Bristol Bay fisheries and water quality: does the Pebble DEIS adequately assess risks?

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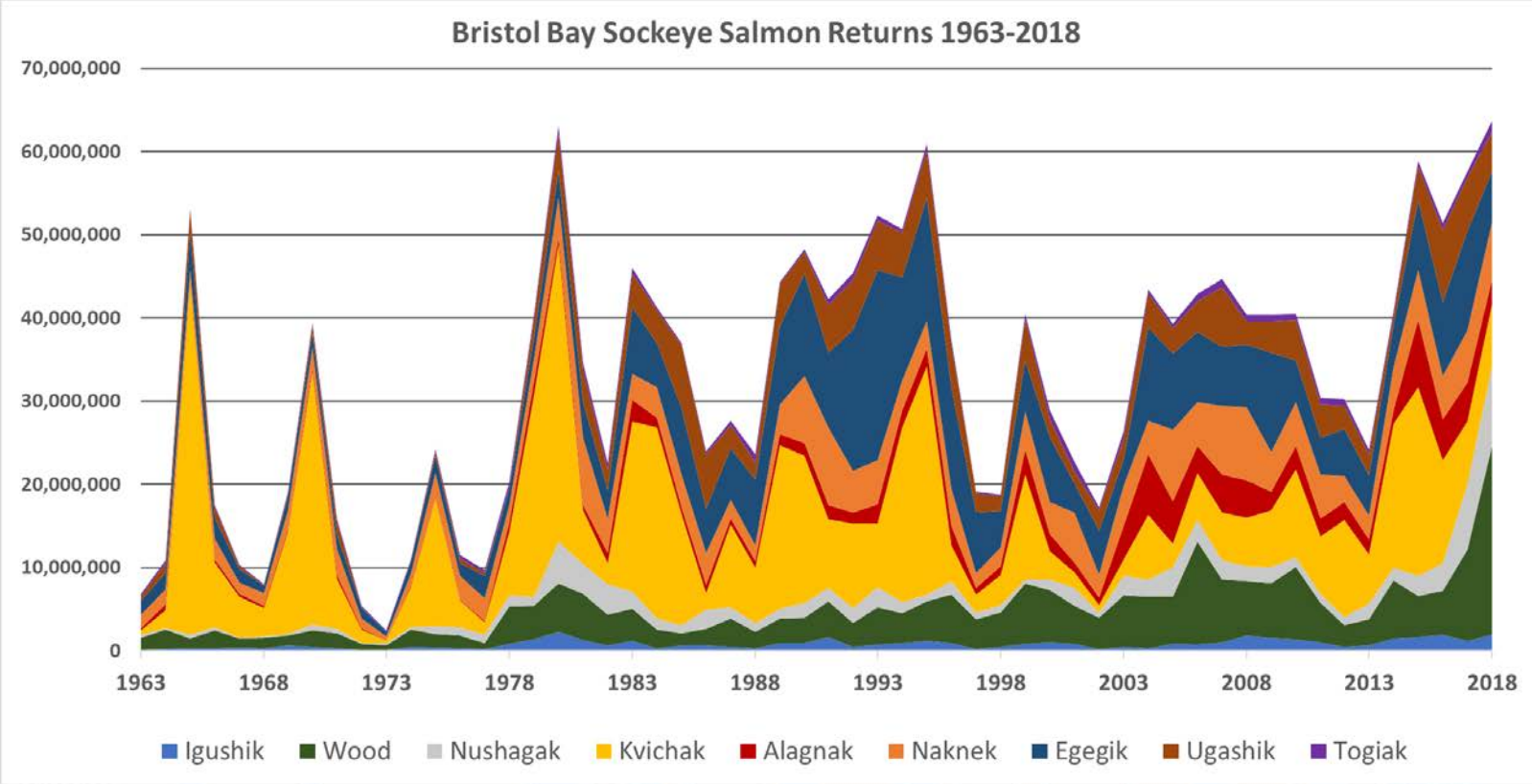
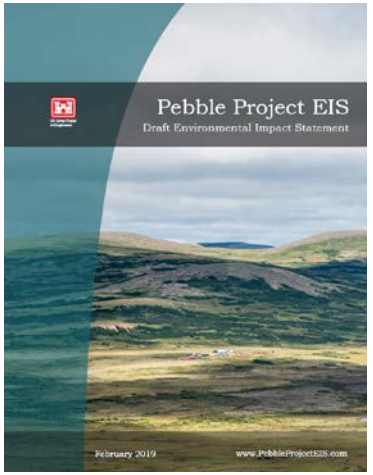
Alaska fisheries are the envy of the world



