilbert Ochoa
Superior Court of California
County of San Bernardino
San Bernardino Justice Center
247 West 3rd Street
San Bernardino, CA 92415-0210
Via U.S. Mail

Chair, Judicial Council of California
Administrative Office of the Courts
Attn: Court Programs and Services Division
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Via U.S. Mail

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Southwest Regional Office
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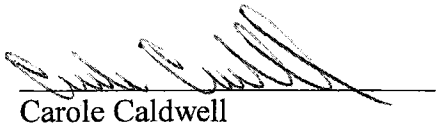
E-mail: lynne@saxtonlegal.com
Via E-mail

Keith Robert Walker
9646 Mormon Creek Road
Sonora, CA 95370
Via U.S. Mail



Carole Caldwell
Declarant

LAW OFFICES OF DAVID YOUNG
David Young, SBN 55341
11845 W. Olympic Boulevard, Suite 1110
Los Angeles, CA 90064
Telephone: (310) 575-0308
Facsimile: (310) 575-0311
Email: dyounglaw@verizon.net

Attorney for Kimble and PLP Plaintiffs/Petitioners

JAMES L. BUCHAL, SBN 258128
MURPHY & BUCHAL LLP
3425 SE Yamhill Street, Suite 100
Portland, OR 97214
Telephone: (503) 227-1011
Facsimile: (503) 573-1939

Attorney for Plaintiffs The New 49'ers Inc. et al.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

Coordination Proceeding Special Title (Rule 1550(b) **SUCTION DREDGE MINING CASES**	Judicial Council Proceeding No. JCPDS 4720 **REPLY DECLARATION OF THOM SEAL IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS** Judge: Hon. Gilbert G. Ochoa Dept.: S36 Date: June 23, 2015 Time: 8:30 a.m.
Related Actions: *Karuk Tribe of California, et al. v. California Department of Fish and Game* *Hillman, et al. v. California Department of Fish and Game*	 RG 05211597 – Alameda County RG 09434444 – Alameda County

Karuk Tribe of California, et al. v. California Department of Fish and Game	RG 1263796 – Alameda County
Kimble, et al. v. Kamala Harris, Attorney General of California, et al.	CIVDS 1012922 – San Bernardino County
Public Lands for the People, et al. v. California Department of Fish & Game, et al.	CIVDS 1203849 – San Bernardino County
The New 49'ers, et al. v. State of California; California Department of Fish and Game, et al.	SCCVCV 120048 – Siskiyou County
Foley, et al. v. State of California; California Department of Fish and Wildlife, et al.	SCSCCV 13-00804 – Siskiyou County
Walker v. Harris, et al.	34-2013-80001439 – Sacramento County

I, Thom Seal, declare:

1. I am a professor in the Mining Engineering Department at the University of Nevada. I have a Ph.D in Mining and Metallurgical Engineering, and am a Registered Professional Engineer, NV.

2. I am familiar with the environmental issues opponents have raised with regard to suction dredge mining, and served as a member of a task force in Oregon appointed to advise the Governor concerning proposed legislation on the subject.

3. One of my research topics is mercury in mining. I was chair for the MS thesis this spring-15 titled: "Investigations of Mercury Reduction in Gold Stripping Processes at Elevated Temperatures." Also, I am a co-author of recent related publications on mercury: "Minimizing Mercury Pollution during Gold Ore Processing", SME 2011. There are several pending scientific articles on this mercury research here at UNR, in which I am the principal investigator.

4. I make this Declaration in support of the motion by suction dredge mining interests for an injunction to bar the California Department of Fish and Wildlife from prohibiting suction dredging on federal lands where operators comply with the California regulations prevailing in 2009 when the Department stopped issuing permits.

5. In my professional scientific opinion, such an injunction will have no appreciable adverse environmental effects.

6. Some facts on Mercury:

- Elemental Mercury is element 80 with symbol Hg^{o}.
- Elemental Mercury has a density of 13.534 so Hg is 13.5 times heavier than water.
- Mercury occurs in the average earth's crust at 80 ppb (parts per billion) = 80 ppm = 0.08 grams per metric ton = <u>160 pounds Hg per one million (US) tons of crust</u>.
- Mercury is slightly soluble in water at normal atmospheric temperatures (solubility of elemental Hg is 1.2×10^{-7} mol/kg at 273.15 K) so at $50^{o}F$ = 53 pounds Hg dissolve per million (US) tons of water, 240 million gallons water.

H. Lawerence et al, "The solubility of mercury and some sparing soluble mercury salts in water and aqueous Electrolyte Solutions"

http://www.nist.gov/data/PDFfiles/jpcrd274.pdf.

7. With respect to the issue of mercury that may be released if suction dredge operators encounter mercury in California rivers and streams, suction dredges efficiently collect approximately 98% of the mercury they encounter. A California Water Boards study in May 2005 "presented an opportunity to test the notion that recreational gold miners effectively clean up mercury hotspots while suction dredging for gold." "Along with gold, recreational dredgers recover iron (nails bolts, etc.), lead (fishing weights, buckshot, and spent bullets) and mercury (elemental mercury, mercury/gold amalgam, and mercury stained gold)." "This report documents the results of a suction dredge test that was completed in September 2003 by State Water Board, USFS, and DFG staff." "When mercury droplets touch, they fuse into much large droplets (up to 25 millimeters)". "High runoff coincides with winter storms, and these flows have ranged to 80,000 cfs (ft^3/sec) as recently as 1997." And "post dredge test inspections also showed that mercury had re-deposited on bedrock that had been dredged clean. Higher controlled flows may be moving sediment and mercury". "Mercury may concentrate at the hotspot because after it is carried over the bedrock hump during high flows, it encounters a low flow velocity zone on the downstream side of the bedrock hump. The river current on the downstream side lacks the power to move mercury anymore (except during extreme high winter events) so it drops out on bedrock on the downstream side." In conclusion: "A suction dredge set up to recover gold recovered liquid mercury from the mercury hotspot. The dredge recovered about 98 percent of the mercury in a test sediment sample enriched in mercury." This mercury recovery from the dredge included minus 30 mesh passing size mercury droplets and the "sediment retained a substantial amount of liquid mercury as small (e.g., 1mm) and fine droplets of floured mercury".

