

HB

80

<TARGET><BILL>HB 80</BILL><SUBJECT>HB
80</SUBJECT><COMM>SFIN28</COMM></TARGET>

SENATE FINANCE COMMITTEE REPORT

DATE: 2/6/13

FURTHER:

DATE TURNED
IN TO OFFICE: _____

Finance Committee considered HOUSE BILL NO. 80

HB 80-CRUISE SHIP WASTEWATER DISCHARGE PERMITS

"An Act relating to the regulation of wastewater discharge from commercial passenger vessels in state waters; and providing for an effective date."

and recommends:

- be replaced with SCS _____ (_____) Same Title Technical Title Change
 New Title/SCR No. _____
- adopt previous SCS _____ (_____) Same Title Technical Title Change
 New Title/SCR No. _____
- attached amendment(s)
- adopt _____ Letter of Intent
- further referral to _____ Committee

Dept Abbr.	
ADM	LWF
CED	LAW
COR	LEG
CRT	MVA
EED	DNR
DEC	DPS
DFG	REV
GOV	DOT
DHS	UA

NEW FISCAL NOTE(S)				
Dept.	Fiscal	Indet.	Zero	FN #

PREVIOUS FISCAL NOTE(S)				
Dept.	Fiscal	Indet.	Zero	FN #
DEC			✓	1

APPROPRIATION - no fiscal note

SIGNATURES AND RECOMMENDATIONS:	PRINTED LAST NAME	Do PASS	DO NOT PASS	No REC	AMEND
<i>[Signature]</i>	Olson				✓
<i>[Signature]</i>	DUNLEAVY			✓	
Anna J. Fairclough	FAIRCLOUGH			✓	
Clint Bishop	Bishop			✓	
CO-CHAIR: <i>[Signature]</i>	Kelly				
CO-CHAIR: <i>[Signature]</i>	Mayer				

FISCAL NOTE

STATE OF ALASKA
2013 LEGISLATIVE SESSION

Bill Version HB 80
Fiscal Note Number 1
(H) Publish Date 1/18/13

Identifier (file name) LL0987-DEC-WQ-01-17-13 Dept. Affected Environmental Conservation
Title Commercial Passenger Vessel Wastewater Discharge Appropriation Water
Allocation Water Quality
Sponsor Rules by Request of the Governor
Requester Governor OMB Component Number 2062

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY14 Appropriation Requested	Included in Governor's FY14 Request	Out-Year Cost Estimates					
			FY14	FY15	FY16	FY17	FY18	FY19
OPERATING EXPENDITURES								
Personal Services								
Travel								
Services								
Commodities								
Capital Outlay								
Grants, Benefits								
Miscellaneous								
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FUND SOURCE		(Thousands of Dollars)						
1002	Federal Receipts							
1003	GF Match							
1004	GF							
1005	GF/Prgm (DGF)							
1037	GF/MH (UGF)							
1178	temp code (UGF)							
TOTAL		0.0	0.0	0.0	0.0	0.0	0.0	0.0

POSITIONS							
Full-time							
Part-time							
Temporary							

CHANGE IN REVENUES	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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Estimated SUPPLEMENTAL (FY13) operating costs 0.0 (separate supplemental appropriation required)
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY14) costs 0.0 (separate capital appropriation required)
(discuss reasons and fund source(s) in analysis section)

ASSOCIATED REGULATIONS

Does the bill direct, or will the bill result in, regulation changes adopted by your agency? No
If yes, by what date are the regulations to be adopted, amended, or repealed? _____ Discuss details in analysis section.

Why this fiscal note differs from previous version (if initial version, please note as such)

Not applicable, initial version.

Prepared by Michelle Bonnet Hale, Director
Division Water
Approved by Larry Hartig, Commissioner
Dept. of Environmental Conservation

Phone 907-269-7599
Date/Time 1/10/13 3:30 PM
Date 1/10/2013

FISCAL NOTE ANALYSIS #1

STATE OF ALASKA
2013 LEGISLATIVE SESSION

BILL NO. HB 80

Analysis

Analysis/Assumptions:

This bill amends current law to allow the Department of Environmental Conservation to permit operation of wastewater discharges from commercial passenger vessels, including discharges from advanced wastewater treatment systems, consistent with standards for other permitted discharges throughout the state. The bill also amends current law to codify a schedule for the approval of plans for discharge from small commercial passenger vessels in state waters.

This bill has no fiscal impact on the Department of Environmental Conservation, Division of Water.



THE STATE
of **ALASKA**
GOVERNOR SEAN PARNELL

Department of Fish and Game

DIVISION OF HABITAT
Headquarters Office

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February 8, 2013

Senator Kevin Meyer
Co-Chair, Senate Finance Committee
Alaska State Capitol, Room 518
Juneau, AK 99801-1182

Dear Co-Chair Senator Meyer:

During the Senate Finance Committee hearing on February 7th on House Bill 80, the Alaska Department of Fish and Game (ADF&G) was asked to provide information and perspective on treated wastewater discharges from cruise ships.

Background on Water Quality Standards

Under the federal Clean Water Act, the Department of Environmental Conservation (DEC) is required to conduct routine reviews of its water quality criteria to make sure they continue to reflect the latest science and will continue to protect aquatic life. ADF&G participates in those reviews.

In 2009, DEC was conducting a routine review of the copper criteria. As a part of ADF&G's participation and evaluation of that copper criteria review, the ADF&G contracted with Scannell Technical Services for a literature review on the effects of copper on aquatic species. Dr. Phyllis Weber Scannell, a retired ADF&G Habitat biologist, conducted a literature review and prepared the report which was published by ADF&G as "Habitat Technical Report 09-04, Effects of Copper on Aquatic Species: A review of the literature. Scannell, Phyllis Weber, 2009, Fairbanks." That report provided a brief discussion of the US Environmental Protection Agency (USEPA) and the State of Alaska Water Quality (AWQ) acute and chronic copper criteria for aquatic life, and published scientific literature was reviewed to address concerns from the state and federal agencies and the public that the AWQ acute and chronic copper criteria may not adequately protect aquatic life. The report included a discussion on the effects of copper to fish, aquatic invertebrates, aquatic plants, and algae. The conclusion in the Executive Summary of the report states that "In most natural water systems, the AWQ acute and chronic criteria should provide adequate protection to most aquatic species." Based in large part on this report, ADF&G did not recommend and DEC did not propose changes to the copper criteria for protection of aquatic life.

Concern has been expressed in legislative hearings about olfactory response effects on salmon in salt water and reference to a 2007 NOAA study was made. That study addressed and identified some behavioral responses of juvenile coho salmon to copper in fresh waters, but noted that "... copper's effect on salmonid olfaction in saltwater environments remains a recognized data gap and it is presently uncertain whether the BMC [benchmark concentrations] thresholds derived in

this document apply to salt water environments... While the physiological basis for salmonid olfaction is well characterized, the transition to saltwater may involve important changes in olfactory receptor neuron function that ultimately influence the expression of the as yet unidentified ligands for dCu [dissolved copper].”

The ADF&G and DEC believe that based on current science, the water quality criteria for copper for marine waters are protective of aquatic life. Both agencies are aware that additional research is being conducted and will be evaluating the results of that data when it is available. Only when there is sufficient and credible data that can withstand EPA and public scrutiny, will DEC propose changes to the water quality criteria.

Heavy Metals Analysis

The ADF&G has been supporting an ongoing DEC project to collect fish tissue samples throughout the state and from multiple species. Those samples are tested for heavy metals, including copper. Results of that work can be found at: <http://dec.alaska.gov/eh/vet/fish.htm>.

Cruise Ship Mixing Zones

Under the current DEC permit, only 7 large commercial passenger vessels (cruise ships) are allowed to discharge while in port. The mixing zones authorized by the permit are very small and all AWQ standards are expected to be met at the edge of the mixing zone. The only “exposure” of fish to the water within the mixing zone would be brief and we wouldn’t expect any toxic effects to fish due to the limited exposure time. Because water quality standards are modeled to be met so close to the vessels, we would not expect any toxic effects to benthic organisms and therefore have not recommended biomonitoring.

As proposed, and because the AWQ standards are met at the edge of the mixing zones, ADF&G does not have any fishery, harvest, or habitat conflict concerns with the changes that would be enacted through the passage of this legislation.

Sincerely,



Randy Bates
Director

cc: Cora Campbell, Commissioner, ADF&G

Fairness — Yes - we have wastewater issues.
do we tell students Alaska needs to grow up and take it on.
Johnny got a C and that's all
he seems to be able to do that C is ok?
or quit entirely?

you have heard from every one
that has something to gain —
financially or corporate control.

We have everything to lose -

February 2013

Opposition to SB 29

TO: Senate Finance Committee

FROM: K. Koski

Please attach these references to my testimony regarding the lethal and sublethal affects of copper at levels far below what cruiseships would be allowed to discharge if SB 29 passes.

American Fisheries Society Reports

Attached

Fisheries

VOL 35 NO 7
JULY 2010

A
S
F

Fish News
Legislative Update
Journal Highlights
Calendar
Job Center

The Mining Law of 1872: Change is Overdue

**Environmental Review Approaches
by Fish and Wildlife Agencies in
the United States and Canada**



20 4 1

000136
MR. K. V. KOSKI
10656 MISTY LANE
JUNEAU AK 99801-7824
.....AUTO-5-DIGIT 99801

The Mining Law of 1872: Change is Overdue

Satellite image of the Sumpter Mine near Sumpter, Oregon (from Google Earth). This is an abandoned placer gold mine occupying 14 km of the Powder River floodplain and destroying its channel.

© 2009 Google

This article is a product of the Environmental Concerns Committee of the Western Division of the American Fisheries Society.

Carol Ann Woody,
Robert M. Hughes,
Eric J. Wagner,
Thomas P. Quinn,
Leanne H. Roulson,
Lori M. Martin, and
Kitty Griswold

Woody is the proprietor of Fisheries Research and Consulting.

Hughes is a senior research scientist with Amnis Opes Institute, a visiting professor in the Laboratory of Fish Biology at Universidade Federal de Lavras, and a courtesy associate professor in the Department of Fisheries and Wildlife at Oregon State University. He can be contacted at hughes.bob@epa.gov.

Wagner is a senior scientist at the Fisheries Experiment Station of the Utah Division of Wildlife Resources.

Quinn is a professor in the School of Aquatic and Fishery Sciences at the University of Washington.

Roulson is president of the Western Division of the American Fisheries Society.

Martin is president elect of the Western Division of the American Fisheries Society.

Griswold is an affiliate professor in the Department of Biological Sciences at Idaho State University.

ABSTRACT: Hardrock mining for metals has been, and is, an economically important land use in all western U.S. states. However, metals contamination associated with mining can be highly toxic to aquatic life, the composition of metal-bearing rock often leads to acid mine drainage and increased concentrations of dissolved metals, and mine-related disruptions to soil and water often produce excess fine sediments and altered stream flows. Such environmental degradation leads to large numbers of perpetually polluted streams and impaired aquatic life and fisheries. The primary U.S. law governing mining, the General Mining Law of 1872, was passed during the pick-and-shovel era to encourage economic growth; however, modern mining processes are massive in extent, highly mechanized, and incorporate additional toxic chemicals for leaching metals from ores. We provide an overview of hardrock mining impacts to aquatic life, a set of mining case studies, and suggestions for amending U.S. mining law. Our hope is that this article will lead to improved management and rehabilitation of existing mine sites and sufficient protections for the aquatic life and fisheries likely to be disturbed by future mines.

La ley de minería de 1872: un cambio retrasado

RESUMEN: la minería metalúrgica subterránea ha sido, y aún es, una actividad económicamente importante en cuanto a uso de suelo en los estados del oeste de los Estados Unidos de Norteamérica. Sin embargo, la contaminación por metales asociada a la minería puede ser altamente tóxica para la vida acuática, la composición de las rocas que contienen metales suele derivar en drenaje ácido de mina e incrementar la concentración de metales disueltos y las alteraciones en el suelo y agua relacionados con la minería pueden producir un exceso de sedimentos finos que alteran el cauce de los ríos. Tal degradación ambiental da lugar a un considerable número de cauces permanentemente contaminados, lo que pone en peligro tanto a la vida acuática como a las pesquerías. La ley directriz de minería de los Estados Unidos de Norteamérica, La Ley General de Minería de 1872, fue decretada durante la época de "pico y pala" con el fin de promover el crecimiento económico; no obstante, los actuales procesos de minería son extensivos, altamente mecanizados e incorporan químicos tóxicos para lixiviar metales a partir de minerales. En este trabajo se presenta una revisión de los impactos de la minería subterránea en la vida acuática, un grupo de minas como casos de estudio y sugerencias para modificar la Ley de Minería de los Estados Unidos de Norteamérica. Nuestra esperanza es que la presente contribución de lugar a un mejoramiento en el manejo y rehabilitación de las minas existentes y a suficientes medidas de protección para la vida acuática y las pesquerías que puedan ser alteradas por la explotación de más minas en el futuro.