http://www.absc.usgs.gov/research/Fisheries/Lake_Clark/subsistence.htm

Inadequacies of the DEIS for assessing risk to water and salmon from Pebble



1) Inappropriate time frame
2) Inappropriate fish habitat assessment
3) Cumulative risks essentially ignored (i.e., multiple stresses)
4) Long-term treatment of wastes
5) Climate change and interactions with mining impacts
6) Selective and inappropriate use of scientific literature

1) Inappropriate time frame

Implicit assumption that risks disappear once the mine has been closed (< 75 years)

Mine wastes, including those that will generate acid mine drainage (sulfuric acid and toxic metals) must be stored and maintained for centuries

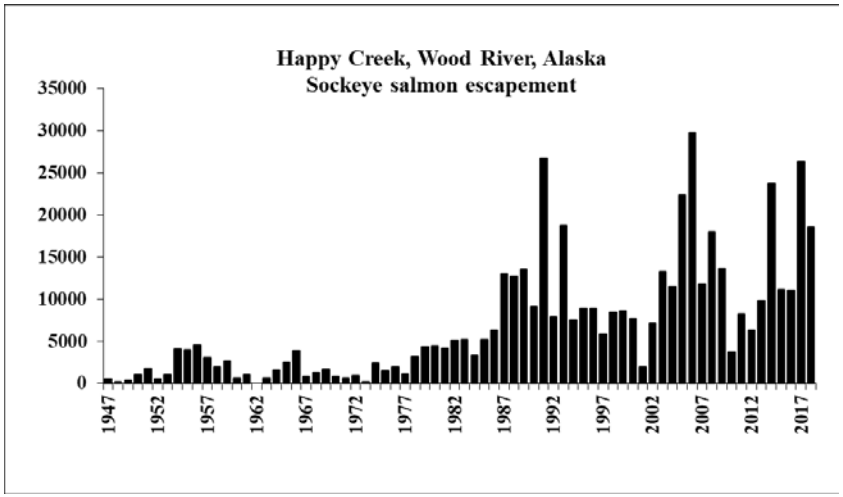
Many of the ecological responses will take decades or longer to express themselves (i.e., after the mine has closed)

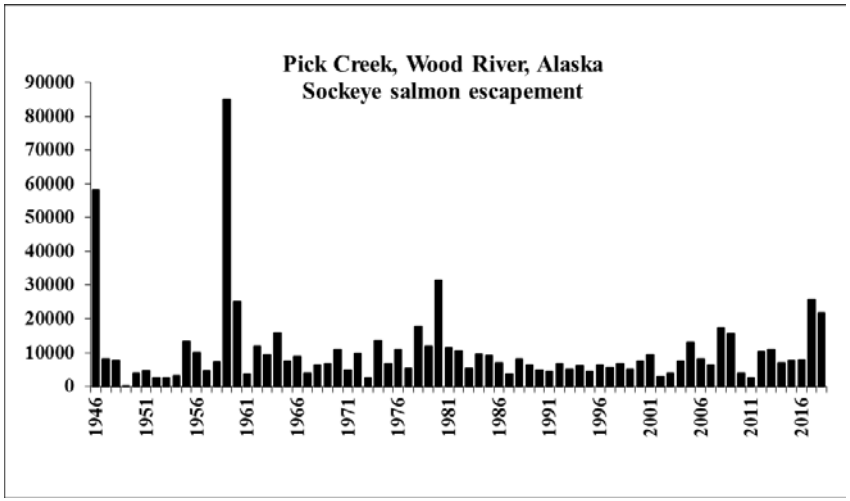
2) Inappropriate fish habitat assessment