Humphreys "Mercury Losses and Recovery During a Suction Dredge Test in the South Fork of the American River" California Water Boards, 2005:

http://westernminingalliance.org/wp-content/uploads/2014/01/Humphreys-2005-Water-Boards-Merc-Report-D-L-M.pdf

Observations from an EPA Alaska eight inch (8") dredge study found: "For the unfiltered samples, two metals, copper and zinc, showed distinct increases downstream of the dredge. Total copper increased approximately 5-fold and zinc approximately 9-fold at the transect immediately downstream of the dredge, relative to the concentrations measured upstream of the dredge. For both metals, the concentrations declined to near upstream values by 80 m downstream of the dredge. The pattern observed for total copper and zinc concentration is similar to that for turbidity, suggesting that the metals were in particulate form, or associated with other sediment particles." And "Values of dissolved mercury actually were greater upstream of the dredge".

Todd, et al, "Impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River and Resurrection Creek, Alaska", EPA, April, 1999: http://www.swrcb.ca.gov/water_issues/programs/peer_review/docs/dfg_suction_dredging/03_Ch4_2WQTOX_references_Feb2011/109_Royer_1999.pdf

Mercury has a density of 13.5 (g/ml) while copper has a density of 8.0 and zinc has a density of 7.1, so the settling velocity of mercury would be somewhat faster than copper and zinc with similar particles as found in the above Alaska 8" dredge study, "concentrations declined to near upstream values by 80 m downstream of the dredge". These physical facts clearly do not support claims that floured mercury travels downstream for great distances from the site where it was disturbed. Plus, "when mercury droplets touch, they fuse into much large droplets (up to 25 millimeters)". This is an obvious benefit to the environment notwithstanding the remaining 2% that may fall back into the water.

8. It is important to review the peer reviewed published science on the subject of mercury and have an understanding of the life cycle of mercury in streams. The following illustration (Figure 2 from Wood) is of a typical stream with bottom sediment, a column of water, and the air above. From the illustration, and the science, methylmercury, CH_3Hg^+ is only formed in the sediment. And according to J. M. Wood "the pH optimum for the synthesis of

methylmercury either under laboratory conditions or in natural sediments is 4.5", which is rather

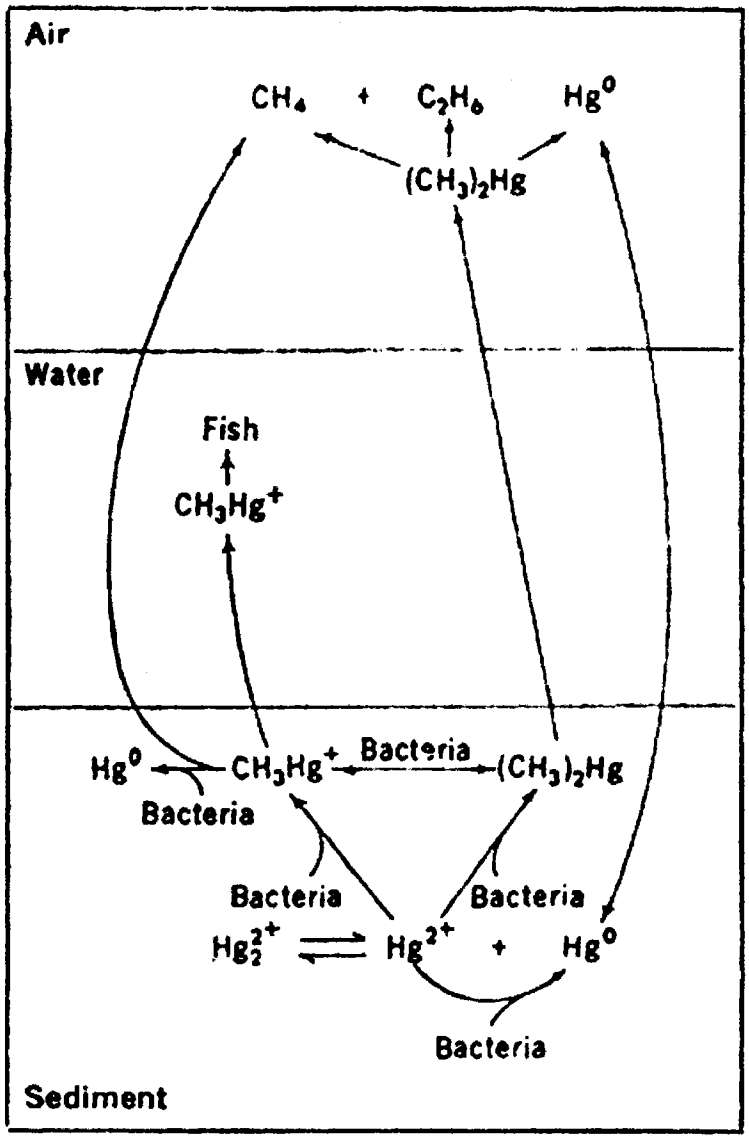


Fig. 2. The biological cycle for mercury.

low for most streams. In addition, "Other microorganisms can detoxify their environment of methylmercury by reducing it to Hg^0 (mercury metal) plus methane." Also, "the rate of synthesis of methylmercury depends on the concentration of available Hg^{2+}, the composition of the microbial population, the pH, the temperature, the redox potential, and the synergistic or antagonistic effects of other metabolic or chemical processes."

Science. J. M. Wood, "Biological Cycles for Toxic Elements in the Environment",1974 Mar 15;183(4129):1049-52

In a later article by M. J. Colombo, et al, "Anaerobic bacteria play a central role in the Hg biogeochemical cycle through their catalysis of Hg methylation."

