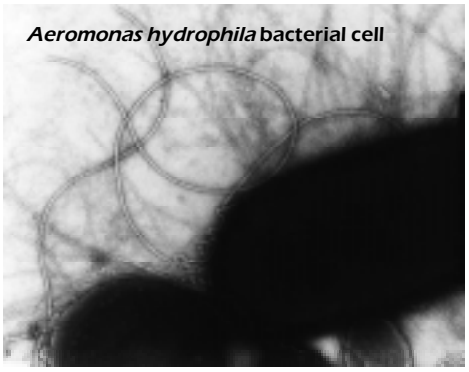
Developing methods to identify & control pathogenic microorganisms that threaten fishery resources

Problem Statement

Microbial infections for which no vaccines exist can sicken or kill fish in hatcheries, aquaculture pens, and captive broodstock programs designed to restore endangered salmon populations. In turn, these diseases may have impacts on wild stocks.

Critical Factors

- Endangered salmon species raised in captive broodstock programs are particularly susceptible to bacterial kidney disease (BKD) caused by the bacterial pathogen *Renibacterium salmoninarum*.
- There is no vaccine and no reliable treatment for BKD.
- Bacterial pathogens called Aeromonads cause hemorrhagic septicaemia and a debilitating disease called furunculosis in salmon.
- There is no vaccine that confers long-term immunity against diseases caused by Aeromonads.
- Other diseases may infect captive populations of marine fish species for which aquaculture techniques are being developed (e.g., lingcod, sablefish, halibut).
- The Northwest Fisheries Science Center (NWFSC) provides an infectious disease diagnostic service for endangered species captive salmon broodstock programs and marine fish culture programs.



Aeromonas hydrophila bacterial cell

Status of Research

Researchers that are part of the NWFSC's Fish Health / Microbiology team are conducting genetic studies of the bacterial pathogens *R. salmoninarum* (which causes bacterial kidney disease), *Aeromonas hydrophila* (which causes hemorrhagic septicaemia), and *A. salmonicida* (which causes furunculosis). The scientists are characterizing what makes these pathogens virulent and their host-pathogen interactions, including specific immune responses. They are developing highly sensitive molecular techniques to diagnose infections caused by the pathogens and identify molecular markers that can differentiate among pathogen strains. One marker that has already been identified by the team will be used in conjunction with other molecular techniques to test whether strains of *R. salmoninarum* isolated from Pacific Northwest salmon stocks can be distinguished from one another. Such markers can also be used as tools to determine whether hatchery fish transmit these pathogens to wild stocks. In addition, NWFSC scientists are developing similar tests for other important fish pathogens and evaluating antibiotic treatments and vaccines for bacterial kidney disease.

Future Considerations

As the decline and listing of wild salmon stocks create a need for captive broodstock rearing, the need to improve the survival of hatchery salmon both before and after their release, and reduce their risk of infecting wild stocks, will also increase. As a result of the methods being developed to control pathogenic microorganisms, the NWFSC is in a position to quickly identify "new" pathogens that threaten endangered species of captive salmon broodstock or marine fish aquaculture programs.

Key Players

Resource Enhancement and Utilization Technologies (REUT) Division, NWFSC

Western Fisheries Research Center, U.S. Geological Survey

Pacific Northwest Fish Health Protection Committee

U.S. Food and Drug Administration

U.S. Fish and Wildlife Service

University of Washington

Idaho Department of Fish and Game

Washington Department of Fish and Wildlife

Washington Department of Agriculture

Oregon Department of Fish and Wildlife

Oregon Department of Agriculture

Contact: Dr. Robert Iwamoto, Director, REUT Division (206/860-3380)