C V T

Introduction

The U.S. General Mining Law of 1872 governs mineral extraction (e.g., uranium, copper, gold, etc.) on about 147 million ha of public lands in the western United States, an area equal to approximately 38% of the nation (National Academy of Sciences 1999). The 1872 law makes mining a priority use on most of these lands, guarantees priority rights for minerals extraction, and was originally intended to encourage economic growth by conveying public lands to private owners for the purpose of mineral extraction. In practice, applications to mine public lands often cannot be denied despite deleterious impacts to other resources. Under this law, a miner can purchase (patent) the surface estate and mineral rights to federal land for \$1–2/ha by demonstrating the presence of a valuable mineral deposit. Currently, there is a year-to-year moratorium on new patents but this is not a permanent solution. Due diligence, i.e., \$100 of annual spending on mining activity, is required, but even if millions of dollars worth of minerals are extracted from these public lands, no fees or royalties are required in return (Bakken 2008), resulting in an estimated annual loss of revenue of \$160 million to the U.S. government (Pew Foundation 2009). This law remains in effect, despite serious environmental and economic issues caused by hardrock mining practices and a shift in priority use on federal lands. In addition to the Mining Law of 1872, other federal laws apply to regulate the effects of hardrock mining (e.g., Clean Water Act, National Environmental Protection Act). However, because of the magnitude of the issue and the antiquated nature and primacy of the Mining Law of 1872 a comprehensive reform of that law is needed. Our focus in this article is hardrock metal mining, the extraction of metals found in hard rock geological formations. Placer mining of alluvial deposits is also governed under the Mining Law of 1872 and is associated with damage to aquatic life (e.g., Sumpter Mine on the Powder River, Oregon), but is not a focus of this article. Related concerns also pertain to surface coal mining, which is regulated by a different under-protective law (Surface Mining Control and Reclamation Act of 1977).

Impacts to fisheries from hardrock metal mining result from both abandoned and active mines. The U.S. Environmental Protection Agency (USEPA) estimates that there are 500,000 abandoned mines in the United States; 40% of western headwater streams are polluted from mining. Clean-up costs are estimated at \$32–72 billion (USEPA 2000). Under the Mining Law of 1872, mining companies are not required to provide adequate insurance for clean up and reclamation of federal lands. Perhaps more troubling, many mines slated for clean-up require long-term or perpetual water treatment (USEPA 2004). Such ongoing water contamination threatens drinking water supplies, valuable fisheries, wildlife, agriculture, recreation, tourism, human health, and industries that rely on clean water. In effect, the 1872 law shifts wealth from the United States public to mining companies, and shifts liability from those companies to the taxpayer (USEPA 2004).

Most high-grade, accessible mineral deposits in the United States are already exploited; therefore, new hardrock mining ventures generally focus on low-grade ore deposits. The Mining Law of 1872 and relatively high prices allow for low-grade ore to be marginally profitable because mining corporations are not required to purchase sufficient reclamation insurance. If there is a disaster or massive reclamation expense, they can simply abandon the site and declare bankruptcy. The quantity of waste material generated can

be massive, with mine waste areas covering hundreds of hectares and containing tens to hundreds of millions of tons of spoil. For example, the proposed Pebble Mine in the headwaters of Bristol Bay, Alaska, has an estimated mineral resource of less than 1% copper, gold, and molybdenum; 99% of the estimated 7.5 billion tons to be excavated are projected to be acidic waste that will remain on site in perpetuity (www.dnr.state.ak.us/mlw/mining/largemine/pebble/index.htm). The processes used to access and extract minerals in modern mining operations create extensive ecosystem disturbance that can lead to long-term adverse effects to ground water, aquifers, surface water, aquatic resources, terrestrial vegetation, wildlife, soils, air, and cultural resources. Typical environmental effects are associated with:

Access. In remote areas, road construction and increased human activity lead to a variety of ecological effects, either directly related to the roads or the increased number of people accessing the area.

Earth disturbance. To reach and extract desired minerals, most hardrock mining operations displace massive amounts of soil and rock, either at the surface or underground.

Waste piles. Waste rock, spent ore, or tailings are generally disposed of in large heaps, ponds, or tailing impoundments, which can occupy hundreds of hectares. If these facilities are poorly designed, improperly constructed, or prematurely abandoned, their failure can lead to long-term contamination of surface and ground water.

Toxic dust. Toxic dust from dried-up tailings ponds, open pits, roads, and trucks hauling crushed ore can be carried by wind far from the mine site and contaminate surface and ground water as well as air and terrestrial vegetation.

Toxic processing chemicals. Desired metals are extracted or leached using chemicals that can be toxic if released into the environment (e.g., sodium cyanide, mercury, sulfuric acid, xanthates).

Acid mine drainage (AMD). Exposure of sulfide minerals, frequently associated with metallic ores, can create acidic conditions and leach metals into local waters. This AMD constitutes one of the most serious and common water pollution problems associated with mining (USEPA 1994; Sherlock et al. 1995); perpetual treatment may be required.

Water and soil contamination. Even without acidic conditions, metals can be discharged from mine sites and enter surface water, ground water, and soils. This can cause significant damage to aquatic life, vegetation, and terrestrial wildlife, and poses a hazard for human health. Toxic loading of stream waters can alter the assemblage structure of invertebrates (Clements et al. 2000; Maret et al. 2003), invertebrates and fish (Hughes 1985), and fish behavior (DeCicco 1990). Those toxic metals also contaminate water and sediment and bioaccumulate in fish tissues (Harper 2009), leading to reduced fitness or death (National Academy of Sciences 1999).

Flow alteration. Impoundment of water and stream diversions can lead to loss of habitat for fish spawning and rearing.

The perception that modern mining techniques are vastly improved over historic methods was recently challenged by a comprehensive study of modern U.S. mines (Maest et al. 2005; Kuipers et al. 2006). For example, the study compared predicted water quality impacts to observed impacts found at a sample of 25 U.S. mines. In summary:

- 00% of mines predicted compliance with water quality standards prior to operations (assuming pre-operations water quality was in compliance).
- 6% of mines exceeded water quality criteria as a result of mining.
- 4% of mines employed mitigation measures that failed to prevent water quality contamination.

Examples of mining impacts on aquatic resources

Without responsible laws and policy, and adequate reclamation and remediation, existing and future hardrock mines pose a risk to fish-bearing waters, in addition to the legacy effects of abandoned mines. Numerous examples of valuable fisheries and aquatic ecosystems harmed by hardrock mining exist across the western United States. High metals prices and demand for raw materials have created a modern minerals rush, with existing mines expanding, new claims being staked on public lands, and old mines reopening. Select case studies are presented to exemplify frequent compatibility issues existing between fisheries resource conservation and hardrock mining. These are not rare occurrences; USEPA (2004) identified 156 hardrock mining sites in the United States with past or potential Superfund liabilities of \$1 million or more each.

Alaska

Red Dog Mine

The Red Dog Mine is located in northwest Alaska, near Kotzebue, and has been in operation since 1989 (www.reddogalaska.com/). It is the largest zinc mine in the world, providing 10% of the world's zinc (<http://northern.org/news/epa-rescinds-key-red-dog-mine-permit-limits>; Szumigala et al. 2009), and has polluted Wulik River tributaries with zinc, lead, selenium, and cyanide. The Wulik River is the drinking water source for the native village of Kivalina and the location of a subsistence and sport fishery for Pacific salmon (*Oncorhynchus* spp.), Dolly Varden (*Salvelinus namaycush*), and Arctic grayling (*Thymallus arcticus*). Observed shifts in overwintering sites by Dolly Varden were reported by DeCicco (1990; 1996), coincident with increased metals in 1989. Natural levels of zinc are high (approximately 10 times the state water quality standards in 1989), but rose to as much as 200 times higher once mining began in 1989. Because natural levels of minerals are high, the regulatory framework for water quality on Red Dog Mine is complex. However, tools to differentiate naturally-occurring metals vs. anthropogenic sources are available (Kelly and Hudson 2007). High levels of metals associated with dust from haul trucks were measured as highly toxic and are potentially affecting the entire watershed (Ford and Hasselbach 2001). In addition, the mine has been subject to numerous regulatory actions and currently the permit to expand the mine has been rescinded. In 1991, the mine operator was cited for 134 violations of effluent limitations for metals and pH, and spent \$11 million in 1991 to route Red Dog Creek around the mine and isolate it from seepage (USEPA 1991). Dead fish from the Wulik River, approximately 40 km downstream from the mine, were discovered periodically by the public (ADNR 2004), suggesting that water chemistry samples were insufficiently protective of aquatic life, which is similar to what was concluded

by Ohio EPA (1990) in its comparison of chemical and biological criteria. The mine operators paid a \$1.7 million penalty for illegal discharges in 1997, and in 2008 agreed to pipe mine wastes to the Chukchi Sea or pay an additional \$8–20 million penalty.

Kensington Mine

The U.S. Army Corps of Engineers approved a permit application by Coeur Alaska to deposit up to 4.5 million tons of gold mine tailings from the Kensington Mine into Lower Slate Lake, Alaska, which hosts Dolly Varden and threespine stickleback (*Gasterosteus aculeatus*). The permit was approved even though Coeur Alaska agreed in its application that these two fish species would be extirpated from the lake by the waste. The U.S. Supreme Court upheld the Corps' decision in 2009 because of conflicting and confounding laws and regulations governing when mine waste is treated as fill or as pollutant discharge (*Coeur Alaska, Inc. vs. Southeast Alaska Conservation Council*). The Supreme Court decision sets a legal precedent that may allow other mining operations to avoid adherence with Clean Water Act water quality criteria by petitioning the Corps of Engineers to redefine pollutant-containing waste material as fill. This is a key issue also related to mountaintop removal and valley fill for surface coal mining in the Appalachians (USEPA 2009b).

Arizona

Pinto Valley Mine

Pinto Valley Mine, an open pit copper mine in Gila County, began operations in 1972, withdrawing water from the local aquifer and discharging to an intermittent section of Pinto Creek. Copper and zinc concentrations exceeded Arizona aquatic life criteria, metals bioaccumulated, and fine sediments buried natural substrates by an average of 15 cm, converting the reach from riffles and pools to a homogeneous run. Mountain sucker (*Catostomus platyrhynchus*) and western mosquitofish (*Gambusia affinis*) were greatly reduced in the polluted reach and 20 macroinvertebrate taxa were eliminated within 4 years. During spills and high flow events, dissolved metals were sufficient to kill fish (Lewis and Burraychak 1979).

California

Iron Mountain Mine

Iron Mountain Mine was a copper mine in operation from the 1860s through 1963 in northern California, near Redding (www.epa.gov/superfund/eparecovery/iron_mountain.html). This mine became infamous for developing the most acidic water in the world with a pH of -3.6 and it is estimated that the AMD from this site will persist for at least 3,000 years (www.epa.gov/aml/tech/imm.pdf; National Academy of Sciences 1999). Water from Iron Mountain Mine entered adjacent streams and eventually Keswick Reservoir, a run-of-the-river reservoir on the Sacramento River. Streams draining Iron Mountain Mine are devoid of aquatic life downstream of the mine. As early as 1900, the California Fish Commission investigated fish kills in the Sacramento River attributed to pollution from the mine. State records document more than 20 fish-kill events in the Sacramento River downstream of Iron Mountain Mine since 1963. AMD from Iron Mountain Mine killed 100,000 or more fish on separate occasions in 1955, 1963,

and at least 47,000 trout died during a one-week period. The AMD from Iron Mountain Mine has harmed four brook salmon (*O. tshawytscha*), steelhead (*O. mykiss*), cutthroat rainbow trout, as well as hundreds of benthic species (Rechtenwald 1990). The National Marine Fisheries Service protects the winter-run and spring-run Chinook salmon, which are listed on the Sacramento River near Redding, as endangered and threatened, respectively, pursuant to the Endangered Species Act. Iron Mountain Mine is now a Superfund site.

Leviathan Mine

Leviathan Mine began operations in 1863 on the eastern side of Nevada (Alpine County), and from 1952 to 1962 (www.epa.gov/superfund/sites/npl/nar1580.htm) consisted of an open pit mine covering about 101 ha. Acid mine drainage developed during operations. Additional contaminants include aluminum, arsenic, copper, iron, nickel, selenium, and zinc. The AMD from Leviathan Creek at numerous points, devastating aquatic life. Leviathan Creek joins the East Fork of the Carson River. Each year, roughly half of the flow in Leviathan Creek is composed of AMD ([http://yosemite.epa.gov/r9/sfund/r9sfdocw.nar1480943378825723300794f02/93009e9e968d57078825723300794f02/OpenDocument](http://yosemite.epa.gov/r9/sfund/r9sfdocw.nar1480943378825723300794f02/93009e9e968d57078825723300794f02/93009e9e968d57078825723300794f02/OpenDocument)). The Aspen Seep releases AMD with elevated levels of aluminum, copper, iron, and nickel into Leviathan Creek. Each of these metals has historically exceeded water quality criteria for aquatic life by over 500 times. Since 1992, California has invested millions of dollars to contour the pit mine, lining waste piles, channel Leviathan Creek around the contaminated area, and capture the most concentrated flow in a tunnel. Leviathan Mine is now a Superfund site.

Summitville Mine

Summitville Mine

Summitville Mine, located in southwestern California near Del Norte, were mined from 1984 to 1992 as a gold and copper open pit heap leach operation. Acid mine drainage and leachate from the open-pit mine and heap leach pad were the dominant source of aluminum, copper, iron, nickel, zinc, and acidity in the Alamosa River (www.epa.gov/region8/superfund/co/summitville/). The mine was determined by the U.S. Geological Survey to be the dominant source of aluminum, copper, iron, nickel, zinc, and acidity in the Alamosa River (<http://pubs.usgs.gov/ofr/95-0023/summit.htm#King.1995a>). As a result of contaminated ground water inputs as well as surface water from the Summitville Dam, the mine operator declared bankruptcy in 1992. The EPA assumed control of the site as part of an Emergency Response Action. The mine was listed as a Superfund site and cleanup costs have exceeded \$150 million and perpetual maintenance is required.

