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SEAWATER MAY DECREASE SURVIVAL OF ATLANTIC SALMON INFECTED WITH *RENIBACTERIUM SALMONINARUM*

Atlantic salmon (*Salmo salar*), as well as other anadromous salmonids, are susceptible to Bacterial Kidney Disease (BKD). The disease, caused by *Renibacterium salmoninarum*, is a significant problem in freshwater hatcheries. Little is known, however, about the effect that *R. salmoninarum* may have on the survival of smolts entering the saltwater environment, on fish during the seawater phase of their life, or on adults returning to the freshwater environment during spawning runs.

SALMON EXPERIMENTALLY INFECTED WITH BACTERIA

To determine the seawater survival of *R. salmoninarum*-infected Atlantic salmon we exposed fish to *R. salmoninarum* via intraperitoneal injection. The bacterium used was originally isolated from a spawning adult chinook salmon (*Oncorhynchus tshawytscha*) from Lake Michigan with clinical BKD. Fish were divided into two groups ($n = 200$ fish); those held in freshwater (Leetown, West Virginia) and those held in seawater (Narragansett, Rhode Island). All fish in both groups received an i.p. injection equivalent to 7×10^4 Colony Forming Units (CFU)/fish. Fish were immediately stocked into freshwater (70 day mean and peak water temperature of 12.5°C) or into seawater (70 day mean water temperature of 7°C with a peak of 12.5°C).

Daily deaths from both groups were screened using a BKD-ELISA assay. Kidney tissues from all examined fish were positive by BKD-ELISA. Cumulative mortality for each group of fish was calculated after 70 days (Figure). Mortality for fish held in seawater reached 100% on day 64. Highest mortality for the fish held in freshwater reached approximately 50% on day 45. This mortality rate following

an exposure of 7×10^4 CFU *R. salmoninarum* per fish closely approximated the previously determined 50% lethal dose (LD₅₀) of 6×10^4 CFU/fish for Atlantic salmon. All fish died in the seawater treatment so an LD₅₀ could not be calculated for this group. The lag phase before onset of mortality was prolonged in seawater compared to freshwater (Figure). Death may be the result of temperature.

LOWER ESTIMATED LD50 FOR SEAWATER SALMON

Preliminary results suggest that the LD₅₀ of *R. salmoninarum*-infected Atlantic salmon held in seawater is at least 1 logarithm lower in magnitude than fish held in freshwater or approximately 6×10^3 CFU/mL. We suggest a decreased survival of *R. salmoninarum*-infected smolts entering the saltwater environment. Future trials using i.p. injections of cell suspension at several dilutions should yield a closer estimate of the LD₅₀ of *R. salmoninarum* in seawater Atlantic salmon.

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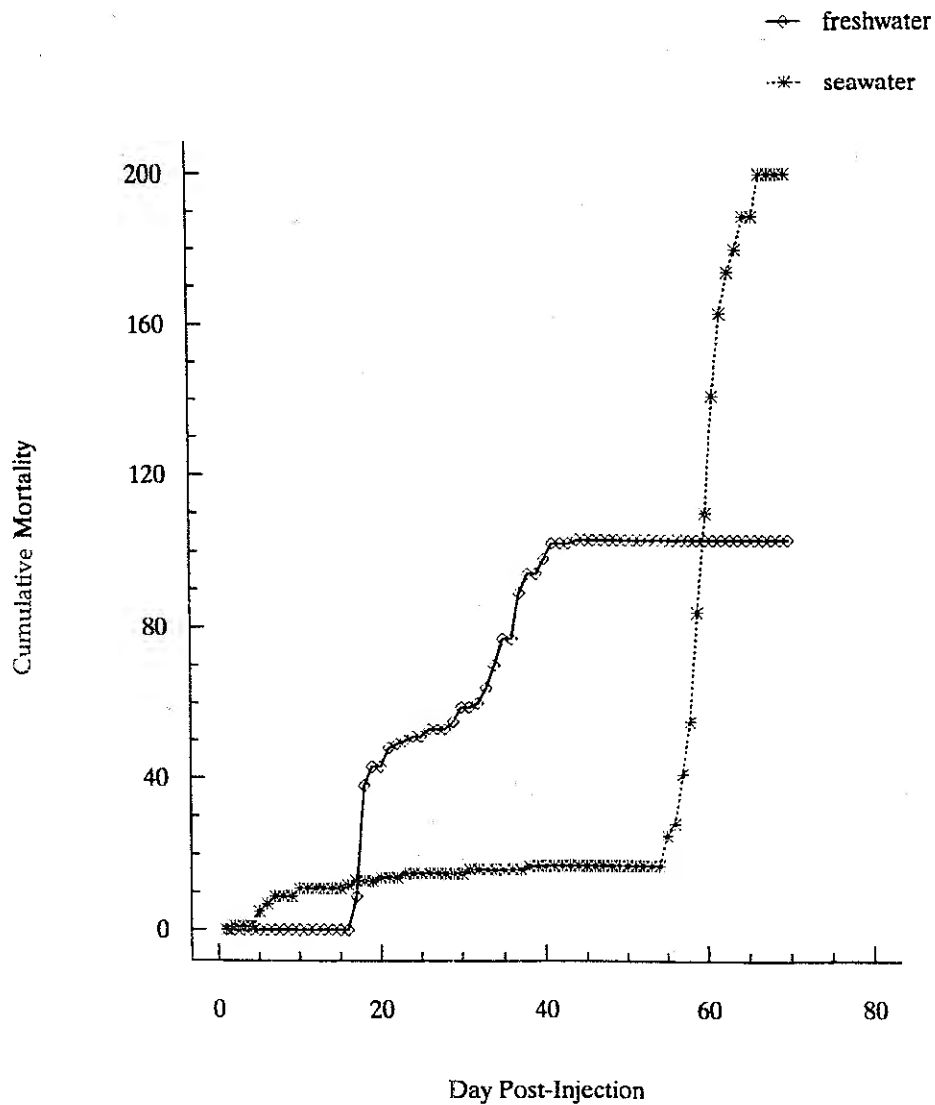


Figure. Cumulative mortality for Atlantic salmon challenged with 7×10^4 CFU *Renibacterium salmoninarum*/fish and held for 70 days in freshwater ($n = 200$ fish) or seawater ($n = 200$ fish).