

Marine fish health

Problem Statement

Chemicals that cause cancer, reduce disease resistance, disrupt the endocrine system, and alter growth and reproduction threaten marine fish populations and, potentially, the health of anyone who eats marine fish.

Critical Factors

- Many common marine pollutants, including aromatic hydrocarbons derived from fossil fuels, pesticides, surfactants present in detergents, phthalates present in plastics, DDT, PCBs, and even food preservatives can impair growth, reproduction, and disease resistance and increase cancer risk.
- Many of these compounds exert their effects by disrupting the endocrine system, a network of glands and organs that regulates many bodily functions, including growth, metabolism, reproduction, and immune function.
- Some endocrine-disrupting compounds mimic the effect of estrogens.
- These types of chemicals contaminate Puget Sound's urban bays and similar sites all along the West Coast.
- Some of these chemicals (e.g., PAHs, PCBs) clearly affect the health of marine fish. Northwest Fisheries Science Center (NWFSC) scientists have found that English sole from contaminated sites in Puget Sound exhibit depressed sex hormone levels, altered or inhibited reproductive development, reduced egg and larva viability, and a high prevalence of liver disease.
- These chemicals may also affect the health of anadromous fish. NWFSC scientists have found that contaminants present in urban estuaries reduce the growth rates and suppress the immune functions of juvenile salmon.
- Little is known about the impact on marine fish of other potentially toxic or endocrine-disrupting chemicals such as alkylphenols, phthalates, pharmaceuticals, and biotoxins for which tests are seldom performed.
- There is no quick and accurate way to gauge the health risk posed by seafood contaminated with these contaminants.
- Current regulations may not protect trust resources or threatened or endangered marine species against the sublethal impacts of these contaminants.

Status of Research

The NWFSC is investigating the effects of chemical contaminants on the development, growth, reproduction, and survival of marine species. Center scientists have developed a substantial body of information about the effects of some contaminants on the cancer risk and reproductive function in English sole and other bottomfish. They are currently studying ways in which these contaminants affect growth, development, and stress response. Such studies have formed major parts of recent damage assessment investigations, including the Hylebos fish injury studies. (Because growth rates and reproductive success help to determine the productivity and population dynamics of fish stocks, they are crucial indicators of resource damage.) NWFSC scientists are also developing molecular biology-based assays to screen fish for exposure to endocrine-disrupting chemicals. One of their major objectives is to apply this knowledge to the development of adequate sediment and water quality standards to protect marine species against the impacts of chemical contaminants. As part of this effort, they are developing a bioassay system using zebrafish, a model organism with a short life cycle, to rapidly screen chemical contaminants for lethal and sublethal effects on development, growth, reproduction, and other critical life processes.



Pathology of rock sole for reproductive studies

Marine fish health (continued)

Future Considerations

Quick, reliable tests for the presence of currently-used and poorly-regulated compounds (e.g., certain endocrine disruptors like surfactants and synthetic hormones) in the nation's seafood and endocrine-disrupting compounds in marine fish populations must be developed. An understanding of the ways in which these compounds affect declining marine species and the manner in which their impact on individual marine organisms, in turn, affects fisheries productivity must also be gained. Lastly, adequate guidance for resource managers must be accrued, enabling them to protect marine species from the adverse effects of these compounds, especially for those listed or being considered for listing under the Endangered Species Act (ESA).

Key Players

Environmental Conservation (EC) Division, NWFSC

Office of Habitat Conservation, NMFS
Office of Response & Restoration, NOAA
Fishery Management Councils
Puget Sound Ambient Monitoring Program
University of Washington
Oregon State University
U.S. Environmental Protection Agency
University of Bergen, Norway
Muckleshoot Indian Tribe
Suquamish Indian Tribe

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