Coeur d'Alene Mining District

The Coeur d'Alene Mining District is located in the panhandle of Idaho. This mining area has produced lead, silver, gold,

and zinc from the 1880s to the present. Widespread contamination of water and soils resulted from numerous mining operations. The South Fork Coeur d'Alene River and tributaries, Coeur d'Alene River and lateral lakes, Lake Coeur d'Alene, and the Spokane River are associated with the Bunker Hill-Coeur d'Alene Basin Superfund site, a "mining megasite" (National Academy of Sciences 1999). Tributaries to the North Fork Coeur d'Alene River are also water quality impaired, associated with mining. Water quality, biological, and hydrologic conditions have been affected, and reduced native species diversity and abundance have been measured within study areas downstream of mined areas compared to non-mined sites because of metals contamination (Ellis 1940; Hoiland et al. 1994; Maret and MacCoy 2002). Metals-contaminated water also has impaired westslope cutthroat trout (*O. clarkii lewisi*) fisheries and contributed to the extirpation of bull trout (*Salvelinus confluentus*) from the Coeur d'Alene Basin upstream of Lake Coeur d'Alene. Spawning migrations of introduced Chinook salmon have also been affected, which has implications for their long-term sustainability and survival (Goldstein et al. 1999). The Idaho Department of Health and Welfare (IDHW 2003) issued a fish consumption advisory for Lake Coeur d'Alene based on lead, arsenic, and mercury concentrations in fish flesh. The advisory cites historical mining practices in the Coeur d'Alene watershed as the source of the contaminated soil and water in the area. The fishes sampled included bullhead (*Ameiurus* sp.), kokanee (*O. nerka*), and largemouth bass (*Micropterus salmoides*). Those species were chosen because they are consumed extensively by tribal anglers (IDHW 2003). Cleanup costs to the taxpayers as of 2001 were \$212 million (Steele 2001). Recent analyses estimate attainment of water quality goals in just the upper basin of this mining district could take several centuries at costs of \$1–2 billion ([http://yosemite.epa.gov/R10/CLEANUP.NSF/9a80cd5553c69ff588256d14005074ad/97c56add3ad94678825755900771691/\\$FILE/Draft_Upper%20CDA%20Basin%20FFS_Report_Executive_Summary%282%29.pdf](http://yosemite.epa.gov/R10/CLEANUP.NSF/9a80cd5553c69ff588256d14005074ad/97c56add3ad94678825755900771691/$FILE/Draft_Upper%20CDA%20Basin%20FFS_Report_Executive_Summary%282%29.pdf)).

Blackbird Creek Mine

Blackbird Creek Mine covers approximately 336 ha of private patented mining claims and 4,047 ha of unpatented claims, all within the Salmon National Forest, Idaho. Active mining for cobalt and copper occurred from the late 1800s to the 1980s, but the mine is currently dormant. Shaft and open pit methods were used and tunnels and waste rock piles occur along 13 km of Meadow and Blackbird creeks. Waste piles include as much as 2 million m³ of material. Acid drainage from mines and spoil, and high levels of arsenic, copper, cobalt, and nickel, have been documented downstream in both surface water and sediments; copper levels exceeded USEPA water quality criteria (www.atsdr.cdc.gov/HAC/PHA/blackbird/bla_p3.html; www.epa.gov/superfund/sites/npl/nar1369.htm). Panther Creek, downstream of Blackbird Creek Mine, once supported fish, but by 1960, steelhead and Snake River spring/summer Chinook salmon were extirpated from it. Contaminants released at Blackbird Creek Mine were indicated as causal (www.darrp.noaa.gov/northwest/black/index.html). Blackbird Creek Mine is a registered public health hazard and a designated Superfund site.



Satellite image of the Berkeley Pit and tailings pond near Butte, Montana (from NASA). The long axis of the site is 7.5 km.

Montana

The Berkeley Pit

The Berkeley Pit operated from 1955 to 1985 as an open pit copper sulfide mine in Butte, Montana. The excavated mine pit 542 m deep and 1.4 km across the rim. The pit filled with water once mining was completed, and it now contains about 1 trillion liters of acidic (pH 2.7–3.4) water and metals (aluminum, arsenic, cadmium, copper, zinc; Twidwell et al. 2006). Over 193 km² of the Clark Fork River and flood plain, and Milltown Reservoir, are contaminated by approximately 5 million cubic meters of contaminated mine tailings that washed downstream from Butte and collected behind the Milltown Dam (removed in 2008). Scientists with USEPA concluded that the metals behind the dam were contaminating local drinking water wells and causing large fish kills during high water events and ice scours (<http://rtac.org/clarkforksite.php>). Silver Bow Creek, which drains Butte, is nearly devoid of aquatic life (Hughes 1985). The pit and much of the surrounding mine facilities, including the Clark Fork River, form the largest Superfund site in the United States. Reclamation and remediation are ongoing and perpetual water treatment is required.

McLaren Mine

McLaren Mine in Cooke City, Montana, operated from 1933 to 1953 to extract gold, silver, and copper through use of heap leach cyanide methods (http://serc.carleton.edu/research_education/ativelands/ftbelknap/environmental.html). In 1950, a tailings dam failure on Soda Butte Creek released about 115,000 m³ of metal laden effluent downstream. As much as a 60-cm-deep layer of tailings were deposited as far as 8 km downstream (Ecology and Environment 1988). Copper concentrations, documented as highly toxic to aquatic life (Sorensen 1991; Eisler 2000; Hecht et al. 2007), are elevated in macroinvertebrates and fish. Greater trace metal toxicities occur in spring runoff compared to fall base flows (Nimmo et al. 1998; Marcus et al. 2001), indicating continued leaching. Soda Butte Creek was known for “fast fishing and large trout” during the late 1800s, but fishing opportunities declined with its water quality (USFWS 1979).

Zortman-Landusky Mine

The Zortman-Landusky gold and silver mine began operation in the 1880s. Mining was extended onto lands purchased from the Fort Belknap Indian Reservation in 1895 (Klauck 2009). Modern heap leach activity began in the late 1970s, and an environmental impact statement (EIS) was completed by the state in 1979, when the mine covered 109 ha. AMD impacts resulted from several spills, including a 2,953 L leak of cyanide-tainted solution from a containment pond in 1982. A rupture in a section of piping used in the mine's cyanide sprinkling system expanded the spill, releasing 196,841 L of cyanide solution onto lands and creeks (Klauck 2009). Local tap water revealed cyanide concentration levels above drinking water standards and the community's local water system was shutdown. Over the next two years, eight separate cyanide spills occurred (Klauck 2009). In September 1986, 75 million L of treated cyanide solution were released onto 7 ha of land when a solution pond was at risk of overflowing after a heavy rainstorm. The spills have contaminated streams and ground water throughout the area. By the late 1990s, total land disturbance reached almost 486 ha with about half on Bureau of Land Management (BLM) lands. In 1998, Zortman-Landusky, now consolidated with Pegasus Gold Ltd., filed for bankruptcy. Despite a \$36 million settlement from a lawsuit filed under the Clean Water Act in 1996, the agencies had to file a notice of an \$8.5 million reclamation bond shortfall with the bankruptcy court (Klauck 2009). Although \$1.0 million of the shortfall was eventually awarded, the bankruptcy was finalized in December 2003, and BLM and the Montana Department of Environmental Quality assumed responsibility for water storage and treatment in perpetuity (BLM 2010). The BLM (2010) estimated that it will cost approximately \$528,000/y to manage the site. In addition, the state expects to spend \$240,000 annually on AMD treatment through 2017, and has established a fund to pay for treatment beyond 2017.

Nevada

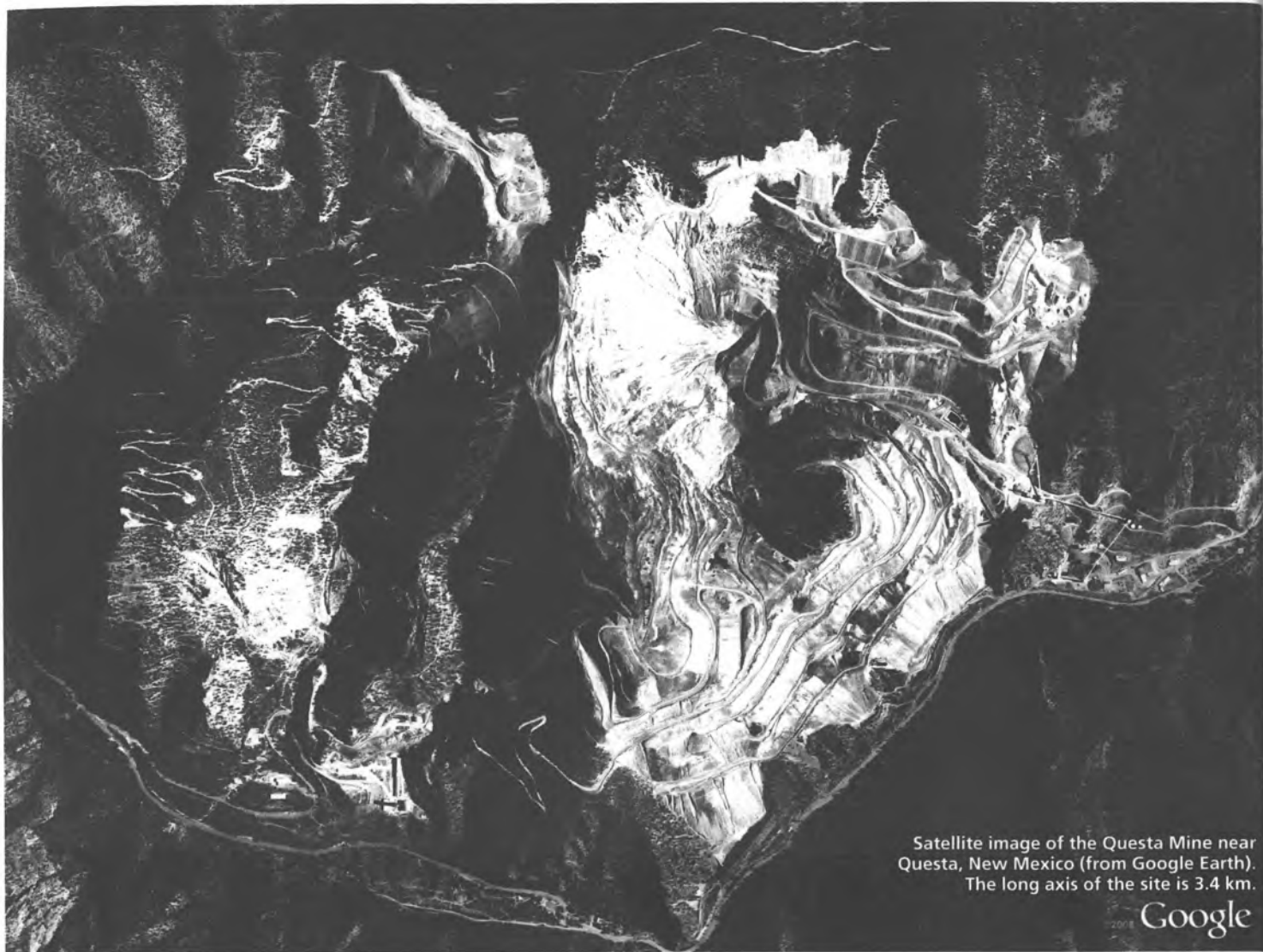
Caselton Mine

The Caselton Mine in Lincoln County began production in 1863 for silver, gold, lead, zinc, copper, and manganese. Part of the site continues to be marginally active, but most of it has been abandoned (IAMLET 1999). The value of metals produced was approximately \$130 million, and approximately 1,147,000 m³ of tailings remain, with an estimated cost of \$11 million for on-site reclamation. That estimate does not include downstream treatment of contaminants.

New Mexico

Questa Mine

The Questa Mine Superfund site is located northeast of Santa Fe, and includes an active molybdenum mine, mill, tailings ponds, and tailings pipeline, as well as the Red River (USEPA 2010). The open pit mine opened in 1965 and the lower 13 km of the Red River were deemed “dead” by the New Mexico Water Quality Commission in 1994. Numerous pipeline breaks, AMD from the tailings ponds, aluminum, arsenic, cadmium, chromium, cobalt, fluoride, iron, lead, manganese, sulfate, and zinc have



Satellite image of the Questa Mine near Questa, New Mexico (from Google Earth). The long axis of the site is 3.4 km.

Google

contaminated ground water and the Red River floodplain. Such contaminants threaten the Red River fisheries for brown trout (*Salmo trutta*) and cutbows (*O. clarki* x *O. mykiss*), the endangered Rio Grande cutthroat trout (*O. c. virginalis*), and a rainbow trout hatchery.

Oregon

Formosa Mine

The Formosa Mine (copper, zinc, thorium) on Silver Butte Creek near Riddle operated from 1990 to 1993. The mine has contaminated 18 miles of the Umpqua River watershed in western Oregon (USEPA 2007). The mine currently releases approximately 19 million L of AMD annually, containing up to 13,000 kg of dissolved copper and zinc, metals known to be highly toxic to fish (Dethloff et al. 1999; Baldwin et al. 2003). Consuming fish from the system poses a health risk to humans. Metals pollution is eliminating prime habitat for coho salmon (*O. kisutch*) and steelhead. Aquatic insects have disappeared from the upper reaches of the creek.

Utah

Atlas Mine

The Atlas Mine, located near Moab along the Colorado River, opened in 1952 as a uranium mine. The mine closed in 1984 but left an approximately 178 ha waste site and a 53 ha (16 million ton) tailings pile in the floodplain that leached into ground water and the Colorado River, creating a dead zone. Uranium concentrations in the dead zone are 1,660% greater than background levels. Flooding of the site had the potential of further contaminating the water supplies of millions of downriver humans. The U.S. Geological Survey observed 100% mortality of caged fish placed into the dead zone because of ammonia concentrations 750 times acutely lethal levels. The U.S. Fish and Wildlife Service considered leaching from the tailings as jeopardizing four endangered fish species: humpback chub (*Gila cypha*), bonytail (*G. elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*). The tailings removal and burial began in 2009 at a cost of approximately \$1 billion and are projected to require 20 years. The mine operator had posted a \$5 million reclamation bond, and filed for bankruptcy (<http://healutah.org/news/>; http://grandcanyontrust.org/utah/uranium_history.php).