Science Direct, M.J. Colombo, J. Ha, J. R. Reinfelder, T. Barkay and N. Yee, . J. M. Wood, "Anaerobic oxidation of Hg(0) and methylmercury formation by Desulfovibrio desulfuricans ND13", Geochimica et Cosmochimica Acta, Volume 112, 1 July 2013, Pages 166–17;

http://www.sciencedirect.com/science/article/pii/S0016703713001439

Thus, methylmercury only forms in sediments where there is a low pH (US-EPA drinking water standards are: 6.5 to 8.5) at pH of 4.5, which has 100 times the concentration of acid (H^+) ions than in safe drinking water and only in the presence of specific anaerobic bacteria (lack of oxygen, anoxic).

http://safewater.supportportal.com/link/portal/23002/23015/Article/22806/What-is-the-federal-standard-for-pH-in-drinking-water?_ga=1.52858920.1016067586.1429311656

In addition, in a January 2010, EPA reported that "since suction dredge mining creates turbidity in the stream it is likely this action increases oxygenation of the waters and therefore, methylation of inorganic mercury would be less likely to occur in these habitats."

"Biological Evaluation for Small Placer Miners in Idaho National Pollutant Discharge Elimination System (NPDES) General Permit";

http://www.epa.gov/region10/pdf/permits/npdes/id/idg370000_be_01_2010.pdf

9. I was able to obtain some measurements from the input waters for the Nimbus Fish Hatchery on the American River near Folsom, California. The highest mercury reading was less than 1/100th of the mercury levels required under drinking water standards (US-EPA), and the very limited data available did not demonstrate any relationship between mercury levels and the general cessation of suction dredge mining activity.

10. It is possible to engineer and modify the dredge design to improve Hg capture above the 98% recovery reported. I understand this activity is underway, but not completed with quantified measurable mercury recovery efficiencies reported at this time.

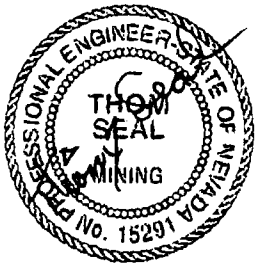
11. Upon reviewing the references provided by representatives of the Karuk Tribe and the Opposition, I do professionally question the references as actually being independent peer reviewed scientific literature and the use of extrapolated spiked mercury chemistry room temperature experiments to conclusions that the same chemistry occurs in mountain streams.

12. In conclusion, by removing the mercury from the streams by dredging, the amount of available mercury available to be methylated sometime in the future is reduced by 98%, benefiting the environment and mankind.

Executed on June 14, 2015.

Thom Seal, Ph.D., P.E., Q.P.

Thom Seal, Ph.D, P.E.



PROOF OF SERVICE

I, Carole Caldwell, hereby declare under penalty of perjury under the laws of the State of California that the following facts are true and correct:

I am a citizen of the United States, over the age of 18 years, and not a party to or interested in the within entitled cause. I am an employee of Murphy & Buchal, LLP and my business address is 3425 SE Yamhill Street, Suite 100, Portland, Oregon 97214.

On June 17, 2015, I caused the following document to be served:

REPLY DECLARATION OF THOM SEAL IN SUPPORT OF MINERS' JOINT MOTION FOR INJUNCTION AGAINST DEFENDANTS

by transmitting a true copy in the following manner on the parties listed below:

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Superior Court of California
County of San Bernardino
San Bernardino Justice Center
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San Bernardino, CA 92415-0210
Via U.S. Mail

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Administrative Office of the Courts
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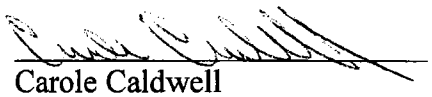

Carole Caldwell
Declarant

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
WARREN T. HANNUM, Director

DIVISION OF MINES
Ferry Building, San Francisco

W. BURLING TUCKER — State Mineralogist

San Francisco] — Bulletin 135 — [October 1946

PLACER MINING FOR GOLD IN CALIFORNIA

By

CHARLES VOLNEY AVERILL

7

Contributing Authors

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It is obvious to those versed in gold mining that the facts are greatly exaggerated in these stories. To the hard-pressed unemployed, however, these accounts sounded like the answer to their need. How could they know that for every one who made a strike in placer mining, tens of thousands would find little or nothing, that not more than a few score at most could possibly expect to develop a profitable lode mine, and that large amounts of capital would be required for most of these mines? The experience of the thousands who are unsuccessful in placering does not make news; the story of the man here and there who is lucky does. Most of the accounts were stories of success, stories which were news but which were misleading to the unemployed.

Number of Small-Scale Placer Miners

Many thousands of unemployed and their families joined in the gold rush that followed the spread of such success stories. Creeks that later had only one or two placer miners per mile sometimes harbored 100 men or more per mile searching for precious metal in 1932-33. Of course no count was ever made of those who flocked to the gold-bearing streams, but 100,000 would seem a conservative estimate for 1932 and 1933. The number probably did not drop much until after 1933, for new men kept coming in considerable numbers until 1934. They came from greater and greater distances as the stories spread eastward, and they came rapidly enough to replace the disillusioned families which were leaving. If there was only one turnover from 1932 through 1933, it would mean that 200,000 men tried their hand at placering, and that there was one would-be miner for every 10 men who were at least 21 years of age in California in 1930.

The 12,422 small-scale miners recorded by the United States Mint as selling gold in California in 1937 sold metal valued at only $542,186, compared with gold worth $1,033,093 sold by 19,463 miners in 1935. It might be pointed out also that the greatest productivity was not reached until 1936, after the crowds had left and when those who knew the business were able to work unhindered by scores of would-be placer miners.

Summary of Findings

Small-scale placer mining has certain advantages for the able-bodied unemployed. It provides a meager income to a few without requiring much in the way of training or capital. It enables them to work at any time without going through the sometimes hopeless process of finding an employer. And, in addition, mining has given many who took it up seriously a new sense of self-reliance, of independence, and of initiative. Such results have had a salutary psychological effect on many unemployed during hard times.

