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An investigation into the consumption of wild food organisms, and the possible effects of lights on predation, by caged Atlantic salmon in British Columbia

The potential for predation by caged Atlantic salmon (*Salmo salar*) on wild food organisms has raised concerns about the possible impacts on local populations of wild fish species in the vicinity of fish farms. The use of bright lights on some sites had raised specific concerns that wild species of fish and zooplankton were being attracted to the lights and were then being consumed by the captive salmon. A recent report describes an investigation on predation on wild organisms by Atlantic salmon in cages (Hay et al. 2004). The work follows from previous investigations in the early 1990's that focused on other farmed species, primarily chinook salmon (*Oncorhynchus tshawytscha*) (Haegele et al. 1991; Black et al. 1992). Since the previous study, Atlantic salmon has become the predominant species on farms in British Columbia. Often caged salmon are not fed during preparation for harvest. It is at this time that their hunger levels may increase and they may be more prone to consume wild organisms, if available. Therefore, some 'starved' salmon were included in these analyses.

The main objective was to examine the consumption of wild food, especially juvenile or larval fish such as eulachons (*Thaleichthys pacificus*) or herring (*Clupea pallasii*), by farmed Atlantic salmon. A supplementary objective was to compare consumption of wild food between lighted

and unlighted farms. This was a cooperative project that was partially funded by the British Columbia Ministry of Agriculture, Food and Fisheries (E.A. Black) in cooperation with the Pacific Biological Station, Fisheries and Oceans, Nanaimo.

All samples from commercial farms were collected in southern Queen Charlotte Strait area. This area contains many salmon farm sites including lighted and unlighted farms. The area is topographically varied with diverse marine habitats and used by migratory and marine species such as Pacific salmon juveniles (*Oncorhynchus* spp.), eulachons and juvenile herring. The sampling sites were selected to include farms with, and without lights. Also, the samples were chosen to compare farms that fed the salmon immediately prior to sampling and farms where the salmon were starved, to clear the guts, prior to marketing. When possible twenty salmon were sampled each week from each farm, from the first week of May to the second week of July. One site used large lights as a technique to suppress sexual maturation. We examined a total of 600 stomachs from all sites collected over a 9-week period. We collected an additional 134 stomachs from an experimental aquaculture site near the Pacific Biological Station, Nanaimo. The pelagic plankton community in the vicinity of pens and the net-fouling community were

examined with occasional plankton net hauls.

There was very little wild food in any of the salmon stomachs, and the few wild food items that were found were small and occurred infrequently. The most common organism was the caprellid, a small arthropod that forms part of the 'fouling' community that grows on the webbing of nets on the cages. It also was the most common wild organism found in previous work examining farmed Pacific salmon. Only one fish was taken from all the samples, a small (<8 cm) sand lance (*Ammodytes hexapterus*) that is common throughout all coastal waters. There were very few pelagic zooplankton taken in any of the samples with a total of only two euphausiids (*Euphausia pacifica*) from all the guts. No fish larvae were found in the stomachs but very small items, such as larvae of marine fish such as herring or eulachons might have gone undetected because after a short time in the stomachs, the fragile tissue in fish larvae would have been unrecognizable. It is probable, however, that if substantial numbers of fish larvae had been consumed, we would have detected some. There were no obvious differences in the consumption of wild organisms among the sites and lights had no apparent effect on the consumption of wild food.

The general observation from all farm sites is that there was very little wild food in any of the salmon stomachs. The few food items that were there were small and infrequent. There were no obvious differences in food consumption related to lighted versus

unlighted farms, but sample sizes were small (one farm) and the duration of the study (9 weeks) was too short to support general conclusions.

Our main conclusion is that the caged Atlantic salmon in this study consumed very few wild food organisms. The most common wild organisms were caprellids, which live on the side of netpen cages. We found no larval fish in the guts but there few fish larvae among the wild plankton in the vicinity of the farms.

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