Washington

Midnite Mine

The Midnite Mine was an open-pit uranium mine on the Spokane Indian reservation in eastern Washington, and operated from 1955 to 1981. The Dawn Mill site, just off the reservation, also processed uranium. In the 1990s, both sites were found to be leaching radioactive metals, metals, and AMD into ground water and neighboring streams, including Blue Creek, which drains Lake Roosevelt, the Columbia River reservoir behind Grand Coulee Dam. Blue Creek is used for spawning and rearing by rainbow trout, Paiute sculpin (*Cottus beldingi*; a species of concern in Washington), and other fishes (USEPA 2009a). Midnite Mine is currently an active Superfund site.

Holden Mine

The Holden Mine, in the Okanogan-Wenatchee National Forest in Chelan County, eastern Washington, operated from 1938 to 1957. It was one of the largest copper mines in the United States, and zinc, silver and gold were also mined. The AMD and metals leach into Railroad Creek, a tributary to Lake Chelan (Johnson et al. 1997). Risks to aquatic life include degradation of surface water quality and streambed armoring. Additionally, spoil piles along stream banks pose a risk to the aquatic community. A flood in 2003 required an emergency cleanup (www.fs.fed.us/r6/okanogawenatchee/holden-mine/flood-damage-2003.shtml). The Holden Mine is an active Superfund site.

Wyoming

Smith-Highland Ranch Mine

The Smith-Highland Ranch Mine is a uranium mine near Douglas in northeast Wyoming that began operations in 1988. In 2008, the Wyoming Department of Environmental Quality (WDEQ) issued a notice of violations to the mine operator for 80 spills over multiple years, pond leaks, well casing failures, failure to restore ground water quality, and a grossly inadequate reclamation bond. Despite those concerns about contaminating ground water, mine self-monitoring, and inadequate WDEQ oversight, the mine has been allowed to continue to operate (http://trib.com/news/state-and-regional/article_b8f9b03a-d250-51f5-a1fc-f34646cfc567.html; www.powertechexposed.com/Cameco_Wyo_mine_permit_violations.htm).

An example of possible future mining impacts

The preceding examples demonstrate fisheries impacts from mining and the poor track record for maintaining water quality suitable for aquatic life (Maest et al. 2005; Kuipers et al. 2006), adding to concerns for new mines and a continuing legacy of mineral extraction trumping all other uses of public land. For example, the Pebble Mine claim on Alaska state lands in the Bristol Bay watershed is part of a massive low-grade porphyry copper sulfide deposit also containing gold and molybdenum. Its development is projected to require an open pit mine (~6 km²

in area and ~490 m deep), an underground mine, dams at or above 200 m high, a ~160 km long haul road and slurry pipeline, development of a port facility on Cook Inlet for fuel and concentrated mineral storage, and 1.1 billion L of water annually (www.dnr.alaska.gov/mlw/mining/largemine/pebble/2006/damaap.pdf; www.dnr.alaska.gov/mlw/mining/largemine/pebble/2006/swutorig.pdf; www.dnr.alaska.gov/mlw/mining/largemine/pebble/2006/gwsfkfinal.pdf). The region that contains the Pebble copper deposit has porous alluvial soils, abundant ground and surface water, interconnected watersheds, undefined seismic faults, significant seismic activity, little buffering, and a high concentration of sulfides that are known to produce AMD (USFS 1993; Northern Dynasty Mines Inc. 2005; HDR Alaska and CH2M Hill 2008a,b; <http://earthquake.usgs.gov/eqcenter/recenteqsus/Maps/special/Alaska.php>; Jennings et al. 2008).

The Pebble prospect conditions have serious implications for fisheries. Dissolved copper concentrations as low as 2–10 µg/L above background can alter the olfactory-mediated survival and migration of salmonids (Hecht et al. 2007; Sandahl et al. 2007). The waters draining the Pebble copper deposit are essential to spawning, incubating, rearing, and migrating salmon and non-salmonids, and drain into waters supporting diverse Bristol Bay fisheries. Bristol Bay is home to the world's largest wild sockeye salmon (*O. nerka*) fisheries, and sustains healthy productive fisheries of other salmonids, herring, and crab. The local seafood industry employs about 10,000 people annually; gross earnings reported in 2007 were over \$100 million in international sales (www.sf.adfg.state.ak.us/Statewide/economics/). A 2007 study of sportfishing economic impacts in Alaska indicated expenditures of \$1.4 billion dollars generating 15,879 jobs, of which, \$989 million and over 11,000 jobs were attributed to the southcentral region which includes Bristol Bay (www.sf.adfg.state.ak.us/Statewide/economics/). The Bristol Bay exvessel commercial salmon fishery has a 20-year estimated average annual value of \$125.7 million (\$123.1 million for sockeye; Sands et al. 2008). National catch statistics for sockeye salmon alone (mostly from Bristol Bay) indicated an exvessel value of over \$7.8 billion between 1950 and 2008 (www.st.nmfs.noaa.gov/st1/commercial/landings/gc_runc.html). Alaska Native peoples have relied on annual salmon returns to the rivers draining the Pebble copper deposit for subsistence for thousands of years; salmon still comprise 60–80% of their total subsistence harvest, which for the last 20 years has averaged over 100,000 salmon annually from the Nushagak and Kvichak drainages alone (Fall et al. 2006; Sands et al. 2008). The Pebble copper deposit lies under state land straddling both the Nushagak and Kvichak drainages, is adjacent to Lake Clark National Park and Preserve, is about 24 km upgradient of Lake Iliamna where millions of sockeye fry rear annually, and is in the headwaters of the Nushagak, a major Chinook salmon producer. The Nushagak and Kvichak river drainages have produced about 50% of all commercially harvested sockeye salmon from Bristol Bay for 125 years (ADFG 2008a,b; Fair 2003). Given the importance of sustainable fisheries in Bristol Bay and its drainages, it seems advisable to mount an ecologically and statistically defensible surveying program in the region, and to make the study designs and all data produced from surveying the region publicly available for independent peer review.

Given the history of hardrock mining documented above, the risks to fisheries like those in the Bristol Bay drainage are high. The value of these fisheries, and the livelihoods of those who

depend on them, should be considered when making decisions about land use. However, the Mining Law of 1872 still maintains mineral extraction as the highest priority use of federal lands and the BLM is considering opening 0.5 million ha of federal lands around Pebble to mining, which would further exacerbate the threat to the fishery. As Senator Lee Metcalf explained in his address to the North American Wildlife Conference in 1974, the Mining Law of 1872 is the "only law that puts the land use decision entirely in the hands of the developer" (Bakken 2008). Attempts to change the legislation in the 1990s failed due to powerful corporate interests and public apathy. An update to the Mining Law of 1872, signed by Ulysses Grant, is long overdue.

Future policy needs

Healthy sustainable fisheries support important local and national economies and depend on clean water and healthy watersheds. The examples presented, along with a wide array of other scientific evidence concerning hardrock mining, have demonstrated frequent incompatibility of hardrock mining with conservation of important fisheries resources due to outdated and inadequate regulations and policy. Although the American Fisheries Society has a surface mining policy (#13; www.fisheries.org/afs/policy_statements.html) in place, we recommend that the policy be revised to address more thoroughly the potential impacts of hardrock mining on fish and aquatic ecosystems. More importantly, and because hardrock mining is a vital industry, we recommend that the U.S. Congress revise the Mining Law of 1872 to:

1. **Establish clear environmental standards.** Specific standards for environmental protection need to be strengthened and elucidated within mining law, including:
 - a. **Reclamation.** Mine sites should be reclaimed to sustain uses conforming to the applicable land use plan of the region, not just pre-existing, degraded conditions. Concurrent reclamation of mined lands prior to expanding onto undisturbed land can reduce overall impacts as well as provide data on the efficacy of the proposed reclamation plan. Such reclaim-as-you-go programs increase the probability that the proponent will cover the cost of reclamation before the mining operation shuts down.
 - b. **Fish and wildlife protection.** Habitat and fish and wildlife assemblages should be restored to pre-mining conditions, at a minimum.
 - c. **Surface and ground water protection.** Current federal law does not adequately protect ground water from mining pollution and the requirements of mine reclamation are insufficient to maintain compliance with state and federal water quality standards. Operations should minimize damage to surface and ground water resources, restore to at least pre-mining hydrological conditions, and ensure compliance with water quality standards.
 - d. **Revegetation.** Mined areas should be reseeded and planted with sufficient vegetation and success should be measurable and monitored. Native species should be encouraged and noxious species controlled.
 - e. **Prohibition of perpetual pollution.** Before mining ceases, mine operators should meet water quality criteria required
2. **Protect special places.** The U.S. government currently interprets mining as the highest priority and best use for public lands based on the Mining Law of 1872. However, many places are of significant environmental value and should deserve special protections.
 - a. **Designate special lands as off-limits to hardrock exploration and development.** Wilderness study areas, lands recommended for wilderness designation, sacred sites, areas of critical environmental concern, lands supporting highly valued or ESA-listed fish or wildlife populations, roadless areas, lands in the Wild and Scenic River System or recommended for such, and lands administratively withdrawn or segregated should be off limits to mineral exploration and development that would directly or indirectly affect them.
 - b. **Allow land managers to appropriately value mining relative to competing uses of public land.** Land managers should be able to weigh competing land uses and consider the impacts of mining and the potential for reclamation to a desired state before mine approval. No mine should degrade the environment, public health, or public safety. Land managers should have the ability to deny permits when appropriate or to include appropriate requirements to protect the environment for approved operations.
3. **Initiate fiscal reform to increase permittee financial responsibility.** In 2000, the U.S. Bureau of Land Management estimated \$982 million worth of hardrock minerals were excavated from public lands, yet the mining industry paid no royalty on those minerals. Fiscal reform is needed to aid in restoring damaged watersheds, and should include:
 - a. **End patenting.** Under the Mining Law of 1872, an area about the size of Connecticut valued at over \$245 billion dollars has been patented for far less than the land value.
 - b. **Establish royalty fees.** Fees for new and existing mines similar to those paid by the fossil fuel industry (e.g., 8%–12.5%) should be established and used for land and water rehabilitation.
 - c. **Statutorily ensure reclamation bonding.** Adequate reclamation bonds with clear clean-up standards are needed to protect both the environment and taxpayers. Estimated clean-up liability for operating mines is estimated to exceed \$12 billion to taxpayers because of inadequate bonds.
 - d. **Establish regulatory fees.** Fees are needed in the permitting process for effectiveness monitoring, enforcement infrastructure, and research.
4. **Create funds to clean up abandoned mines.** No dedicated federal funds currently exist to clean up abandoned mine sites. A royalty fund of \$32–72 billion should be established to clean up abandoned mine sites. A program should be clearly developed and implemented to evaluate, prioritize, and fund those projects.

5. **Improve mine oversight and environmental protection.**

Self-monitoring and self-reporting by the mining industry has frequently failed to protect waters and fishery resources because of irresponsible mining practices. Compliance with the Clean Water Act and state water quality standards must be achieved, including implementation of agency permit requirements and conditions, monitoring associated with National Pollution Discharge Elimination System (NPDES) permits, and other applicable regulations. Industry oversight from initial baseline studies to mine closure is needed, including:

- a. **Independent peer review from exploration to closure.** Annual technical reports and data should be prepared by independent mining consultants and released directly to the public as well as state and federal oversight agencies for review, critique, and improvement. Inadequacies in baseline studies and monitoring programs (including study design, site-scale design, standard methods, and indicators) should be documented and addressed (Hughes et al. 2000; Hughes and Peck 2008; Bonar et al. 2009). Agency recommendations should be considered and integrated or the status quo defended.
- b. **Independent effectiveness monitoring.** Independent or agency monitoring of water and sediment quality, flow regime, physical habitat structure, and biological assemblages (fish, benthic macroinvertebrates, algae, riparian vegetation) should be conducted at least during high and base flows as part of the mine permit and paid for by the permittee. Monitoring should be independent of the agencies responsible for mineral leasing, because of their roles in encouraging mining.
- c. **Inspections.** Unannounced inspections should be mandatory. Water quality samples should be split for independent analyses by independent laboratories, with oversight by responsible agencies for quality control. Regulatory agencies should be adequately funded to conduct rigorous and frequent inspections. In addition, the right of the public to reasonably request inspections should be guaranteed.
- d. **Cessation of work.** Failure to successfully address mining violations should require ceasing operations until appropriate remediation is addressed and implemented.
- e. **Track violators.** Operators (including firms and persons) that have a history of serious violations or are currently seriously violating laws should be ineligible for new or renewed permits and liable for criminal proceedings. Further, additional permits or permit renewals should not be considered until reclamation at other sites has been deemed appropriate and successful by the regulatory agencies and stakeholders involved.
- f. **Right to sue.** Citizens should have the right to file suit in federal and (or) state courts when operators or government agencies fail to implement and monitor best management practices.
- g. **Risk analysis.** Unanticipated events that lead to the release of metals, chemicals, dust, and debris pose serious risks to aquatic biota. Mine permitting and reclamation insurance should be developed within

the context of risk assessment that takes into account landscape properties, climate, earthquake hazards, and extraction and reclamation methods.

