



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

December 5, 2007

James Powell, Section Manager
Alaska Department of Environmental Conservation
410 Willoughby Ave. Suite 303
P.O. Box 111800
Juneau, Alaska 99801-1800

Dear Mr. Powell:

Every three years, the Alaska Department of Environmental Conservation (DEC) reviews Alaska water quality standards. This comprehensive evaluation, known as the Triennial Review, is carried out in three phases, the first of which is a widespread call for information on potential topics. The National Marine Fisheries Service (NMFS) has identified three primary issues that we would like to see reviewed during the current Triennial Review: total dissolved solids, bio-criteria, and invasive species. This letter serves as a follow-up to our initial response to your initial call for information (fax dated August 2007) and discusses our reasons for recommending that you address these topics.

1) Total Dissolved Solids

Total Dissolved Solids (TDS) are a measure of inorganic salts and substances or organic and other dissolved materials (Weber-Scannell and Duffy 2007, Chapman 2000). TDS cause toxicity not only because of the toxicity of individual ions, but also by increasing salinity and changing the ionic composition of the water (Weber-Scannell and Duffy 2007). While the primary sources for TDS are not specific to any particular industry sector, common contributors in Alaska include activities associated with mining, oil and gas development and production, timber harvest, and urban development. These point source and non-point source discharges degrade water quality and aquatic habitats and can affect aquatic species from invertebrates to anadromous fish (Weber-Scannell and Duffy 2007, Brannock 2002, Stekoll 2001, Chapman 2000, Kline 1999, Hanson 1999, Buhl 1999).

Increases in salinity have been shown to alter biotic communities, limit biodiversity, exclude less-tolerant species, and result in acute or chronic effects at specific life stages of some species (Bierhuizen and Prepas 1998, as referenced in Scannell-Weber and Duffy 2007). Modifications in the ionic composition of water can exclude some species while encouraging an increase in the population of others (Weber-Scannell and Duffy 2007). This can result in the destruction of previously functional nutrient pathways that support populations of microfauna, invertebrates, and juvenile and adult fish populations (Boulton, 2007, Edwards 2001). In Alaska, this loss of ecosystem connectivity and aquatic substrate function has been shown to significantly reduce available habitat for salmon egg incubation, limit alevin emergence, and increase mortality of juvenile salmon (Heifetz 1996, Hartman 1987).



2) Invasive Species

Invasive aquatic species can significantly alter ecosystem equilibrium and create devastating impacts to indigenous species. One of the best documented case studies is in the Great Lakes Region. Zebra mussels (*Dreissena polymorpha*), once indigenous to Mediterranean waters only, now populate the Great Lakes in numbers estimated in the billions, displacing native species.

The introduction of invasive aquatic species into Alaskan waters poses a serious environmental and economic threat. Ballast water from large vessels has been identified as the primary mechanism of transit for invasive aquatic species introduced to U.S. waters.

Researchers have already documented several invasive aquatic species in Alaskan waters: oysters, mussels, clams, tunicates, sponges, kelp and algal and plants, brown and red algae, and bryozoans and amphipods (<http://www.pwsrca.org/projects/NIS/index.html>). More aggressive invasive species such as the European green crab have also become established from California to British Columbia, and the presence of Chinese mitten crab is documented in several areas in California. Experts on invasive species predict these crab species will eventually establish themselves in Alaskan waters.

The costs of monitoring and controlling invasive species to protect indigenous and economically important species are not well understood or documented, but estimates indicate costs are quite high. An estimated \$3 billion has been spent addressing the Great Lakes zebra mussel issue, while expenditures for sea lamprey control in the same region range between \$10 million and \$15 million annually. Controlling the European green crab associated with the demise of the soft-shell clam industry in New England has an estimated cost of \$44 million a year (Congress, 2002). A study by Cornell University scientists estimates the total annual economic loss and associated control costs of invasive species in the U.S. is about \$137 billion a year. Invasive species are now the number two threat to endangered species, right behind habitat loss. Quantifying the loss due to extinction of these species is nearly impossible (Subcommittee on Environment, Technology and Standards 2002).

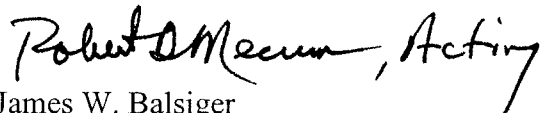
3) Biocriteria

The Clean Water Act allows water quality standards to be based on chemical, physical, and biological criteria. Alaska's current water quality standards are predominantly derived from physical and chemical factors. Biological criteria, or biocriteria, are used to describe the qualities that must be present to support a desired condition in a body of water. Thus, these criteria serve as the standard against which to compare assessment results.

Biocriteria are derived from biological assessments involving integrated measures, indices of the composition, diversity, and functional organization of a reference aquatic community. Since biocriteria set the biological quality goal, or target, to which water quality can be managed, rather than the maximum allowable level of a pollutant or other water quality condition in a water body, as in chemical water quality standards, this measure may be more protective of living marine resources (EPA 2007).

We would appreciate the opportunity to provide additional information to DEC on these issues. We look forward to working with you and remain available to assist DEC in your efforts to complete the Triennial Review. Should you have any questions, please contact Doug Limpinsel of my staff at 907-271-6379 or doug.limpinsel@noaa.gov.

Sincerely,


for James W. Balsiger
Administrator, Alaska Region

cc: EPA – Mcguire.Lisa@epamail.epa.gov
PRD – brad.smith@noaa.gov
Records

References:

Total Dissolved Solids (TDS)

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Invasive Species

Prince William Sound Regional Citizens Advisory Committee. Non-Indigenous Species (NIS) home page. <http://www.pwsrccac.org/projects/NIS/index.html>

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Biocriteria

United States Environmental Protection Agency. 2007 Water Quality Criteria Home Page. <http://www.epa.gov/waterscience/biocriteria/basics.html>