Habitat quality based on short-term assessments of fish abundances

No evaluation of how representative those are for the potential for habitat to produce fish

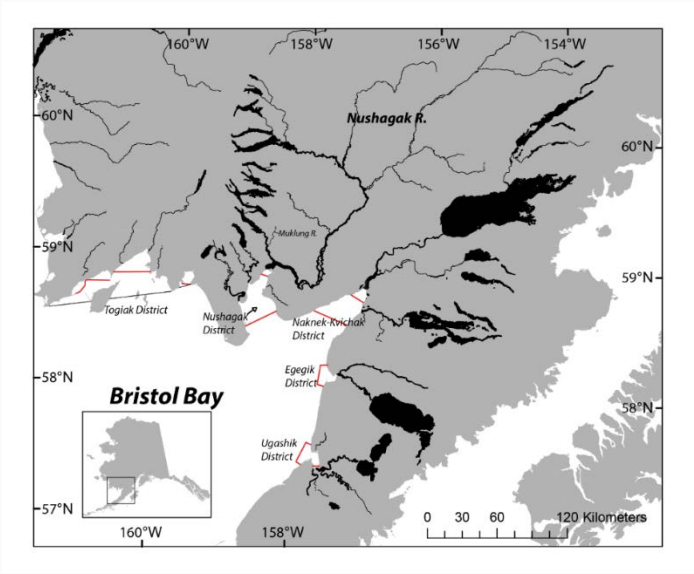
Short-term assessments mis-represent long-term potential of habitat. Examples from Wood River:





data from UW – Alaska Salmon Program

Example: Chinook salmon – habitat use within Nushagak River (how consistent is production within individual tributaries?)