To a few who have mined only intermittently and who have relied on the creeks to augment their incomes from other sources rather than to provide them with a living, placering has proved particularly helpful. It has enabled many men, together with their families, to have some occupation between jobs, and it has contributed more to the welfare of these individuals than the small financial returns might suggest. And to a very small proportion of the few who have stuck to the creeks fairly steadily, placer mining has proved profitable.

To some who dislike discipline and authority, placer mining has proved preferable to other ways of making a living. There are men who

Value of gold produced in California, 1848 to 1933[a]

Period	Placer							Total lode	Total placer and lode value
	Surface placers					Under-ground placers drift	Total placer		
	Dredging (bucket-line)	Dredging (suction)	Non-flowing[b] auriferous placers	Hydraulic	Small-scale wet	Hand method drift			
1848-1858							$51,000,767		$51,000,767
1859-1879							581,561,868	$5,874,392	587,436,260
1880-1899							211,388,439	23,487,604	234,876,043
1900	$4[illegible]						120,910,077	51,828,604	172,738,681
1901-1910	[illegible]						37,841,328	113,683,986	151,525,314
1911-1920	76,896,535			3,939,534	1,383,844	2,538,075	29,416,(e)9	117,664,105	147,080,095
1901	[illegible]			$1,608,220	$719,07[illegible]		$1,061,459	3,951,045	16,989,044
1902	[illegible]			1,250,222	1,234,554		865,161	4,247,602	12,862,718
1903	1,475,748			872,812	748,521		905,679	4,052,741	16,910,329
1904	2,187,[illegible]			1,078,198	536,113		923,954	4,985,296	12,648,296
1905	3,276,141			976,140	525,558		815,240	5,992,076	13,906,469
1906	5,0[illegible],359			1,054,172	617,577		605,517	7,375,925	11,356,527
1907	5,6[illegible],837			909,011	302,464		563,393	6,840,695	9,887,233
1908	6,5[illegible],159			743,787	580,656		290,545	8,251,187	10,536,372
1909	7,382,959			605,568	376,078		739,707	9,104,432	11,133,437
1910	7,550,254			635,498	186,114		516,929	8,888,795	10,826,645
1901-1910	39,911,544			9,779,103	6,457,112		7,421,994	63,569,813	118,337,674
1911	7,666,466			675,486	164,689		479,960	6,986,527	10,752,381
1912	7,429,955			659,662	135,034		387,992	8,645,663	11,067,815
1913	8,090,204			329,300	224,045		192,838	8,836,177	11,570,751
1914	7,743,394			702,864	264,623		329,948	9,080,849	11,572,647
1915	7,796,468			420,770	118,427		272,955	8,609,617	13,833,679
1916	7,769,227			390,015	165,118		251,297	8,575,657	22,442,296
1917	8,313,327			267,103	126,641		166,750	9,074,030	21,410,741
1918	7,421,927			213,229	85,203		109,420	11,013,474	20,087,504
1919	7,716,910			184,822	45,864		85,341	7,838,779	8,690,174
1920	6,900,266			66,233	31,089		62,925	8,033,076	8,662,879
1911-1920	76,896,535			3,939,534	1,383,844	2,538,075	84,739,988	7,060,613	10,695,955
								2,250,430	14,311,043
								107,240,344	191,989,332

1921	7,756,787			162,806	107,818		127,411	8,154,824	7,549,998	15,704,822
to 1922	4,999,215			158,275	89,739		252,626	5,499,855	9,174,491	14,670,346
1923	6,065,735			111,828	160,249		184,771	6,522,583	6,856,430	13,379,013
1924	4,305,521			66,195	124,088		98,568	4,585,372	8,561,803	13,150,175
1925	4,750,842			175,345	103,434		99,323	5,098,144	7,999,186	13,065,330
1926	4,950,545			69,139	97,463		111,236	5,228,403	6,695,078	11,923,481
1927	5,461,929			120,632	112,923		141,929	5,837,313	5,833,705	11,671,018
1928	4,430,913			91,512	174,818		153,386	4,850,629	5,934,666	10,785,315
1929	3,849,259			56,732	136,948		84,668	3,570,607	4,956,096	8,526,703
1930	3,451,801			69,403	151,324		62,615	3,735,143	5,690,019	9,451,162
1921-1930	49,762,547			1,099,069	1,258,324		1,353,733	53,403,873	68,423,492	122,327,365
1931	3,619,353			62,556	227,636		111,199	4,020,746	6,793,416	10,814,162
1932	3,903,481			122,876	533,238		205,980	4,765,475	7,000,251	11,765,726
1933[10]	5,155,716	$1,924	$40,442	114,890	928,068	$5,737	434,036	6,680,843	9,002,232	15,683,075
1934[11]	6,772,380	121,138	203,810	324,397	1,694,919	6,426	454,094	9,577,168	15,554,116	25,131,284
1935[12]	8,274,130	776,701	416,240	476,809	1,545,153	4,494	599,893	12,093,410	19,071,640	31,165,050
1936	9,671,347	1,748,864	422,079	368,450	1,369,620	11,827	537,818	14,329,805	23,390,665	37,720,470
1937	11,303,635	3,294,970	597,765	161,900	896,429	17,010	258,930	16,530,710	24,579,520	41,110,230
1938	12,138,260	4,133,780	806,810	247,135	1,459,010	6,020	250,040	20,037,955	25,451,560	45,489,515
1939	12,959,240	6,038,165	1,489,290	212,065	1,358,525	5,915	228,375	22,261,575	27,972,665	50,234,240
1940	14,523,810	7,181,335	988,120	422,065	1,374,030	7,385	176,575	24,673,320	26,275,165	50,948,485
1931-1940	89,318,464	23,296,877	4,934,356	2,413,233	11,386,649	64,814	3,556,634	134,971,007	185,481,230	320,452,237
1941	14,639,870	7,875,665	1,004,605	355,075	1,086,645	7,700	160,895	25,130,455	24,177,300	49,307,755
1942	10,882,795	4,126,710	351,540	213,710	613,336	2,565	81,865	16,272,410	13,407,485	29,679,895
1943	2,344,985	498,960	104,895	60,305	89,760	140	33,950	3,129,975	2,091,605	5,191,490
1944	2,573,375	218,435	42,350	29,330	49,280	105	14,840	2,926,715	1,481,340	4,109,055
Grand totals	$286,457,203	$36,014,547	$6,437,746	$17,889,409	$22,304,049	$75,314	$15,091,986	$1,416,671,616	$833,608,031	$2,250,279,647

