



FACT SHEET

Aquatic Life Criteria for Copper

Background information:

Recent studies (2003 – Present) on stormwater runoff and dissolved copper were conducted in the Pacific Northwest by researchers from the National Oceanic and Atmospheric Administration (NOAA) and Oregon State University. These studies indicate adverse effects on Pacific Salmon at very low concentrations (< 10 µg/L). There have been no peer reviewed studies of the effects of dissolved copper on fish in Alaska and very little is known about natural backgrounds of copper in Alaska's waters.

In 2004, Dr. Phyllis Scannell conducted a literature review about the effects of copper on aquatic life in fresh water with a focus on species native to Alaska such as salmon, trout, zooplankton, and freshwater mollusks. Little research has been conducted in marine waters. The review concluded that generally copper is not lethal and growth is not reduced for salmonids at concentrations at or below Alaska's acute or chronic criteria. Several studies in the review determined that dissolved organic carbon (DOC) reduces copper's toxicity to fish. The review generally supported Alaska's current criteria but cautioned that copper could affect several taxa of invertebrates and could affect fish behavior through effects to fish olfactory system.

Since Dr. Scannell's review in 2004, laboratory studies concluded copper at non lethal concentrations can suppress the olfactory system used for predator detection and migration in salmon and trout, which could negatively affect their survival or reproduction. These studies did not investigate interactions with DOC and it is not known if DOC interacts with copper to reduce the olfactory effects on salmonids.

In February 2010, DEC sponsored a session on the effects of copper on aquatic life at the Alaska Forum on the Environment that included presentations by Dr. Scannell, Dr. Tracy Collier, a noted researcher on copper's effects on fish with NOAA Fisheries in Seattle, and Nancy Sonafrank of DEC. These presentations can be found at <http://www.dec.state.ak.us/water/wqsar/wqs/copper.htm>.

DEC is seeking information about recent studies regarding copper's effects on aquatic life and input on future research needs.

Potential actions:

- Evaluate current information about the effects of copper on aquatic life and methods used to derive aquatic life criteria.

Fact Sheet on Copper and the development of water quality standards.

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- Identify research gaps/needs and seek interagency support for studying the effect dissolved copper has on Alaska's fish.
- If appropriate, adopt revised copper criteria.

Who is affected?

- Some mines
- Municipalities with urban stormwater runoff (copper is a component in some brake pads)
- Municipal wastewater facilities (from copper pipes used for water distribution)
- Cruise ship wastewater facilities
- Commercial and sport fishing interests

For additional scientific information: *Effects of Copper on Aquatic Species: A Review of the Scientific Literature*. June 2009. By Phyllis Weber Scannell, Scannell Technical Services, prepared for Alaska Department of Fish and Game, Division of Habitat. Technical Report No. 09-04.

<http://www.dec.state.ak.us/water/wqsar/wqs/pdfs/WeberScannellCopperEffects.pdf>.

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