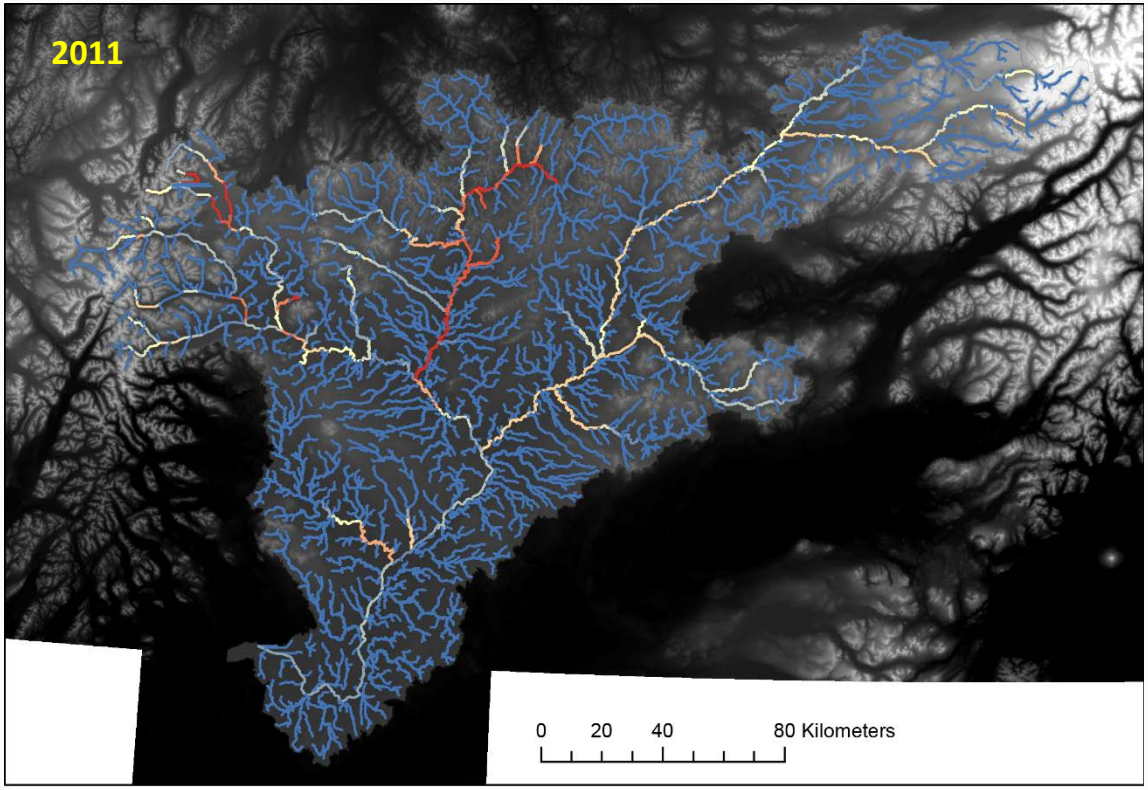


Chinook salmon production in the Nushagak River

Nushagak R.
2011 (n=255)

Ear stone (otolith) from Chinook salmon

Brennan and Schindler (2016)

