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An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska

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Acronyms and Abbreviations

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT	Alaska Department of Transportation and Public Facilities
AFFI	Alaska Freshwater Fish Inventory
ANCSA	Alaska Native Claims Settlement Act
AP	acid-generation potential
APDES	Alaska Pollutant Discharge Elimination System
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AUC	area under curve
AVS	acid volatile sulfides
AW	ambient waters
AWC	Anadromous Waters Catalog
BBAP	Bristol Bay Area Plan for State Lands
BLM	biotic ligand model
BMP	best management practice
CCC	criterion continuous concentration
CFR	Code of Federal Regulations
CH	Channel
CIBB	Cook Inlet-to-Bristol Bay
CMC	criterion maximum concentration
CRU	Climate Research Unit
CWA	Clean Water Act
DBB	Dillingham/Bristol Bay
DEM	digital elevation model
DOC	dissolved organic carbon
EC_{20}	20% effective concentration
EC_{50}	median effective concentration
EL_{50}	median effective level
E-R	exposure-response relationship
ERA	ecological risk assessment
FA	fish avoidance
FERC	Federal Energy Regulatory Commission
FK	fish kill
FP	high floodplain potential
FR	fish reproduction
FS	fish sensory
GCM	global climate model
GIS	geographic information system
GMU	Game Management Unit
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HUC	hydrologic unit code
IA	invertebrate acute
IC	invertebrate chronic
IC_{20}	20% inhibitory concentration
IC_{50}	median inhibitory concentration
IFIM	Instream Flow Incremental Methodology

IGTT	Intergovernmental Technical Team
LC_{50}	median lethal concentration
LFP	left floodplain
MAF	mean annual streamflow
MCE	maximum credible earthquake
MDE	maximum design earthquake
MDN	marine-derived nutrients
Mi	Minerals
MOA	memorandum of agreement
NA	not applicable
NAG	non-acid-generating
NANA	NANA Regional Corporation, Inc.
NDM	Northern Dynasty Minerals
NED	National Elevation Dataset
NFP	no or low floodplain potential
NHD	National Hydrography Dataset
NNP	net neutralizing potential
NP	neutralizing potential
NPR	neutralizing potential ratio
NWI	National Wetlands Inventory
OBE	operating basis earthquake
OHW	ordinary high water
PAG	potentially acid-generating
PEC	probable effect concentration
PEL	probable effect level
PET	potential evapotranspiration
PHABSIM	Physical Habitat Simulation
PLP	Pebble Limited Partnership
PRISM	Parameter-elevation Regressions on Independent Slopes Model
Reclamation	Bureau of Reclamation
RFP	right floodplain
SCADA	supervisory control and data acquisition
SEM	simultaneously extracted metals
SNAP	Scenarios Network for Alaska and Arctic Planning
SWATP	Southwest Alaska Transportation Plan
SWPPP	stormwater pollution prevention plan
TDS	total dissolved solids
TEC	threshold effect concentration
TEL	threshold effect level
TLm	equivalent to LC_{50}
TSF	tailings storage facility
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WWTP	wastewater treatment plant

Units of Measure

μg	microgram
μS	micro-Siemens
°C	degrees Celsius
cm	centimeter
g	gram
ha	hectare
kg	kilogram
km	kilometer
km^2	square kilometers
km-yr	kilometer-year
L	liter
m	meter
m^2	square meter
m^3	cubic meter
mg	milligram
mm	millimeter
s	second
t	ton
yr	year

Unit of Measure Conversion Chart

Metric	Standard
1 µg (microgram)	3.527396 x 10^{-08} ounces
1 mg (milligram)	3.527396 x 10^{-05} ounces
1 g (gram)	0.035 ounce
1 kg (kilogram)	2.202 pounds
1 metric ton	1.103 tons
1 mm (millimeter)	0.039 inch
1 cm (centimeter)	0.39 inch
1 m (meter)	3.28 feet
1 m^2 (square meter)	10.764 square feet
1 m^3 (cubic meter)	35.314 cubic feet
1 km (kilometer)	0.621 mile
1 km^2 (square kilometer) or 100 ha (hectares)	0.386 square mile
1 ha (hectare)	2.47 acres
1 L (liter)	0.264 gallon
1^0C (degrees Celsius)	1.8^0C + 32^0 Fahrenheit

Elements and Chemical Symbols

Ag	silver
Al	aluminum
As	arsenic
B	boron
Ba	barium
Be	beryllium
Bi	bismuth
Ca	calcium
$CaCO_3$	calcium carbonate
Cd	cadmium
Cl	chlorine
CN	cyanide
Co	cobalt
Cr	chromium
Cu	copper
F	fluorine
Fe	iron
Ga	gallium
Hg	mercury
In	indium
K	potassium
Mg	magnesium
Mn	manganese
Mo	molybdenum
Na	sodium
Ni	nickel
O	oxygen
Pb	lead
S	sulfur
Sb	antimony
Se	selenium
Se^{+4}	selenate
Se^{+6}	selenite
Si	silicon
SiO_2	silicon dioxide
Sn	tin
SO_4	sulfate
Sr	strontium
Te	tellurium
Th	thorium
Tl	thallium
U	uranium
V	vanadium
Zn	zinc

PREFACE

This assessment represents a collaboration among the U.S. Environmental Protection Agency's (USEPA's) Region 10, Office of Water, and Office of Research and Development. It was conducted as an ecological risk assessment to evaluate the potential impacts of large-scale porphyry copper mine development on salmon and other salmonid fishes and their habitats and consequent effects on wildlife and Alaska Native cultures in the Nushagak and Kvichak River watersheds of Bristol Bay, Alaska. It is not an assessment of a specific mine proposal for development, but the mine scenarios considered in the assessment are based on a published plan to mine the Pebble deposit. The assessment does not outline or evaluate decisions made or to be made by USEPA.

The first external review draft of this assessment (EPA 910-R-12-004) was released in May 2012 for a 60-day public comment period and external peer review by 12 independent expert reviewers. The revised, second external review draft was released in April 2013 (EPA 910-R-12-004B) for another 60-day public comment period and follow-on review by the same 12 peer reviewers. All public and peer review comments on the two drafts were considered in the development of this final assessment.

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PHOTO CREDITS

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