[a] Compiled by Henry H. Symons from publications of the U. S. Bureau of Mines.
[1] Estimated as 100 percent from placer mines.
[2] Estimated as 1 percent from gold-lode mines and 99 percent from placer mines.
[3] Estimated as 10 percent from gold-lode mines and 90 percent from placer mines.
[4] Estimated as 30 percent from gold-lode mines and 70 percent from placer mines.
[5] Estimated as 75 percent from gold-lode mines and 25 percent from placer mines.
[6] Dredge production first recorded in 1898, $18,887; 1899, $206,302; 1900, $200,929. See U. S. Geological Survey Mineral Resources, Pt. 1, 1914, p. 357, for table to date. Note previous tables gave no production for 1898.
[7] Estimated as 80 percent from gold-lode mines and 20 percent from placer mines.
[8] Estimated distribution from information in Annual Report of Director of Mint, 1901, p. 90.
[9] Estimated distribution from information in Annual Report of Director of Mint, 1902, p. 76.
[10] From U. S. Geological Survey tabulation sheets.
[11] Value calculated at an average weighted price of $25.56 a fine ounce; previously $20.6718.
[12] Value calculated at an average weighted price of $34.95 a fine ounce.
[13] Value calculated at $35 a fine ounce.
[14] Prior to 1933 was included with small-scale hand methods wet.

prefer to live on 25 cents a day which they themselves earn through placer mining rather than to work for wages or to accept public aid. Placer mining has enabled such men to live their own lives to some degree at least.

Another small group to whom small-scale placering has been helpful includes men with outside incomes or pensions. These men would have had nothing to do if they had lived in the cities, but they can work as hard or as easily as they will on the creeks. Knowing that their pensions will enable them to live, they work at their own convenience and at their own rate of speed on the placer gravels, adding a little to their income and taking advantage of the fact that living costs are lower on the creeks than in town. Placer mining has enabled many retired or pensioned persons to enjoy healthful work in moderation, to increase their small incomes, and to dream of making a rich strike some day.

Men who have shown that they can live within their means and build up their equipment out of an income of a dollar or two a day can sometimes secure backing for larger placer projects that require more capital and will return at least a living wage. Each year a few men demonstrate unusual ability to placer and to conserve their resources and are able to lease good bars and equipment. Only a very few succeed in this way, but they prove that it can be done.

All the men in these groups do not add up to 5 percent of the small-scale placer miners of the country. For 95 percent of those who try to depend on small-scale placer mining for a living, it has turned out to be a delusion and a snare, primarily because earnings are tragically low. The output per man-hour from hand methods of placering on the lean bars still available is too low to support life in modest comfort. Less than half of the men who try it find enough gold to hold them at the streams over a month, and half of those who stay over a month do not remain over 2 months. Even among the better full-time miners, half appear to net less than $7 per week. The result is that most miners follow placering only casually in the hope of having a "lucky break" or in an effort to earn an income to tide them over between other jobs.

Earnings from small-scale placer mining, which are too low to support individuals, are far too low to support a well-rounded family life. Even the more successful miners can make no provision for medical attention, good clothing, social life, reserves for emergencies, facilities for recreation, and other such needs. The small-scale placer miner's family lives at a bare subsistence level and from day to day. The uncertain nature of the work—owing to the fact that the gravels at any particular point may give out at any time and force the family to move—has the further disadvantage of discouraging provision for suitable or permanent dwellings and the making or purchasing of furniture or household equipment. This aspect of placering also makes it particularly difficult for children to be educated satisfactorily.

Children are given very limited educational facilities in the mountain counties at best. When they are reared in tents and shacks and are moved from creek to creek, they have access to poor schools only and cannot hope to receive an education equivalent to that given children of more settled families in the more populous sections. They are handicapped in many other ways. Diets are unbalanced, medical facilities hard to secure, and social contacts scarce.

Finally, families find conditions discouraging because the community life is so unsatisfactory. It is quite different from that of the original pioneers or even of farm families. Pioneers and farmers feel that they own the land and are developing it; they are the people who count; they are the community, and they are able to make a community life of their own even with very limited physical facilities. But the placer miners are temporary interlopers. They own no land and are not developing the area; they are living off, or at best, in the community, not as part of it, and they do not have the resources with which to make a life of their own nor with which to purchase an entree to the life of the community in which they are living. Family and social life are very circumscribed.

Not only was the life of the small-scale placer miner unsatisfactory, particularly if he had a family with him, but the future probably will bring a declining level. Small-scale placer mining in the United States provided fewer than 6,000 men with an average recovery above $3.50 per week gross for more than 1 month out of 12, and it supplied fewer than 350 men with that recovery for more than 6 months out of 12. Unless there is a sharp upward change in the price of gold, it probably will provide fewer and fewer men with even this much income and for shorter and shorter periods each year.

The reason for such unsatisfactory incomes may possibly be better understood when it is recalled that small-scale placer mining by hand methods is an attempt to extract a living from a parsimonious Nature by human muscle, with very little aid from tools. The only energy provided by other than human exertion is a little free water power and power drawn upon by about a third of the full-time miners who utilize gasoline engines to pump water. But even these miners, more fortunate than the rest, shovel gravel themselves.

Wherever human muscle, unaided by power equipment works against nature, it is an almost universal result that returns are very low unless the work requires great skill. This holds true for placer mining. If bars are exceedingly rich, as many of them were for a time in the late 1840's and 1850's, muscle power may extract returns for a time comparable with those won by skilled labor in urban centers. But when the bars are small, lean, and uncertain in their distribution and erratic in their content, as they are in most known auriferous areas available to small-scale miners in the United States today, hand labor expended on them generally cannot yield earnings comparable with wages.