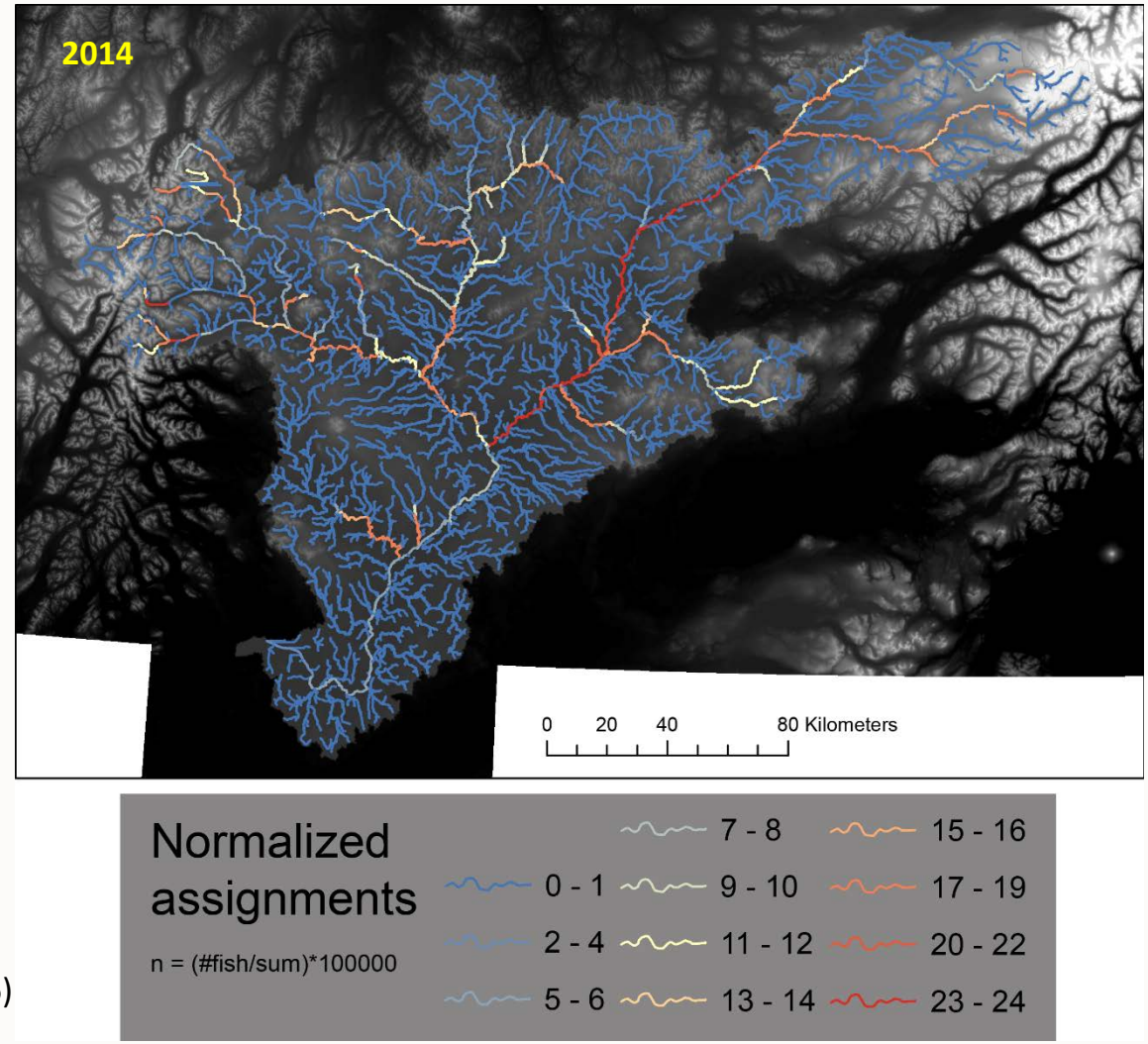


Chinook salmon production in the Nushagak River

Nushagak R.
2014 (n=279)

Ear stone (otolith) from Chinook salmon

Brennan and Schindler (2016)



Bristol Bay salmon habitat operates like an investment portfolio – the aggregate is more stable and productive than the components

3) Cumulative Risks

The effects of multiple environmental stresses can be additive or interact with each other (i.e. stresses multiply with each other)

The DEIS assumes that stresses occur in isolation and are independent of each other

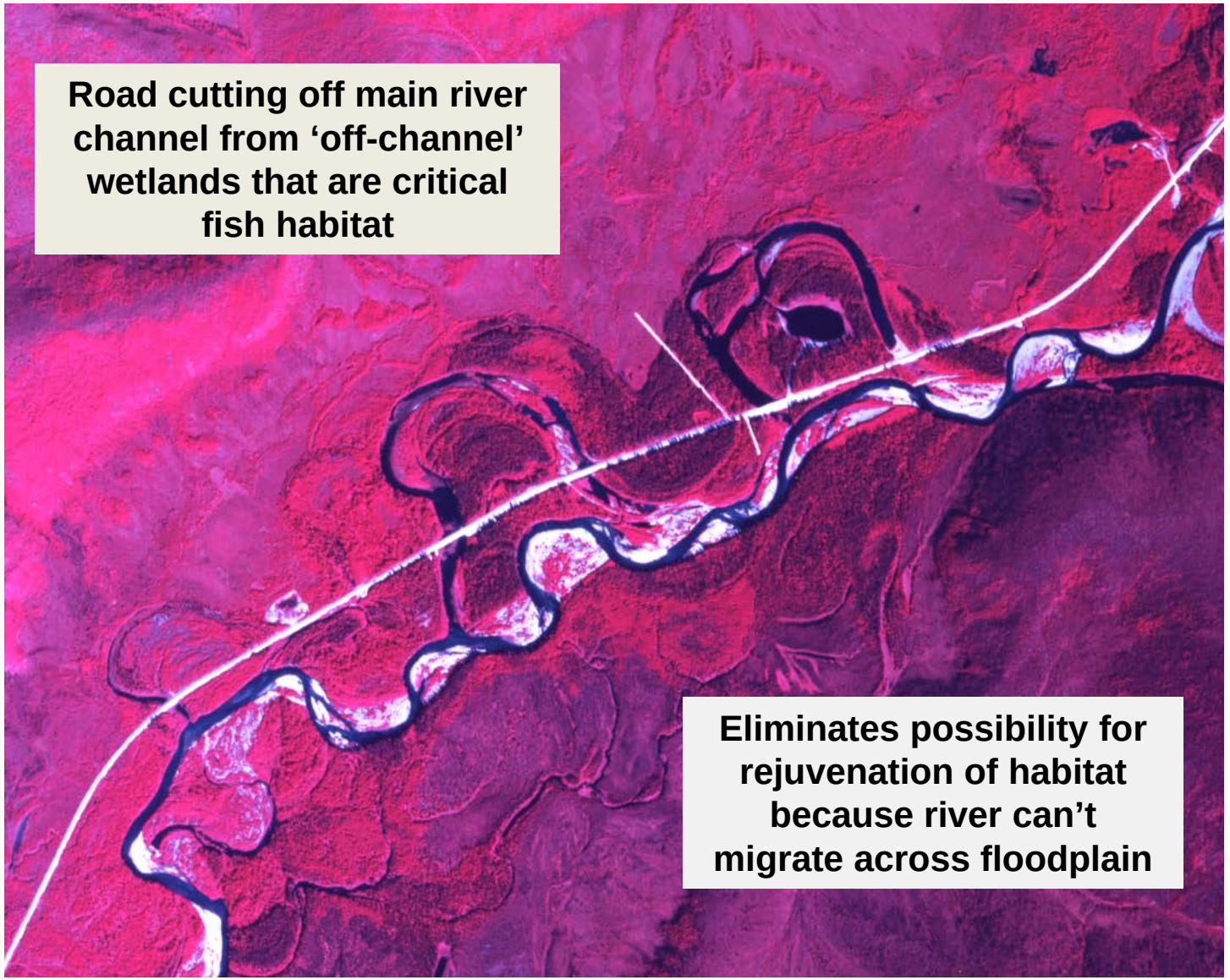
Use of ‘cumulative effects’ in DEIS is used primarily for the effects over the life of the mine (i.e., how they accumulate through time)