6. **Fund research needs.** The National Academy of Sciences (1999) and USEPA (2004) recommended an aggressive and coordinated research program related to the environmental impacts of hardrock mining. A better understanding of mining practices, problems, and solutions is needed to prevent water quality degradation, guide rehabilitation of contaminated watersheds, and mitigate the effects of future hardrock mining.
7. **Follow the precautionary principle.** Time and again we have learned that it is more costly and uncertain to rehabilitate natural resources than it is to protect them. Given the inability of planners and engineers to prevent catastrophic failures, it is incumbent on the professionals that work with fisheries, wildlife, and other resources to carefully scrutinize any proposed new developments. As we write this piece, hundreds of cubic meters of oil are gushing daily from the seafloor in the Gulf of Mexico and drifting shoreward, in an event that was apparently not anticipated, and for which there were no adequate contingency plans. Recent history is replete with similar engineering shortcomings (e.g., Santa Barbara and Exxon Valdez oil spills, Tacoma Narrows and Minneapolis bridge collapses, Three Mile Island and Enrico Fermi nuclear plant meltdowns, Challenger and Columbia space shuttle explosions, Teton and Buffalo Creek dam collapses, Consol and Upper Big Branch mine explosions, Baie Mare and Aznalcollar mine spills). History teaches us that once initiated, mining projects continue no matter how serious the violations of permits. Therefore, the permitting process should assume that stated levels will be exceeded, and that catastrophes and spills will occur. The risks and benefits should be weighed accordingly following rigorous examination of mining and infrastructure plans, economic evaluation, ecological surveys, and peer review of all data.

Summary

The U.S. General Mining Law of 1872 allows mining operators to enter, explore, and begin the permitting process for a claim, but does not require a commitment to return the lands and waters to a state supporting aquatic life. Most mining practices require water in large quantities for some aspect of extraction, processing, or transport of the mined material and its byproducts. Therefore aquatic systems are heavily altered directly, indirectly, and cumulatively by mining. History has shown that the legacy impacts of mining are often significantly more persistent and expensive than those observed during active mining. Just as no mining company would consider it feasible to go back to nineteenth century mining practices and technology, U.S. citizens should expect mining projects to meet modern scientific standards by employing rigorous scientific assessment of all potential impacts, and by providing public access to all information gathered in those assessments in sufficient time for scientific peer review.

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CENTRAL COUNCIL
Tlingit and Haida Indian Tribes of Alaska
EDWARD K. THOMAS BUILDING
9097 Glacier Highway
Juneau, Alaska 99801 - 6922

February 1, 2013

State of Alaska Legislature
House Resources Committee
Juneau, AK 99801

Re: HB 80, Cruise Ship Wastewater Discharge Bill

Dear Members of the House Resources Committee:

I am writing on behalf of the Central Council of the Tlingit & Haida Indian Tribes of Alaska to request you oppose HB 80, the Cruise Ship Wastewater Discharge bill. Central Council is a federally-recognized tribe that serves 22 villages and communities and has over 28,000 tribal citizens. In Southeast Alaska, our food is our way of life and these customary and traditional resources provide our spiritual connection to our place, to our communities, and to each other. Many of our coastal communities depend on a healthy ocean for their cultural, social, and economic health and well-being.

We do not support HB 80 because 1) it will significantly reduce the protection of Alaskan marine water quality from pollution; and 2) it is not based on the best available science and it limits public involvement and participation

1. Significant reduction in the protection of Alaskan marine waters

In the last few years, the Alaska Department of Environmental Conservation (DEC) has been issuing wastewater permits with different standards for different ships. This approach allows the ships to essentially create their own standards for contaminants like dissolved copper and ammonia.

Discharging ammonia into the Inside Passage waters is akin to dumping fertilizer into the ocean during the most biologically productive season. As stated in the report by the Science Advisory Panel on Cruise Ship Wastewater, ammonia is taken up by phytoplankton as a preferred nutrient. Ammonia is also combined in receiving waters with oxygen to form the nutrients nitrite and nitrate. Cruise ships discharged 23 to 160 times over the allowable amount under water quality standards in 2008-2009 and in 2011. This excessive nitrogen input into our ocean surface waters will increase the outbreak of explosive algal blooms, which in turn leads to increased rates of paralytic shellfish poisoning (PSP). PSP affects many resources in the ecosystem, including crab, oysters, mussels, clams, and ultimately the health of humans who consume these resources. Also, increased algal blooms negatively impact herring – a keystone species in the marine food web which other species depend on.

Additionally, with warming sea temperatures, it is likely that discharging ammonia and other wastes into our waters will support the growth and propagation of invasive species. Some of these species may be introduced into the same waste stream as eggs, larval or "seed" forms.

In order to address these concerns, we would like to see that uniform standards be implemented for ships of similar size, as opposed to setting the standards separately for each individual ship. Setting the same standard for all ships will incentivizes better performance and a clear goal of meeting WQC.

2. Not based on the best available science and limits public participation

We do not support HB 80 because it repeals the Science Advisory Panel on Cruise Ship Wastewater two years prior to its legislatively mandated final report, which is due January 1, 2015. This undermines the research already conducted by the panel and eliminates further public involvement. It will preclude having the best available science and best available technology being brought to bear in solving the cruise ship industry's wastewater management challenges. The bill also limits the Alaskan voters' access to the science and technology to inform future decisions on large and small cruise ship management.

The current science is not up to par in considering the effects of cruise ships on the marine ecosystem. The Science Advisory Panel's preliminary report describes an old, simple "dilution model" based on the effects of one ship discharging wastes into a mixing zone in open ocean conditions. This approach does not reflect the reality of Inside Passage waters and the high cruise ship traffic during the summer months.

Stronger scientific data and a more sophisticated model should be developed before risking our marine waters based on an outdated and inadequate model. Rather than analyzing the effects of the discharge of one ship in open water conditions, the report should analyze the effects of discharge from twenty ships in Inside Passage conditions on a daily basis.

In addition, in Monday's House Resources Committee Hearing, Deputy Commissioner of the DEC Lynn Kent stated that there are no studies on the effects of dissolved copper in saltwater habitats. This is an inaccurate statement. Please refer to the research conducted by University of Alaska Fairbanks biologist Dr. Carol Ann Woody which describes the negative impacts of dissolved heavy metals like copper and zinc on marine life. There are also many other studies conducted that show copper has toxic effects on salmon and steelhead in saltwater.

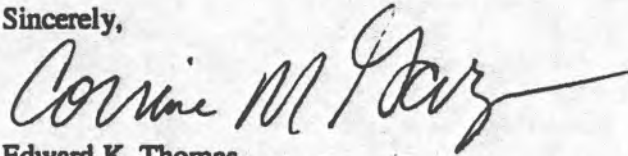
Our tribal citizens and communities have depended on clean waters and the food sources that thrive in healthy ocean conditions since time immemorial. We continue to depend on salmon, herring, crab, oysters, and many other marine species that will be placed at risk if less stringent discharge standards are implemented.

Before proceeding with further contemplation of the yet-to-be defined "moving mixing zones" we want the DEC to be able to assure our tribal citizens that our herring, salmon, shellfish, and seaweeds will not be negatively impacted by loosened discharge standards. We also want to see DEC assure us that these relaxed discharge standards will not introduce invasive species in our region. With just a preliminary report from the panel, and a lack of including other existing science and technological innovations, it is premature for DEC to provide us with these assurances.

We urge you to consider taking the steps necessary to protect our ocean waters and coastal communities by not supporting this bill. We urge you to lead the cruise ship industry forward by setting a uniform and stringent standard in the permit requirements.

Thank you for the opportunity to comment. We hope that you will continue to safeguard the health of Southeast Alaska's customary and traditional food sources and the communities whose livelihoods and existence depend on them.

Sincerely,

A handwritten signature in black ink, appearing to read "Corinne M. Gray", with a long horizontal flourish extending to the right.

Edward K. Thomas
President

Doniece Gott

From: Angela Eldred <a5eldred@gmail.com>
Sent: Wednesday, February 06, 2013 5:07 PM
To: Senate Finance Committee
Subject: HB80 & SB29 -- PLEASE do NOT pass these bills!

As a concerned citizen of the amazing state we call home, I must voice my opinion that I DO NOT support the passage of these bills! Our waterways are our most valuable resource in Alaska, a resource that continually sustains us in so many ways. We need to protect and respect this resource to our utmost abilities. While I do recognize the importance of cruise ships and tourism to our state economy, they do need to be held to a high standard and should hold the same attitude of respect to our waterways as those who reside here. PLEASE be sure you have all the available information to make the most informed decision possible, and PLEASE keep the long term interests of the residents of our great state, the people YOU are hired to represent, in the very forefront of your mind. We depend on the health of our watersheds and natural resources for almost every aspect of life in Alaska. Please work to protect this wonderful resource so that it can be responsibly enjoyed by many more for years and years to come.

Thank you

-Angie Eldred

February 4, 2013

Dear Governor Parnell,

Thank you very much for all of your support to the Alaska Shellfish Industry. The shellfish industry is growing every year, producing revenue, jobs and a healthy sustainable product that we are proud to call Alaska Grown!

The Alaska Shellfish Growers Association represents growers throughout coastal Alaska. We strive to help protect our industry from proposed threats of pollution. We are writing to you today to oppose rollbacks on pollution limits for cruise ships. In 2006, Alaskan voters rightly passed a statewide initiative requiring the cruise ships to meet end-of-pipe pollution standards in our sensitive coastal waters. SB 29/HB 80 undermines the will of Alaskans, and erodes confidence in our democratic institutions.

If passed, SB 29/HB 80 would allow cruise ships to embrace the old, outdated notion that the solution to pollution is dilution – through the use of mixing zones. Mixing zones create sacrifice areas that violate the fishable and swimmable goals of the Clean Water Act. Cruise ships are essentially floating cities, and their waste streams contain a broad array of pollutants and sewage that can harm our businesses.

Additionally, this legislation will put a black mark next to Alaska's well-deserved reputation for clean water and sustainable fisheries. We market our product throughout the nation because consumers understand the importance of clean water for healthy shellfish production. The Alaska Seafood Marketing Institute touts the sustainability of our fisheries due to our strict controls on pollution. Even a subtle change in perception could harm our industry, and the image of large cruise ships dumping sewage and other pollutants around our businesses will hurt our marketing and our sales.

SB 29/HB 80 are unnecessary; cruise ships can now legally discharge into permitted sewage treatment plant or in federal waters beyond the three mile limit. We strongly oppose these bills for the reasons stated above; however, if these bills move ahead, we request the following amendments:

1. **Protect Important Habitat:** The bills should be amended to protect aquaculture, mariculture, critical habitat area, and sensitive estuaries with the more restrictive 2006 provisions to ensure Alaska's magnificent coastal resources remain protected.
2. **Water Quality & Tissue Monitoring:** The cruise ship industry should be required to pay for ambient monitoring and tissue sampling around shellfish farms. Shellfish growers are required to collect water and tissue samples regularly to ensure their product is safe and the surrounding waters are certified

clean. The fees for certification are increasing dramatically and our members should not be forced to carry this fiscal burden alone.

Governor Parnell, we appreciate your consideration of opposing HB 80 to protect our way of life as Alaska shellfish farmers. We are family run Alaska businesses striving to make a living in remote Alaska communities. In our increasingly polluted world, one of our main advantages as an Alaska Shellfish industry is producing a product grown in the pristine waters of Alaska, lets keep it that way.

Sincerely,

Weatherly Bates

Alaska Shellfish Growers Association, Vice President
Pacific Coast Shellfish Growers Association, Alaska Representative'

Alaska Shellfish Farms, Owner
PO Box 1401
Homer, Alaska 99603
AlaskaShell@gmail.com
907-299-2451



Southeast Alaska Conservation Council

419 Sixth Street, Suite 200 Juneau, AK 99801 Phone: (907) 586-6942 Fax: (907) 463-3312

February 6, 2013

Dear Honorable Members of the Senate Finance Committee:

My name is Daven Hafey. I am a Legislative Organizer for the Southeast Alaska Conservation Council, and I live in Juneau.

SEACC advocates for its members from eighteen communities throughout Southeast Alaska, ranging from Yakutat to Ketchikan. Many of our members are commercial fishermen, sport fishermen, subsistence users, and small business owners whose livelihoods and households depend on healthy waters.

My organization is not against the cruise ship industry. We understand very clearly the important economic benefits the industry provides to our communities, including Skagway, Haines, Juneau, Hoonah, Gustavus, Sitka, Ketchikan, and Prince of Wales, and we publicly support responsible tourism in our region. We want to see the cruise ship industry thrive in our communities, but we want them to thrive in a way that honors and respects the waters we depend on.

What concerns many of our members is the fact that this bill is based on the Science Advisory Panel's Preliminary Report—not a final report. That preliminary report's findings are based on the analysis of the effects of one cruise ship's discharge. It is unclear to us in what conditions those studies were conducted, but it appears as though the studies of that one ship were not conducted in Inside Passage conditions. On any given day from May through September, between fifteen and twenty-nine ships travel the Inside Passage, most following similar routes. Prior to making a legislative decision, we would like to see the effects of multiple ships discharging their effluent along similar routes in Inside Passage conditions analyzed to get a better understanding of what will really occur in the inside waters we fish and crab in.

From the report and recommendations from DEC, it appears as though Frederick Sound, Chatham Strait, and Icy Strait would be likely candidates for mixing zone use. It would be unfair for the communities of Gustavus, Hoonah, Elfin Cove, Tenakee Springs, Angoon, and Kake, most of whom depend heavily upon the bounty of the sea for their

healthy and reliable food sources and economic opportunities, to put the future of their livelihoods on the findings of a preliminary report.