Mechanized mining can still yield good returns in many areas, even on beds with a lower gold content per yard than those being worked by hand, because the gold content is certain, the yardage is extensive, and the amount handled per man-day with the aid of power machinery is many times the yardage one man can handle unaided by machinery. But even when beds are worked by power, they must be extensive and must give a constant yield to be profitable. If they yielded well one day, little the next, and nothing the third, as do many bars worked by hand, they could not be made to pay no matter how much machinery each man could put to work.

In view of the character of the work and its low returns, the question naturally arises as to why and how men adapt themselves to this

pioneer type of life and its exceedingly low earnings. The adaptation of those who stick to the work is not so difficult as it might appear, for the selective process quickly weeds out those who cannot adjust themselves readily and leaves those to whom the life does not seem strange and to whom it may even seem attractive. Men who cannot live on a steady diet of canned foods, flapjacks, and beans; who cannot repair their own equipment or fix the roof when it leaks; and who dislike solitude cannot long survive the life at the creeks.

Phrasing it differently, the probability that a miner will adapt himself to placer mining may vary directly with his self-sufficiency. If he can live alone, take care of his own needs, work without supervision, and live on a few cents a day, he may become a full-time, small-scale placer miner. Men to whom such a life appeals, or men to whom it is not unattractive, can adapt themselves to placer mining, and some of them thrive physically on it. But the proportion of workers in California, or even in the country, who can meet such qualifications is very small; so the number who can make a success of or even last at placer mining is very limited. Men who can fix the roof if it leaks, or build it from scratch if necessary, can readily be found; but not many men can both fix the roof and stand living alone under it after working alone all day. So the process of adapting themselves to the creeks is primarily one of selection; most of those who try it cannot adapt themselves, and leave.

Some idea of the difficulties facing a would-be miner entering gold-bearing terrain may be realized when it is recalled that many of the forty-niners failed on the creeks of California when gold was much more plentiful than it is now, and when it is further recalled that in the nearly 100 years during which gold has been actively mined, all the profitable areas have long since been patented or at least taken up as mining claims, or have been purchased for farming or other nonmineral purposes. Consequently, a miner who has been successful in locating a place that looks promising will ordinarily find that someone else has established ownership to it a long time before.

About half of the miners interviewed who gave information on this point (102 out of 201 miners) were working without making any effort to secure permission; 63 were working with permission; 24 owned the claims they were working (mostly claims that were so poor that others had passed them by, but that did yield something); six paid royalties of 10 to 20 percent; and two were supposed to pay royalties above fixed earnings. The rest worked under various sorts of agreements, such as acting as caretaker for property in return for the right to mine. Owners of rich bars of course will not freely permit unrestricted mining, but many private owners of low-grade gravel that will not pay wages make no objection to its being mined without royalties provided the operation does not become a nuisance.

The situation is sometimes different when the men attempt to work on the public domain, for it is the duty of Government officials to protect public property, and they have not been enthusiastic over the invasion of public lands by miners. The Forest Service, for instance, has a very useful policy of keeping a strip of land a quarter of a mile to half a mile wide, on either side of major scenic highways, in its primitive state. Its officials naturally object to the building of hovels

within this protected area, though they sympathize with the men and allow them to build half a mile back from the road. But this means that the miners must maintain their own drives to their shacks, which is a real hardship in muddy weather. The danger of forest fires is ever present, and the Forest Service also must be very careful that careless miners do not become a fire hazard. Game wardens may object to the presence of the small-scale placer miners, who sometimes muddy waters and hunt or fish without regard to game laws. The muddying of water used for irrigation purposes may also create difficulties at times. River pollution is another problem where miners work on streams whose waters are used by towns or cities, and restrictions imposed by sanitary districts sometimes add to the miners' difficulties. One of the first adjustments the miners must make, consequently, is that of accommodating themselves to property rights which deprive them of the chance to work the best bars which already are privately owned, and to laws and regulations which interfere with operations on the poorer bars on the public domain.

Those persons who insist on trying small-scale placer mining in spite of the above warnings will find methods described by Boericke.[2] Numerous practical suggestions by a man who states that he has personally made a living from small-scale placer mining over a period of years are contained in a recent book by Douglas.[3] Small-scale devices described below are suitable for sampling large gravel deposits to determine whether the gold-content is sufficient to justify working by machinery on a large scale. Descriptions of the pan, rocker, dip-box, and sluice-box are reprinted with minor changes and additions from an article by Symons.[4]

Pan, Rocker, Dip-Box, and Sluice-Box

The equipment and operations described herein are among the simplest, and have been used in California to recover gold from placers since the days of '49. They are used not only for gold, but any heavy materials may be separated from lighter ones in this way. They are adaptable for the separation of cassiterite (stream tin), tungsten ore, cinnabar, platinum metals, and gem stones.

Gold-Pan and Batea

The gold-pan is used in prospecting for gold, in cleaning gold-bearing concentrates, and in the hand-working of very rich deposits. It is a shallow pan which varies from 15 inches to 18 inches in diameter at the top, and from 2 inches to 2½ inches in depth, the sides having a slope of about 30°. It weighs from 2 to 3 pounds. It is made of a heavy-gauge steel with the rim turned back over a heavy wire to stiffen it. Where amalgamating is to be done in the pan, it is either made of copper or has a copper bottom. When used by a skilled operator, it has a capacity of from half a yard to 1 yard in 10 hours.

The object of panning is to concentrate the heavier materials by washing away the lighter. To do this most efficiently, all material

[2] Boericke, William F., Prospecting and operating small gold placers, 2d ed., New York, John Wiley & Sons, Inc., 1941.

[3] Douglas, Jack, Gold in placer: published by Jack Douglas, Box 21, Dutch Flat, California, 1944.