<u>This inevitably leads to massive underestimation of potential risks</u>

Cumulative risks to fish

- Acid mine drainage will occur (sulfuric acid), various metals (copper, selenium)
- Copper has known direct and indirect toxic effects on salmon (interferes with salmon's ability to smell)
- Dust, groundwater, erosion make containment challenging
- De-watering streams and wetlands (simplifying habitat)
- Loss of erosional processes that generate new habitat
- Roads, culverts, etc. simplify habitat
- Interactions with climate change (e.g., water temperatures)
- Some of these impacts are permanent (e.g. perpetual storage and maintenance of tailings)
- Many of these risks take decades to express themselves
- Restoration is extremely expensive and often impossible

Chena River, Alaska



Courtesy of Chris Stark, UAF

4) Long-term treatment of wastes

Wastes will remain at site for centuries

Much of the waste will generate sulfuric acid and mobilize toxic metals

Risk assessment must account for long-term storage and maintenance

What are the risks to the long-term water treatment facility?

Long-term seismic, climate related, etc.

5) Climate change

Western Alaska one of the fastest warming places on Earth

'No Action Alternative' –assumes no risk to fisheries and water
(climate change makes that an unreasonable assumption)

Climate change will likely interact with stresses from mining
(this was a critical revision of the EPA watershed assessment)

Intact habitat is the best insurance against climate change

6) Selective Use of Scientific Literature

Example: treated water will raise the temperature of streams it is discharged into (N. and S. Koktuli, Upper Talarik) DEIS Chapter 5.1.1.4

DEIS: “Changes in water temperature could potentially alter spawning timing and egg incubation periods of managed species, alter productivity of receiving waters, and alter aquatic invertebrate community structure.”

But, citing **Weber-Scannell (1991)**….changes in summer water temperature

“would be expected to cause negligible impacts to Pacific salmon and their habitat”

and effects from changes in winter water temperatures to be

“negligible to potentially positive”.

