

**THE EFFECT OF ENVIRONMENTAL SALINITY AND HOST SPECIES
(*Oncorhynchus tshawytscha*, *O. kisutch*, *O. mykiss*)**

ON THE PATHOGENESIS OF *Loma salmonae*

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EXTENDED ABSTRACT – DO NOT CITE

Loma salmonae (Microspora) is a gill disease causing morbidity and mortality of farm-reared salmonids (*Oncorhynchus*), particularly chinook salmon, in the Pacific Northwest region of North America (Hauk 1984; Kent et al., 1989). A high mortality rate and susceptibility to secondary infections often make chinook salmon a difficult host species for researching *L. salmonae*. A freshwater rainbow trout model has been developed to study pathogenesis and pathobiology of *L. salmonae* infections (Speare et al., 1998). Rainbow trout experience less *L. salmonae*-associated mortality than chinook salmon and are less susceptible to secondary infections (Speare et al., 1998). However, host species and environmental factors such as salinity may be important the transmission and proliferation of *L. salmonae*. The effects of host species and salinity on the duration and intensity of *L. salmonae* infections have not been formally examined. The purpose of this research was to determine if host species and environmental salinity affected the duration and intensity of *L. salmonae* infections.

This research was conducted in the Fish Health Wet Laboratory of the Pacific Biological Station (Fisheries and Oceans Canada) in Nanaimo, British Columbia. Eighty fish from each of three species, chinook salmon, coho salmon and rainbow trout (RBT) were examined. Forty fish of each species were reared in freshwater (0 - 5 parts per thousand (ppt)) and forty fish were reared in seawater (22 - 24 ppt). Each fish was infected, *per os* with approximately 50 000 *L. salmonae* spores from infected chinook salmon gills. All three species were cohabited in each seawater and freshwater 750-

litre deep oval fiberglass tanks.

Examination of gills was completed every two weeks post-exposure (PE) to infection to assess the percentage of fish infected which was characterised by the presence of spore-filled cysts (xenomas) within the gill filaments. Lethal gill samples were taken at week 7 and 8 PE for histology to assess the intensity of infection in terms of the number of xenomas per gill arch. The three species were compared within each salinity. Each species was also compared at the different salinities. Interactions between species and salinity were also examined.

Chinook salmon and rainbow trout began developing visible gill xenomas by week 5 PE while coho salmon did not begin to develop xenomas until week 6 PE. Rainbow trout had cleared infection by week 9 PE while infections in chinook and coho salmon persisted. The percentage of infected fish increased over time and then decreased in the case of rainbow trout (Table 1). The percent infection over time in seawater and freshwater did not differ substantially. The mean intensity of infection, measured in xenomas per gill arch, was highest in week 8 PE chinook salmon in freshwater (130) and lowest in week 8 PE rainbow trout in seawater (2). In general, chinook salmon had the highest intensity of infection followed by coho salmon and rainbow trout (Table 2). The intensity of infection may be dependent upon interactions between species and salinity.

The longer duration and higher intensity of *L. salmonae* infections in chinook salmon may explain why *L. salmonae*-associated mortality is more of a problem in chinook salmon aquaculture. Rainbow trout appear to be more resistant to *L. salmonae* infections. This makes rainbow trout a favourable model for studying pathogenesis, since mortality is rare and the complete life cycle may be examined (Speare et al., 1998). The resistance of rainbow trout to mortality from *L. salmonae* infections may be of interest as researchers attempt to find methods for control of epizootics in aquaculture.

Table 1: Effects of host species and salinity on the percentage of *L. salmonae* infections over time, expressed as the percent of xenoma-positive fish examined.

	seawater						freshwater					
week PE	2	5	6	7	8	9	2	5	6	7	8	9
chinook	0	33	90	100	100	100	0	40	90	100	100	100
coho	0	0	90	100	100	90	0	0	90	100	100	67
RBT	0	40	100	38	57	0	0	33	80	60	50	0

Table 2: Effects of host species and salinity on the intensity of *L. salmonae* infections over time, expressed as the mean number of xenomas per gill arch

	seawater		freshwater	
week PE	7	8	7	8
chinook	96	48	116	130
coho	40	20	32	29
RBT	5	2	15	6

The duration and intensity of *L. salmonae* infections is dependent upon species and salinity. Chinook and coho salmon had longer durations of infection while rainbow trout had a comparatively shorter duration of infection. Chinook salmon had a higher intensity of infection compared to coho salmon and rainbow trout which may explain

higher mortality in *L. salmonae*-infected chinook salmon. Salinity does not appear to affect the duration of *L. salmonae* infections but it may affect the intensity of infection and may also be dependent upon species. It is important to realise that host species and salinity are important factors in the transmission, proliferation and pathogenesis of *L. salmonae*.

References

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