Rather than an exemption from meeting Alaska's state water quality standards, we recommend that the ships not currently meeting those standards be granted an extension of three years. Such an extension would provide ships not currently meeting our state's standards adequate time to make necessary renovations so that they can accomplish what the cruise ship Carnival Spirit is already doing: treating their wastes in compliance with Alaska state water quality standards. This would allow ships to continue visiting our ports throughout the coming years while granting them the time to improve their wastewater infrastructure.

Thank you for your consideration.



Daven Hafey
Southeast Alaska Conservation Council

Eli Hanlon III
P.O. Box 183
Yakutat, AK 99689
(907) 784-3493

Alaska Senate Finance Committee
State Capitol Building
Juneau, AK 99801

February 6, 2013

Re: in opposition of SB 29, cruise ship wastewater discharge bill

Dear Members of the Senate Finance Committee:

Thank you for the opportunity to testify on SB 29, the cruise ship wastewater discharge bill.

My name is Eli Hanlon III. I was born and raised here in Southeast Alaska. I grew up in Yakutat, Alaska which is where I currently reside. I make my living as a commercial oyster farmer, as a customary and traditional hunter/fisherman, and as an Alaska Native artist. In sum, all facets of my economic and cultural livelihood depend on a high standard of water quality and I was thus in very strong support of the 2006 citizen initiative. I am deeply concerned that my cultural and economic wellbeing will be degraded if the discharge standards for the cruise ship industry are lowered.

I am therefore writing to oppose SB 29 because 1) scientific studies have shown that contaminants such as dissolved copper have negative effects on shellfish, such as oysters; and 2) the potential for negative impacts on our customary and traditional resources is far too great.

1) Scientific studies show that the contaminants commonly found in cruise ship wastewater discharges have negative effects on shellfish

I oppose SB 29 because my commercial oyster farm depends on clean water and the bill will compromise the high water quality standards that my business requires. Oysters are filter feeders, which mean that they ingest any particulate matter in the water column. Thus, they could be negatively affected by directly ingesting partially treated human waste and other contaminants that would be released in the cruise ship discharge. In addition, oyster could be indirectly affected by ingesting plankton that has been exposed to the wastewater. Please see attached report which explains the effects of dissolved copper on fishes, shellfish, birds, and mammals in saltwater and freshwater systems.

It will be difficult for me to sell oysters from Alaska's pristine waters if the oyster industry is tainted with claims that our waters are contaminated. Additionally, it will be health hazardous to Alaskans if our traditional wild foods that we have always consumed experience increased rates of contaminants such as copper.

2) The potential for negative impacts of contaminants on our customary and traditional resources is far too great

Yakutat is one of many Tlingit villages that still derive much of our cultural identity and economic wellbeing from our natural surroundings. We continue to traditionally hunt, fish, and gather year round. I oppose SB 29 because the wastewater discharge from the cruise ships will threaten our health and wellbeing by contaminating our customary and traditional resources that we continue to harvest and depend upon today.

The cruise ships' untreated wastewater discharge is known to contain contaminants such as dissolved copper and ammonia. These contaminants are known to have negative effects on many of our harvested species. For example, increased amounts of copper in the water make it difficult for salmon to smell, thus having difficulty finding their spawning streams. If the salmon populations continue to decrease, this will compromise my ability to feed my family and my community as we have done for countless generations. Concern over the effects of cruise ships on our fisheries is shared by many Alaskans and this is why there was the 2006 citizen initiative. I urge you to uphold the 2006 citizen initiative and not go against the will of Alaskan voters-including myself.

Conclusion

As a life-long Alaskan who has no intent on ever residing anywhere else in the world, my livelihood relies on maintaining pristine water quality. My business as an oyster farmer would be compromised by impaired water quality because oysters are filter-feeders. My cultural identity and existence is derived from the continued practice of customary and traditional hunting and fishing for resources such as salmon, herring, seals, kelp, seaweeds, and so much more. These too will be compromised and threatened if cruise ships are allowed to dump their untreated wastes into our waters. I therefore strongly oppose SB29 and urge you to do the same.

Thank you for the opportunity to testify.

Sincerely,

/s/

Eli Hanlon III

Commercial oyster farmer; Customary/Traditional hunter and fisherman; Alaska Native artist

Doniece Gott

From: Marc Scholten <scholtenmarc@gci.net>
Sent: Wednesday, February 06, 2013 6:19 PM
To: Senate Finance Committee
Subject: HB-29 opposition to HB29

Dear Senate finance committee:

Please give testimony/consideration of my opposition to SB 29. I am very concerned that we do not make pollution laws weaker . With the increasing acidity and temperatures of our oceans and declining fish stocks and decline of other marine creatures we need to insure we can do everything that current technology allows to decrease pollution of our seas. It is proven that high mercury levels produce birth defects in ocean and land creatures. Other toxins from cruise ship dumping also causes harm to marine life. All the pollution and increase of acidity is cumulative, so it is imperative that we reduce pollution to our seas any way we can. Thanks for this opportunity to comment.

Sincerely, Marc Scholten
Douglas, Ak

Dear Senate Finance Committee Members,

I am writing to ask you not to pass HB 80 out of your committee in its current form. I was born in Juneau, and I am now a ninth grader at Juneau Douglas High School. I am glad cruise ships come to Juneau, and I enjoy the activity and excitement they bring to town each summer. However, I believe cruise ships should be asked to meet the standards in the current law or "pack it out" of Alaska until they can make changes to their ships to meet the standards.

I oppose HB 80 because:

1. The copper, ammonia, nickel and zinc in the wastewater are harmful to salmon and other sea life. Copper makes it hard for salmon to find their native streams, and ammonia causes algal blooms that lead to more PSP.
2. The fishing industry is very important to Southeast Alaska, and clean water is one of the reasons people buy Alaska fish.
3. In 2006, Alaskans passed a ballot initiative that created the current standards for water as it leaves the cruise ship pipes. HB 80 would weaken the law passed by voters.
4. We regularly swim and wade in Gastineau Channel, which means we swim in the cruise ship discharge.
5. Many cruise ships follow the same path, so their mixing zones will overlap, which will increase the effect of the wastewater.
6. Our neighbors the people of Kake, sent a letter stating their concern about HB 80.
7. The bill is passing through the legislature too quickly for regular people to figure it out and express their opinions.

Thank you for considering my opinion,

Madeline Handley

630 Dixon St.

Juneau, AK 99801

Doniece Gott

From: Stacie Joseph <staciejoseph99835@gmail.com>
Sent: Tuesday, February 05, 2013 12:37 PM
To: Senate Finance Committee
Subject: no cruise ship dumping close to us

Please do not loosen the regulations on cruise ship dumping. Allowing them to dump so close to our ports is damaging to the natural beauty and endangers the wildlife. Thank you, from Sitka, Stacie Joseph

Doniece Gott

From: sigrid Bulloch <goofygirl@gci.net>
Sent: Tuesday, February 05, 2013 2:23 PM
To: Senate Finance Committee
Subject: dumping

I have heard that a bill has passed, allowing cruise ship to dump their sewage into our waters. I can't believe that this is even being talked about let alone voted on, how could anyone approve this? This is gross! The lobbyist has bought somebody.

I cannot believe this is up for vote, and I cannot believe it has passed how this cans happen this day and age.

Somebody please explain to me how this is a good idea, please!

Sigrid Bulloch

907-243-4126



THE STATE
of **ALASKA**
GOVERNOR SEAN PARNELL

**Department of Environmental
Conservation**

OFFICE OF THE COMMISSIONER

Post Office Box 111800
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February 6, 2013

Edward K. Thomas
President
Central Council Tlingit and Haida Indian Tribes of Alaska
9097 Glacier Highway
Juneau, Alaska 99801-6922

Dear Mr. Thomas:

I am in receipt of a copy of your February 1 letter to the House Resources Committee expressing concerns about House Bill 80, a bill that would make several changes to existing state requirements relating specifically to the discharge of treated wastewater from commercial passenger vessels ("cruise ships"). I appreciate your interest in this bill and the need to protect water quality. I am providing some information that might be helpful in understanding why the Department of Environmental Conservation, which has been working diligently for a number of years on the concerns you describe in your letter, believes HB 80 would not result in the adverse effects on water quality you anticipate. In this letter, I also note several important provisions in DEC's water quality criteria and mixing zone regulations, which will continue to apply to cruise ships just as they do to other dischargers, and how these provisions protect marine and fresh waters of Alaska. We at DEC would be pleased to have the opportunity to follow up with you or your board on any other questions or concerns you might still have on this topic.

Background

All large cruise ships discharging in Alaska currently have Advanced Wastewater Discharge Treatment Systems onboard to treat wastewater before discharge. An earlier science panel, the current Science Advisory Panel, and the Department have all determined that, as a class, cruise ships using Advanced Wastewater Treatment systems have the best technology available for ships. Advanced Wastewater Treatment Systems generally produce higher quality effluent than shore-side treatment plants. The quality of the treated effluent of these cruise ships also exceeds that of other types of vessels operating in Alaska waters that do not employ Advanced Wastewater Treatment Systems.

In 2012 there were 28 ships that came to Alaska. Only 17 were permitted by DEC to discharge treated wastewater in Alaska waters. Eleven were permitted to discharge only while underway. Only seven cruise ships were also authorized to discharge while in port, with more stringent effluent limits.

Current state law requires large cruise ships that discharge treated wastewater into waters of the state to meet state water quality criteria "at the point of discharge." In other words, the quality of the treated effluent has to meet these high standards in the pipe within the ship before it is discharged into the receiving waters. No other dischargers, including other types of ships or shore-side treatment plants, are held to this standard, nor could most of them likely come close to meeting it. HB 80 would authorize DEC to permit

large cruise ship discharges using the same requirements that apply to all other dischargers in Alaska – those dischargers include community domestic wastewater treatment facilities and discharges from the timber, oil and gas, seafood, mining, and construction industries. Under HB 80, cruise ships operating in Alaska would be allowed to apply for a mixing zone. A mixing zone is a limited area in the receiving water where the treated effluent “mixes” with the receiving water before all water quality criteria must be met. Shore-based facilities around Alaska have been permitted to operate with such mixing zones for decades. All draft wastewater discharge permits and the proposed mixing zones, including permits for cruise ships, are publicly noticed for review and comment.

However, under HB 80, only large cruise ships with Advanced Wastewater Treatment Systems are even eligible to apply for authorization of a mixing zone. This assures that large cruise ships operating in Alaska will continue to have the best available wastewater treatment systems on-board. As you may already know, the treated effluent from these systems already largely meets state water quality criteria “at the point of discharge” and it is likely mixing zones would only be required for four parameters – ammonia and three dissolved metals (zinc, nickel and copper.)

Again, only large cruise ships with Advanced Wastewater Treatment Systems could apply for a mixing zone. Even then, no mixing zones would be allowed unless they could show to DEC’s satisfaction that the discharge would also comply with the 19-point “test” in DEC’s mixing zone regulations. These are the same regulations that apply to all other dischargers. The mixing zone regulations include requirements such as:

- no lethality to passing organisms
- overall biological integrity of the waterbody will not be impaired
- mixing zone is as small as practicable
- can’t preclude fish and shellfish harvesting
- can’t result in a reduction in fish or shellfish population levels
- can’t contain pollutants that bioaccumulate or persist above natural levels
- can’t result in undesirable or nuisance aquatic species

With these background points in mind, I will try to address some of the specific concerns raised in your letter.

Concern: HB 80 will significantly reduce protection of Alaskan marine water quality from pollution, in part because DEC sets different discharge limits for different vessels and ships get to set their own limits.

There are different types of Advanced Wastewater Treatment Systems made by different manufacturers. Some of them are configured differently and they may treat different waste streams. Even though some vessels may have the same type of system, there may be individual differences in the effluent quality due in part to these differences in configuration. These differences are accounted for by DEC when preparing its permit. Permit limits are not now, nor would they be under HB 80, determined by the cruise ship companies themselves.

Concern: Cruise ships discharged 23-160 times over the “allowable amount under water quality standards.” This will increase algal blooms and increase paralytic shellfish poisoning.

The chronic marine water quality criterion for ammonia (a nutrient) that is established to protect aquatic life is 1 milligram per liter (mg/l) over a four-day period. A gram is about 1/28 of an ounce. One milligram would be one one-thousandth of that amount, or one twenty-eight thousandth of an ounce. A liter is about a quart, so the standard is approximately one twenty-eight-thousandth of an ounce in a quart of water.

Effluent limits for ammonia in the current cruise ship wastewater discharge permit, for the seven vessels permitted to discharge in port, range from 12-28 milligrams per liter, which equals four ten-thousandth to ten ten-thousandth of an ounce in a quart of water. These permit limits are established to ensure that water quality standards are met in the marine water within about 15 yards of the discharge point for those seven vessels that are permitted to discharge when stationary. This is fully protective of the aquatic life in marine waters.

The effluent limits in the current permit for ammonia for the 17 vessels that were permitted to discharge underway range from 12-143 milligrams per liter. Dilution when a vessel discharges while underway is so great that the water quality standard is met nearly instantaneously after discharge to marine waters. For example, the dilution is calculated to be about 1 in 50,000 when a ship is going 6 knots. In other words, if the concentration of ammonia being discharged is 143 milligrams per liter, within seconds that 143 milligrams per liter is diluted to $143 \div 50,000$, or 0.00286 milligrams per liter, which is far below the 1 milligram per liter standard. Thus, there is an extremely low risk that any aquatic life in the area of the cruise ship would be exposed to any harmful concentrations of pollutants. Any exposure that could occur would be extremely short in duration because of the rapid mixing, rather than the exposure occurring over a period of days or hours as would be necessary for effects to occur.