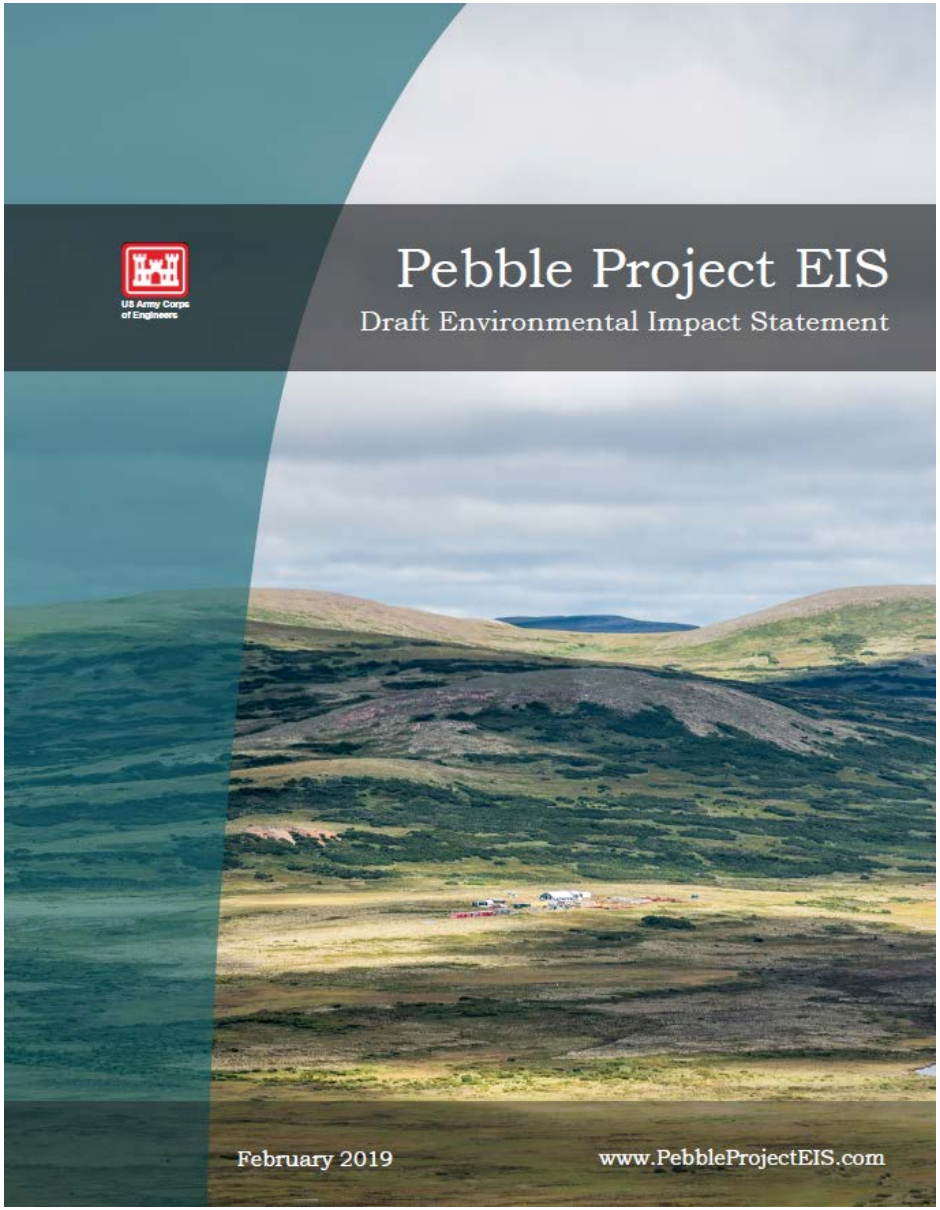
INFLUENCE OF TEMPERATURE ON FRESHWATER FISHES: A LITERATURE REVIEW WITH EMPHASIS ON SPECIES IN ALASKA

By
Dr. Phyllis K. Weber Scannell

Technical Report 91-1

Alaska Department of Fish & Game
Division of Habitat

In Alaska, elevations in temperature may be particularly harmful to fishes that are adapted to coldwater conditions and rarely experience significant summer warming. Many of the studies that relate changes in temperature to effects on fish examine higher ranges than are usually experienced by fish in Alaska. Therefore, acceptable upper and lower temperature ranges from published literature are often not applicable to fish naturally occurring at higher latitudes. This report examines much of the published literature on coldwater species of fish that inhabit freshwater. Summaries are given of the effects of changes on temperature on different life stages. The final section of this report presents recommendations for optimal temperatures for various fish life stages.



- **Distinctly underestimates risks**
- **Involves many very tenuous assumptions**
- **Assumes no important cumulative risks**
- **Assumes no interactions between climate change and mine stresses**
- **Inappropriate:**
  - **time frame (much too short)**
  - **fish habitat assessments**
- **Many examples of misrepresenting published scientific results**
- **Does not pass as credible science**