[4] Symons, Henry H., The pan, rocker, dip-box, and sluice-box: California Jour. Mines and Geology, vol. 30, pp. 126-135, 1934.

INTERNAL
MINERAL REPORT

MINERAL EXAMINATION OF THE
ORO GRANDE PLACER MINING CLAIM
KLAMATH NATIONAL FOREST
Portions of Sections 13 and 14, T.37N., R.10W., MDM.

By

LESTER LUBETKIN
Certified Mineral Examiner #5
North Zone, MAM

November 30, 1990

INTRODUCTION

This internal report is to document the findings of a mineral examination of the Oro Grande placer mining claim (PMC). The examination was conducted because a Plan of Operations was submitted for this claim, which is located within the Trinity Alps Wilderness. This report was prepared to describe and summarize the findings of the mineral examination of the Oro Grande PMC up to this date, and is not to be used for other purposes.

In order to conduct a mining operation in a designated wilderness, the presence of a valid existing right at the present and as of the date of wilderness designation must be confirmed. Forest Service policy and direction regarding mining activities on unpatented mining claims in Congressionally designated wilderness are provided in Forest Service Manual 2816.11. As mentioned, the Oro Grande PMC is located within the Trinity Alps Wilderness. This wilderness was designated by Act of Congress on September 28, 1984, and withdrawn from mineral entry as of that date, subject to valid existing rights.

I conducted a preliminary field visit to the Oro Grande PMC on September 20, 1989. I was accompanied by Ken McMaster during this site visit. Mr. McMaster is the claimant's representative and operator on the claim. I met with the claimant, Ms. Marion Fawl, on September 21, 1989, to discuss the purpose of the mineral examination and the mineral examination procedures. At that time I also requested detailed information to verify that a discovery exists on the claim, and that a discovery existed as of the date of withdrawal.

The field examination of the Oro Grande placer claim occured on June 26-28, 1990. I was accompanied and assisted during the examination by:

Jim Voss (North Zone Minerals Geologist)
Ken and Debbie McMaster, Operators, and claimant's representative

In addition, Mary Ann Garringer, Assistant Resource Officer, Salmon River RD, was present for a portion of the day on Tuesday, June 26.

During the mineral examination, the northeast and southwest claim corners were observed (photos 1 and 2), along with the west centerline monument (photo 3) and the discovery monument. Three suction dredge samples were collected, and the geology and mineral deposits within the claim were examined. Based on the sampling results and analysis of the data obtained during the mineral examination, it appears that the stream gravels currently being worked within the limits of the claim could be profitably mined using a suction dredge. Based on this conclusion, it appears reasonable to approve the Plan of Operations submitted for the Oro Grande PMC, provided the mitigation, reclamation and other requirements are adequately addressed.

LANDS INVOLVED AND RECORD DATA

The mining claim examined is the Oro Grande PMC (CAMC 29103). This claim is located in the SW1/4NW1/4 and NW1/4SW1/4 of Section 13, and in the NE1/4SE1/4 of Section 14, T.37N., R.10W., MDM (Map 1). According to Ms. Fawl, one of the current claimants of record, the claim was originally located in 1934, and was called the Golden Rule # 1 placer mining claim. Roy R. Latta, Ms. Fawl's father, was one of the original locators (I am not sure how many other locators there were). The claim was renamed to the Oro Grande placer mining claim in 1942. On July 3, 1950, the claim was relocated by Roy R. Latta (Vol. 77, Pg. 401, Mining Records of Siskiyou County), having the same description as the earlier Golden Rule and Oro Grande claims. This claim was identified as a 20 acre placer claim with only one locator. The claim was described in this relocation notice as being 600 feet wide and 1,500 feet long (which encompasses 20.66 acres); the description is not tied to any land survey corners or aliquot part description. The Oro Grande placer claim was again relocated on June 23, 1953, by Roy R. and Dorothy E. Latta (Vol. 80, Pg. 438, Mining Records of Siskiyou County; see Attachment 1). This relocation notice and date of relocation is the one recorded with the BLM under the FLPMA recordation requirements. This relocation was again identified as containing 20 acres, and included the same claim description as the 1950 relocation (which again encompasses 20.66 acres). The apparent purpose for this relocation was to add Dorothy E. Latta as another locator. Following Roy Latta's death, on May 17, 1965 Dorothy E. Latta granted her interest in the Oro Grande placer claim to Dorothy E. Latta, Marion L. Fawl and Johnnie E. Fawl (Joint Tenancy Deed; Vol. 516, Pg. 468, Official Records of Siskiyou County). Ownership transfered again to Dorothy Latta and Marion Fawl, following Johnnie Fawl's death on October 9, 1974. At this time, Marion Fawl and Dorothy Latta are the claimants of record with the BLM, even though Dorothy Latta is deceased since 1985 (Affidavit-Death of Joint Tenant, Official Records of Siskiyou County).

The claim was located on the ground with the aid of Ken McMaster. As mentioned, the northeast and southwest corners, the west centerline monument, and the discovery monument were observed. No monuments or markings were observed that would identify any land survey corners. Based on the topographic

Ken and Debbie McMaster and Jim Richmond mined limited portions of the Oro Grande PMC using a suction dredge in 1979 and 1980. The operators provided production information relating to their dredging from that time. This production data has been summarized in Table 1. Notices of Annual Assessment Work filed from 1969 up to 1988 state that work performed on the claim consisted primarily of sluicing, panning, prospecting and maintenance.