There was no science or data provided by or to the Science Advisory Panel indicating that cruise ship discharges in Alaska cause an increase in algae growth, let alone, cause a bloom. Nor was any scientific link to paralytic shellfish poisoning in Alaska provided. The Science Advisory Panel was aware of information about nitrogen and phosphorous loading from cruise ships in the Baltic Sea, but the Panel as a whole did not extend that concern to Alaska. That is likely due to the very different nature of the Baltic Sea – it is shallow (about 30 fathoms deep) with a very low exchange of water – water remains in the Baltic for up to 30 years. Additionally, there are some 80+ million passengers in the Baltic Sea each year, whereas all of Alaska only has about one million passengers per year.

If any data or analyses come forward to show these nutrients could be concerns in Alaska, they could be addressed either in the state's water quality criteria, the state mixing zone regulations, or the terms of the permit itself. Nothing in HB 80 limits or changes DEC's authorities in these areas.

Concern: Discharging ammonia and other waste will support the growth and propagation of invasive species. Invasive species may come from cruise ship wastewater discharges.

Again, no data or analyses were provided to the Science Advisory Panel regarding a concern like this. DEC regulations prohibit a mixing zone if it will result in undesirable or nuisance aquatic life. Wastewater on a cruise ship - which originates as drinking water - is generated from its use in accommodations, the galley, the laundry, etc. It is highly unlikely that the original water source (drinking water) would contain invasive species and even more unlikely that such a species could survive treatment through an Advanced Wastewater Treatment System. However, if data or analyses are developed that show invasive species could be a concern, these concerns could be addressed through DEC's existing authorities and permit conditions, which again would not be diminished by HB 80.

Concern: HB 80 is not based on the best available science and technology and limits public participation because the Science Advisory Panel has only issued a preliminary report and HB 80 repeals the Science Advisory Panel prior to its "legislatively mandated final report." This eliminates further public involvement.

The existing law directs DEC to evaluate potential wastewater treatment methods that could result in cruise ships meeting water quality standards at the point of discharge, with advice from a Science Advisory Panel.

The Panel does not have an obligation to produce a report; however, they elected to provide information and findings to DEC through a report on their work. Although the title of their report includes the word "Preliminary," the finding they made that Advanced Wastewater Treatment Systems, as a class, are the best currently available and are anticipated to continue to be the best available systems in the foreseeable future, are definitive. These findings support HB 80. A thorough reading of the contents of the report, and not just selected portions and the title, is important in order to understand the report's findings. The results of two science advisory panels and two technology conferences have produced consistent results. There are no existing or emerging technologies available and engineered for installation on cruise ships that will allow the ships to meet all water quality standards at the point of discharge.

Again, it is also important to remember that DEC has many other statutory authorities (like its ability to set and amend water quality criteria and to put necessary limitations on the authorization of mixing zones) that will continue in full force if HB 80 passes. Under HB 80, DEC retains its existing authority to continue to evaluate future technological improvements and to hold cruise ships to higher standards as technology advances.

Conferences and the Panel's meetings have been open to the public and any future workshops sponsored by DEC would also be open to the public. The public has an opportunity to review and comment on a new draft of the cruise ship wastewater discharge permit every time it is re-issued (every 5 years). Historically, when DEC has convened its own technology conferences, these have been noticed and open to the public, including the cruise ship wastewater treatment technology workshops DEC convened in Juneau in 2009 and in September of 2012.

Concern: The panel only considered the impacts of one ship discharging in Alaskan waters and did not consider the effects of multiple ships. A newer, more sophisticated dilution model is needed.

Among the many requirements of DEC's mixing zone regulations, consideration must be given to the cumulative effects of multiple discharges, including discharges from sources other than cruise ships. In setting effluent limits for wastewater discharges from cruise ships or from other types of regulated ships or facilities, the Department considers other discharges in the area and other types of information such as effluent quality, quantity, and location; the characteristics of the discharge; characteristics of the receiving water such as flow, tidal influence, and stratification; and dilution studies specific to the type of discharge. The models DEC uses to predict concentrations within and at the boundaries of proposed mixing zones are in standard use around the country. If refinements to these models become available, they can be incorporated. Again, HB 80 would not put any limitations on DEC's ability to do this.

Concern: The Department is not considering the effects of dissolved copper in saltwater habitats.

Water quality standards are established by each state under a process set out in the federal Clean Water Act and implementing regulations by EPA. Following the federal requirements, DEC sets water quality criteria for different pollutants (such as for copper) that are designed to protect the existing and potential uses (such as the growth and propagation of fish and shellfish) of marine and freshwater. States are required to review their water quality criteria every three years to ensure they incorporate the most current and defensible science. The criteria are established in DEC regulations which undergo public review and comment, and which must be approved by EPA. The Science Advisory Panel was not tasked with evaluating the appropriateness of any of the Department's water quality criteria. HB 80 does not make any changes to the water quality criteria. Nor does HB 80 in any way change the rigorous scientific and public process DEC is required to follow to set and update its water quality criteria, including its statewide marine and freshwater criteria for copper.

The Department adopted copper criteria for both fresh and marine water developed by the Environmental Protection Agency to protect aquatic life. These criteria were based on many studies of both chronic and acute toxicity in marine and fresh water.

Recent studies indicating behavioral changes in salmonids at low concentrations of copper have been done in fresh water. The researchers themselves indicated that their results cannot be extrapolated to marine waters. The Department will continue to evaluate the evolving science on copper and when/if it is scientifically defensible, will change the water quality criteria for fresh and/or marine waters as appropriate.

Concern: Marine species will be at risk if less stringent discharge standards are implemented.

The cruise ships in Alaska have vastly improved the quality of wastewater discharge since all vessels began using Advanced Wastewater Treatment Systems by 2004. There have been no indications of harm to aquatic resources either before or since that time.

HB 80 will treat cruise ship discharge permits based on potential impact to the environment rather than based on the source of the discharge. The bill will result in them being permitted to discharge under the same rules as all other discharges and which are described above. Permits for the discharge of treated wastewater generally become more stringent over time, not less.

Thank you again for your interest in this legislation. Again, I would be happy to provide you with any additional information that may help you understand the legislation, cruise ship activities in the State, and the nature of their treated wastewater discharges.

Sincerely,



Larry Hartig
Commissioner

cc: The Honorable Senator Giessel
The Honorable Senator Dyson
The Honorable Senator Kelly
The Honorable Senator Meyer
The Honorable Representative Feige
The Honorable Representative Saddler



Southeast Alaska Conservation Council

419 Sixth Street, Suite 200 Juneau, AK 99801 Phone: (907) 586-6942 Fax: (907) 463-3312

Senator Kevin Meyer
Chairman Senate Finance Committee
Alaska State Capitol, Room 518
907-465-4945

Re: SB29/HB80 Issues and Questions Dealing With The Science Advisory Panel's Preliminary Report

Dear Senator Meyer,

Thank you for giving us the opportunity to testify today. We would like to submit this document for the record and see if your committee could find the answers to these and other questions.

Thank you

James Sullivan
Legislative Organizer
Southeast Alaska Conservation Council

We have been told by DEC that the Water Quality Criteria (WQC) is unattainable for cruise ships in the key categories of Ammonia, Copper, Nickel, and Zinc. How is it then, that the spreadsheet on page 28 shows that numerous ships have attained a level, on average, within the WQC?

Please look at the spreadsheet on page 25 and see the bottom row, Carnival Spirit, has an almost perfect score. According to the data they exceeded the WQC only 3 out of 40 times. Can we find out there methods of discharge and why their score is different from the other ships?

7 different advanced water treatment systems (AWTS) are discussed on pages 30 & 31. Can we contact these companies and see what ideas they have on handling the treatment of ammonia, copper, nickel, and zinc?

Can we get a list of every cruise ship planning on cruising through Alaska waters this year, find out what AWTS they have in place, and their method of discharge? This would allow us to discuss best practices and make recommendations other than mixing zones

**SB20 Hearing Testimony by Vi Waghiyi, Native Village of Savoonga Tribal Member
February 7, 2013**

Co-Chairs Senators Kelly and Meyer and Members of the Senate Finance Committee:

I represent the Native Village of Savoonga on St. Lawrence Island. My name is Vi Waghiyi, I'm the daughter of the late John and Della Waghiyi, I'm a Yupik mother and grandmother. Thank you for taking my testimony today.

Our people are very concerned about cruise ship contamination polluting the ocean waters in the Bering Sea, and we ask you to oppose Senate Bill 29 on cruise ship wastewater.

Our Yupik people of Gambell and Savoonga have lived on our island which we call Sivuqaq, for over 10,000 years. We have two villages with 800 people in each village. We depend on the sea for our physical, cultural, and spiritual sustenance. We are blessed with a rich ocean environment including sea mammals and other animals that have sustained our people over all these years.

We understand that if this bill passes, both large and smaller cruise ships will be allowed to release partially treated human waste and grey water discharges into the waters from which we draw our sustenance. With waters warming up here, we are getting more cruise ships coming closer to the island each year. Allowing them to dump their waste into the sea is unacceptable to us, and we ask that you help by opposing the passage of this bill and ensure that our voices are heard.

We are especially concerned about the discharge of ammonia wastes by ships. Ammonia discharges unnaturally fertilize the tiny plants of the sea, the phytoplankton, causing unusual and harmful algal blooms. Some of these blooms are toxic and can carry Paralytic Shellfish Poisoning.

We are also concerned about the heavy metals including zinc, copper and nickel. Heavy metals can concentrate in the meat of our traditional foods and in the food chain. We are at the top of that food chain, and heavy metals can make humans sick, cause immune system suppression, brain damage, reproductive problems and illnesses.

Some of our primary foods will be at risk. Out here, we rely on our subsistence foods such as: seals, walrus, bow-head whales, clams, uupa (sea peaches), seaweeds, crab, salmon, tomcod, halibut, char and seabird eggs. All of our (neqepik) traditional foods may be damaged by cruise ship wastes.

For example, young salmon are affected by the copper in the waste and it can destroy their ability to navigate in the ocean and back. Crabs can accumulate PSP. Clams can get PSP, and accumulate heavy metals. The walrus eat the clams, and so do some seabirds. The primary food

of bow-head whales we hunt, krill, can be affected by the metals and ammonia released by ships. Bow-head whales, walrus and seals are our primary food we harvest from the ocean.

This is a matter of our food safety, health and well-being, and the survival of our people, our children and our future generations. Please do not pass this bill that will harm our traditional foods that sustain our Yupik people of St. Lawrence Island. Igamsiqayugviikamsii, thank you for representing us.

Senator Olson asked me to describe the changes we are seeing in our traditional foods, my response is below:

We are some of the most highly contaminated population on the planet because of our reliance on our traditional foods due to global contaminants, Persistent Organic Pollutants (POPs) that travel northward through air and ocean currents. These POPs come up to the Arctic because it's cold and get trapped here and are ending up in our environment, our lands, our oceans, in our traditional foods and in our bodies. We have had a community based project since 2000 addressing our concerns of global contaminants and two former Air Force Bases on our Island. We sampled and tested our traditional foods and found very high levels of PCBs, also pesticides and heavy metals that we attribute to POPs. We are being contaminated without our consent from global contaminants that have greatly affected the health and well-being of our Yupik People. Our health has been compromised by the abandoned military contamination on our Island and global sources already so we are asking you to hold the cruiseship industry to the highest standards possible and not to put profit before the health and well-being of our Yupik People.

Doniece Gott

From: Carol Ann Woody <carolw@alaskalife.net>
Sent: Thursday, February 07, 2013 2:41 PM
To: Senate Finance Committee
Subject: Cruise Ship Waste Discharge

7 Feb. 2013

Dear Committee,

The cruise ship industry, in response to a citizen initiative, has made great strides in reducing toxic discharges into Alaskan waterways, except in regards to ammonia, copper, nickel, and zinc. Ammonia and copper can be highly toxic to marine species (see references attached). Continued discharges of such toxins into marine environments can cause their build up in sediments- removal and remediation of contaminated sediments now costs the US billions and harms marine life.

The cruise ship industry should be held to meeting Alaska Marine Water Quality Standards at the point of discharge. Period. There are other technologies that can and should be applied such that cruise ships do not continue to discharge toxic waste into Alaskan waters - see attached references below

I urge you to continue to hold the cruise ship industry responsible for meeting Alaska's Marine Water Quality Criteria at the point of discharge, instead of changing the law to allow cruise ship "mixing zones". The reason cruise ships come to Alaska is because our marine environments still supports healthy abundant populations of wildlife, fishes, birds, etc. all of which are a product of Alaska's high water quality. Conserve Alaskan waters for future Alaskans and tourist dollars.

Carol Ann Woody, Ph.D.
6601 Chevalier St.
Anchorage AK 99502
phone: 907.242.3496

References

Copper Toxicity in the Marine Environment

Eisler R. 1998. Copper hazards to fish, wildlife, and invertebrates: A synoptic review. US Geological Survey. Contaminant Hazard Reviews Report 33. Available on the web.

Excerpt pg. 48: The most sensitive saltwater species to copper have LC50 (96 h) values from 28 to 39 ug/L and include summer flounders (*Paralichthys dentatus*), copepods (*Acartia tonsd*), and softshell clams (*Mya arenaria*; USEPA 1980; Eisler 1995; Table 5). Adverse sublethal effects of copper on representative species of estuarine algae, mollusks, and arthropods frequently occur at 1 to 10 ug/L (Bryan and Långsten 1992; Table 5).

Excerpt from page 71:

Fishes

Adverse sublethal effects of copper on behavior, growth, migration, and metabolism occur in representative species of fishes at nominal water concentrations between 4 and 10 ug/L. In sensitive species of teleosts, copper adversely affects reproduction and survival from 10-20 ug Cu/L (Hodson et al. 1979; Table 5). Copper exerts a

wide range of physiological effects in fishes, including increased metallothionein synthesis in hepatocytes, altered blood chemistry, and histopathology of gills and skin (Iger et al. 1994). At environmentally realistic concentrations, free copper adversely affects resistance of fishes to bacterial diseases; disrupts migration (that is, fishes avoid copper-contaminated spawning grounds); alters locomotion through hyperactivity; impairs respiration; disrupts osmo-regulation through inhibition of gill Na⁺-K⁺-activated AT- Pase; is associated with tissue structure and pathology of kidneys, liver, gills, and other hematopoietic tissues; impacts mechanoreceptors of lateral line canals; impairs functions of olfactory organs and brain; and is associated with changes in blood chemistry, enzyme activities, and corticosteroid metabolism (Hodson et al. 1979). Copper-induced cellular changes or lesions occur in kidneys, lateral line, and livers of several species of marine fishes (Gardner and LaRoche 1973).

Grosell M, Blanchard J, Brix KV, Gerdes R: Physiology is pivotal for interactions between salinity and acute copper toxicity to fish and invertebrates. *Aquatic Toxicology* 2007, 84:162-172.

Main WPL, Ross C, Bielmyer GK: Copper accumulation and oxidative stress in the sea anemone, *Aiptasia pallida*, after waterborne copper exposure. *Comparative Biochemistry and Physiology Part C Toxicology & Pharmacology* 2010, 151:216-221.

Viant MR, Walton JH, TenBrook PL, Tjeerdema RS: Sublethal actions of copper in abalone (*Haliotis rufescens*) as characterized by in vivo P-31 NMR. *Aquatic Toxicology* 2002, 57:139-151.

Pinto E, Sigaud-Kutner TCS, Leitao MAS, Okamoto OK, Morse D, Colepicolo P: Heavy metal-induced oxidative stress in algae. *Journal of Phycology* 2003, 39:1008-1018.

Challenges for the development of a biotic ligand model predicting copper toxicity in estuaries and seas

Author(s): de Polo, A (de Polo, Anna)^{1,11}; Scrimshaw, MD (Scrimshaw, Mark D.)^{1,11}

Source: ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY Volume: 31 Issue: 2 Pages: 230-238 DOI: 10.1002/etc.1705 Published: FEB 2012

Times Cited: 0 (from Web of Science)

Cited References: 95 [[view related records](#)] [Citation Map](#)

Abstract: An effort is ongoing to develop a biotic ligand model (BLM) that predicts copper (Cu) toxicity in estuarine and marine environments. At present, the BLM accounts for the effects of water chemistry on Cu speciation, but it does not consider the influence of water chemistry on the physiology of the organisms. We discuss how chemistry affects Cu toxicity not only by controlling its speciation, but also by affecting the osmoregulatory physiology of the organism, which varies according to salinity. In an attempt to understand the mechanisms of Cu toxicity and predict its impacts, we explore the hypothesis that the common factor linking the main toxic effects of Cu is the enzyme carbonic anhydrase (CA), because it is a Cu target with multiple functions and salinity-dependent expression and activity. According to this hypothesis, the site of action of Cu in marine fish may be not only the gill, but also the intestine, because in this tissue CA plays an important role in ion transport and water adsorption. Therefore, the BLM of Cu toxicity to marine fish should also consider the intestine as a biotic ligand. Finally, we underline the need to incorporate the osmotic gradient into the BLM calculations to account for the influence of physiology on Cu toxicity. *Environ. Toxicol. Chem.* 2012;31:230238. (C) 2011 SETAC

Zinc Toxicity in the Marine Environment

The Effects of Salinity on Acute Toxicity of Zinc to Two Euryhaline Species of Fish, *Fundulus heteroclitus* and *Kryptolebias marmoratus*

Author(s): Bielmyer, GK (Bielmyer, Gretchen K.)¹¹; Bullington, JB (Bullington, Joseph B.)²¹; DeCarlo, CA (DeCarlo, Carri A.)¹¹; Chalk, SJ (Chalk, Stuart J.)²¹; Smith, K (Smith, Kelly)²¹

Source: INTEGRATIVE AND COMPARATIVE BIOLOGY Volume: 52 Issue: 6 Pages: 753-760 DOI: 10.1093/icb/ics045 Published: DEC 2012

Times Cited: **1** (from Web of Science)

Cited References: **39** [[view related records](#)] [Citation Map](#)

Abstract: It is well known that the toxicity of zinc (Zn) varies with water chemistry and that its bioavailability is controlled by ligand interactions and competing ions. Zn toxicity in freshwaters with varying water chemistry has been well characterized; however, far less attention has been paid to the toxicity of Zn in estuarine and marine systems. We performed experiments using two euryhaline species of killifish, *Fundulus heteroclitus* and *Kryptolebias marmoratus*, to investigate the effects of changing salinity on acute toxicity of Zn. Larvae (7- to 8-days old) of each species were exposed to various concentrations of Zn for 96 h at salinities ranging from 0 to 36 ppt and survival was monitored. As salinity increased, Zn toxicity decreased in both fish species, and at salinities above 10 ppt, *K. marmoratus* larvae were generally more sensitive to Zn than were those of *F. heteroclitus*. The protection of salinity against Zn toxicity in *F. heteroclitus* was further investigated to determine the role of Ca²⁺. Increased Ca²⁺ in freshwater protected against Zn toxicity to the same extent as did saline waters with an equal Ca²⁺ concentration up to similar to 200 mg/L Ca for *F. heteroclitus* and similar to 400 mg/L Ca for *K. marmoratus*. These results suggest that these two species may have differing Ca²⁺ requirements and/or rates of Ca²⁺ uptake in water of intermediate to full-strength salinity (similar to 200-400 mg/L Ca²⁺) and thus differ in their sensitivity to Zn. The overall goal of this study was to better understand Zn toxicity in waters of different salinity and to generate data on acute Zn toxicity from multiple species over a range of salinities, ultimately for use in development of estuarine and marine biotic ligand models.

Novel ways to remove heavy metals & pollutants

Removal of heavy metals by biosorption

Author(s): Mudhoo, A (Mudhoo, Ackmez)¹¹; Garg, VK (Garg, Vinod K.)²¹; Wang, SB (Wang, Shaobin)²¹

Source: ENVIRONMENTAL CHEMISTRY LETTERS Volume: 10 Issue: 2 Pages: 109-117 DOI: 10.1007/s10311-011-0342-2 Published: JUN 2012

Times Cited: **2** (from Web of Science)

Cited References: **45** [[view related records](#)] [Citation Map](#)

Abstract: Industrialization and urbanization have resulted in increased releases of toxic heavy metals into the natural environment comprising soils, lakes, rivers, groundwaters and oceans. Research on biosorption of heavy metals has led to the identification of a number of microbial biomass types that are extremely effective in bioconcentrating metals. Biosorption is the binding and concentration of adsorbate from aqueous solutions by certain types of inactive and dead microbial biomass. The novel types of biosorbents presently reviewed are grouped under fungal biomass, biomass of non-living, dried brown marine algae, agricultural wastes and residues, composite chitosan biosorbent prepared by coating chitosan, cellulose-based sorbents and bacterial strains. The reports discussed in this review collectively suggest the promise of biosorption as a novel and green bioremediation technique for heavy metal pollutants from contaminated natural waters and wastewaters.

Arch Environ Contam Toxicol. 2004 Nov;47(4):440-7.

Use of zeolite for removing ammonia and ammonia-caused toxicity in marine toxicity identification evaluations.

Burgess RM, Perron MM, Cantwell MG, Ho KT, Serbst JR, Pelletier MC.

Source

United States Environmental Protection Agency, ORD/NHEERL Atlantic Ecology Division, 27 Tarzwell Dr., Narragansett, Rhode Island 02882, USA. burgess.robert@epa.gov

Abstract

Ammonia occurs in marine waters including effluents, receiving waters, and sediment interstitial waters. At sufficiently high concentrations, ammonia can be toxic to aquatic species. Toxicity identification evaluation (TIE) methods provide researchers with tools for identifying aquatic toxicants. For identifying ammonia toxicity, there are several possible methods including pH alteration and volatilization, *Ulva lactuca* addition, microbial degradation, and zeolite addition. Zeolite addition has been used successfully in freshwater systems to decrease ammonia concentrations and toxicity for several decades. However, zeolite in marine systems has been used less because ions in the seawater interfere with zeolite's ability to adsorb ammonia. The objective of this study was to develop a zeolite method for removing ammonia from marine waters. To accomplish this objective, we performed a series of zeolite slurry and column chromatography studies to determine uptake rate and capacity and to evaluate the effects of salinity and pH on ammonia removal. We also assessed the interaction of zeolite with several toxic metals. Success of the methods was also evaluated by measuring toxicity to two marine species: the mysid *Americamysis bahia* and the amphipod *Ampelisca abdita*. Column chromatography proved to be effective at removing a wide range of ammonia concentrations under several experimental conditions. Conversely, the slurry method was inconsistent and variable in its overall performance in removing ammonia and cannot be recommended. The metals copper, lead, and zinc were removed by zeolite in both the slurry and column treatments. The zeolite column was successful in removing ammonia toxicity for both the mysid and the amphipod, whereas the slurry was less effective. This study demonstrated that zeolite column chromatography is a useful tool for conducting marine water TIEs to decrease ammonia concentrations and characterize toxicity.



UNITED FISHERMEN OF ALASKA

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February 5, 2013

Senator Kelly and Senator Meyer
Co-Chairs Senate Finance
State Capitol, Rm 516 & 518
Juneau, AK 99801-1182

RE: RECOMMENDATIONS - SB 29 CRUISE SHIP WASTEWATER DISCHARGE

Dear Senator Kelly and Senator Meyer,

United Fishermen of Alaska (UFA) is the largest statewide commercial fishing trade association, representing 34 commercial fishing organizations participating in fisheries throughout the state and its offshore federal waters. Thank you for the opportunity to provide our recommendations regarding SB 29.

UFA believes that the control of all forms of cruise ship wastewater discharge should be directed to occur seaward of the territorial sea boundary (approximately three (3) miles from adjacent shorelines) or discharged into land based systems and that for the purposes of this requirement the "doughnut holes" (federal waters) present within some interior waters of Southeast Alaska and Prince William Sound shall be closed to discharge except, as allowed under special circumstances, by the Commissioner of the Department of Environmental Conservation.

In the absence of requirements to discharge outside of three miles, UFA continues to urge the cruise industry to sit down with affected parties and individuals to establish reasonable no discharge zones. UFA also supports restricting discharges in critical or sensitive habitat.

UFA also supports a requirement for an applicable technology review, for the purposes of requiring upgrades to improved discharge, at the five (5) years permit reissue. If the technologies for improvement are found to exist there would be a period, not exceed two operational years, for vessels to come into compliance with the improvements.

Thank you for considering our recommendations, please let us know if you have any questions.

Sincerely,

Julianne Curry
Executive Director



3075 Vintage Blvd., Suite 200, Juneau, Alaska 99801-7109 (907) 790-4990 Fax (907) 790-4999

February 6, 2013

The Honorable Kevin Meyer
Co-Chair, Senate Finance Committee
Alaska State Legislature
State Capital Room 532
Juneau, AK 99801

Re: House Bill 80 – Letter of Support

Dear Senator Meyer,

On behalf of Goldbelt, Incorporated, I would like to express our support for House Bill 80, an act relating to the regulation of wastewater discharge from commercial passenger vessels in state waters.

Organized under the terms of the Alaska Native Claims Settlement Act, Goldbelt is an urban, for-profit corporation with over 3,300 tribal member shareholders, most of who reside in Alaska. Goldbelt is more than just a for profit business however, we are a community organization that is charged with the responsibility of promoting the socio-economic well-being of our shareholders.

This is a responsibility that is taken seriously and financial returns generated from our operations are distributed back to our shareholders and descendants in the form of dividends, scholarships, elder's benefits, internships, numerous job opportunities and in support of the Goldbelt Heritage Foundation, a non-profit organization which is dedicated to the preservation and promotion of the Tlingit culture and language.

The heart of Goldbelt's tourism operations and the primary source of financial returns in Alaska is the Mount Roberts Tramway in Juneau. The Tram is one of the premier tourist attractions in the state with up to 200,000 ticketed passengers riding it every summer. Approximately three fourths of those passengers come from the cruise lines.

Over the years, we have seen our ticket sales at the Tram mirror the number of cruise ships and cruise line passengers disembarking in Juneau. It is evident that our operations are sensitive to an industry which can easily change their venues to new ones with reasonable permitting and attainable standards. The economic impact on our operations from a reduction or loss of cruise ship passengers would be felt immediately and difficult at best to recover.

We understand that a panel of independent experts created by the Legislature concluded that cruise ships have the best technology available and no proven system exists which can meet the 2006 initiative standards. Also, this piece of legislation allows the DEC to issue permits applying

Alaska's tough Water Quality Criteria while not reducing any standards for cruise ships and still requiring more advanced treatment than other dischargers in Alaska.

In turn, Goldbelt supports HB 80 as we believe it will have a positive effect on the cruise line industry, the economic health of our state, and the financial performance of our operations. We respectfully ask for your consideration and support of it too.

Sincerely,

A handwritten signature in black ink, appearing to read "Derek Duncan". The signature is fluid and cursive, with a long horizontal stroke at the end.

Derek Duncan
Vice President, Alaska Operations
Goldbelt, Inc.

cc: Bob Loiselle, President & CEO, Goldbelt
Senator Dennis Egan