MINERAL DEPOSITS, SAMPLING DATA AND DEPOSIT VALUES

The only significant placer deposit observed within the limits of the Oro Grande PMC during the mineral examination was the alluvial gravels within the active stream channel of the South Fork Salmon River. As mentioned before, all of the terrace gravels have been extensively mined or prospected in the past for their gold content. There is a total of about 3,739 cubic yards of alluvium overlying the previously described bluish-green clay outwash deposit. Of this total volume, only about 2,416 cubic yards is considered capable of being mined, as shown in the following table:

CHANNEL UNIT[1]	TOTAL VOLUME	PERCENT DREDGABLE[2]	MINABLE VOLUME
I	1,336 CY	90%	1,202 CY
II	1,361 CY	70%	953 CY
III	1,042 CY	25%	261 CY
TOTAL	3,739 CY		2,416 CY

Only the very uppermost two to six inches of the bluish-green clayey gravel outwash deposit is included in the volume of minable gravels. The majority of this outwash deposit is too compact to permit efficient dredging. This deposit does appear to serve as a highly effective false bedrock, with some of the gold extending into the upper surface of the deposit (held in place by the highly plastic fines). Little gold was observed within the clayey unit, where sampling extended into this deposit.

Prior to the mineral examination, the McMasters collected nine samples from six separate sites (see Map 4), using their 5-inch single-sluice dredge. The

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1 Channel units are described previously in the GEOLOGY OF THE CLAIM section, and the limits of each of the channel units are shown on Map 4.

2 Percent dredgable is a measure of the percent of total stream gravels capable of being mined. The limitation on dredging the total volume is primarily due to the number, and location, of very large diameter boulders within the river channel. Channel unit I is 80 to 100 percent dredgable, with an average of 90 percent. Channel unit II is 60 to 80 percent dredgable, with an average of 70 percent. Channel unit III is 10 to 40 percent dredgable with an average of 25 percent.

Sample OG-3 was collected on June 28, 1990, from a site located in the western portion of the claim, within Channel Unit I (see Map 4). The sample area nearly spanned the river in this low gradient reach (Drawing 3), at the same location as the operator's sample site 2. The sample was collected by dredging for a total of two hours. The sample included roughly crescentic-shaped area of about 12 by 23 feet, with gravels ranging from 0.6 to 2 feet deep. The total volume of material dredged was approximately 10 cubic yards.

The deposit at this site was loose sandy gravel overlying outwash material, similar to that at sample sites OG-1 and OG-2. The outwash deposit was locally less compact than at the other sample sites, possibly due to more silt and less clay than at the other locations. The distinctive color, and occurrence of angular metavolcanic rocks and deeply weathered granitic rocks were similar to exposures in the other sample sites.

Photos 13 and 14 show the sample site before and after dredging. The sample represents the entire thickness of the alluvial gravel within the river channel in this area, along with what gold is recoverable from the upper surface of the underlying outwash deposit. 12,684.8 milligrams of gold were recovered from this sample, yielding a gross recovery of $81.57 per hour of dredging for a 5-inch dredge (Table 3).

The sampling results from samples OG-1, OG-2 and OG-3 indicate that the gross recovery from suction dredge mining the loose alluvial gravels ranges from $32.73 to $81.57 per hour of dredging for a 5-inch dredge. The average gross recovery from mining all of the available river gravels within the limits of the claim is $55.50 per hour of operation (Table 3). Table 4 shows that the gross recovery per hour of dredging from samples OG-2 and OG-3 are reasonably close to the gross recovery per hour of dredging determined from the operator's samples at sample sites 3 and 2, respectively. The average gross recovery per hour from samples OG-1, OG-2 and OG-3 is also reasonably consistent with the average gross recovery determined from the operator's samples at sites 1 through 6. The average gross recovery estimated from the production information provided by Ken McMaster is less than the average recovery from samples OG-1, OG-2 and OG-3, and less than the average recovery from McMaster's samples from sites 1 through 6 (Table 1).

MINING METHOD AND ECONOMIC EVALUATION

The only reasonable mining method available for working the alluvial gravels within the active river channel in the Oro Grande PMC would be the use of a small suction dredge, with an intake no larger than 6 inches. This is the mining method being employed by the operators, where a 5-inch suction dredge was being operated. This mining method appears to be economically viable, based on the sampling results, information provided by McMaster, and an economic analysis. Table 5 shows the calculations and assumptions used in estimating the mining costs for a suction dredging operation, using a 5-inch dredge, with one person mining full time. Operating costs are estimated to be $20.66 per hour, based on a reasonable wage rate of $12.00 per hour. Capital costs are estimated to be $7,000 including the move-in costs for equipment and supplies. The mine life is estimated to be 3 years to mine the 2,416 cubic yards of minable gravels in this deposit, at a production rate of 12 cubic yards per day and an operating season of 70 days per year. As seen in Table 3,

the gross recovery per hour of dredging is $55.50. Based on these values, this operation would result in an estimated net profit of $17,970 (Table 5).

Because the claim is located within a Federally designated wilderness, an analysis of whether a discovery existed as of the date of withdrawal from mineral entry (September 28, 1984) is necessary. The average price of gold in 1984 was $360 per troy ounce; the average price of gold for the month of September 1984 was $340 per troy ounce (Engineering and Mining Journal). However, the price of gold in late-1984 was depressed and near its lowest value since mid-1979. For this analysis, the average price of gold for all of 1984 ($360) will be used. The hourly gross recovery for a 5-inch dredging operation on the subject claim is estimated to have been $49.95 per hour (Table 3). The capital cost is estimated to have been $6,005, based on the 1990 capital expenses adjusted to 1984 using mining and milling cost indexes from the U.S. Department of Labor, Bureau of Labor Statistics (Western Mine Engineering, 1990). The hourly operating cost for dredging in 1984 is estimated to have been $17.55 per hour, using a reasonable wage rate of $10.00 per hour. From the above information, and as shown in Table 6, the estimated net profit from suction dredging the stream gravels within the subject claim would have been $17,205 in 1984 dollars.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the mineral examination of the Oro Grande PMC, along with my economic evaluation of a suction dredging operation on the subject claim, it appears that the alluvial gravels within the limits of the claim can be currently mined profitably. It also appears that the deposit within the limits of the subject claim could have been mined profitably in 1984. Therefore, I recommend approval of the Plan of Operations for the Oro Grande PMC, provided the mitigation, reclamation and other requirements are adequately addressed.

Lester Lubetkin
Certified Mineral Examiner #5
North Zone Minerals

11/30/90
Date