PACIFIC SALMON COMMISSION

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Report: *MML2006-28Cave*

Initial trials of an electric pulse deterrent system to protect salmon catches in gillnets from predation by harbour seals in the Fraser River

There have been numerous efforts to mitigate pinniped predation on salmonids. The majority of predator deterrent methods involve acoustic harassment devices or the deployment of secondary or predator nets. Unfortunately, the majority of these efforts have resulted with only limited success. The Pacific Salmon Commission (PSC) and Smith-Root Inc. conducted the initial testing of a Harbour Seal *Phoca vitulina* electric pulse deterrent system in the vicinity of the PSC Whonnock Gillnet test fishery site (PFMA 29) on August 28, 2006. The test was carried out under the authority of Fisheries and Oceans Canada - Marine mammal License MML2006-28Cave.

Background

Since the early 1950's gillnet test fisheries on Fraser River sockeye salmon (*Oncorhynchus nerka)* have been operated by the International Pacific Salmon Fisheries Commission and since 1986 by the PSC. The Whonnock test fishing site is located in the Fraser River approximately 1 kilometer upstream from the Albion Government Dock in Maple Ridge, BC and the Cottonwood test fishing site is located in the Fraser River approximately 1 kilometer upstream from the Highway 99 Deas Island Tunnel. These test fisheries generally begin in late June, and operate daily, at high daytime tide, into September. The test fishery is vital for in-season Fraser River sockeye salmon management. Catch by species, and stock composition information collected from the test fisheries is used to partition estimates of daily salmon passage to species and stock of origin.

In recent years, the Cottonwood and Whonnock test fisheries have been severely impacted by seal presence and predation. Seals now consume a significant proportion of salmon that are caught.—up to 100% of the catch. Historically, during low salmon abundance (10-20,000 per day) catches between 20-100 sockeye per day were not unusual, certainly throughout July. Now, catches seldom exceed 10 per day. In addition, we are convinced that even during high sockeye abundances the presence of aggressive seals is affecting the behaviour of fish in the area so that the proportion of fish removed in these test fisheries is

significantly less than the historical averages or interannual range. Sufficient samples are no longer obtained with which to estimate the sockeye stock composition in the daily passage. In addition, because of the low sample size, there is low confidence in the estimates of species composition from the catches. Both test fisheries are in danger of being suspended permanently unless a solution can be found.

Study

The objective of the project covered by Marine Mammal License MML2006-28 was to observe the response of Harbour Seals to a pulsed electric field gradient in close proximity to a gillnet. Smith-Root Inc., experts and manufacturers of electrical fishing systems, designed and manufactured the portable electric pulse deterrent system. The deterrent system consisted of 2 parallel cables, 20 fathoms long. The upper cable was located at the water surface by a series of purse seine net floats and the lower cable was located 2 fathoms below the surface cable. The cables were separated into 4 sections that could be energized independent from one another. Smith-Root Inc. provided a portable electric generator and a modified VVP 15B Control unit to manage the current output and monitor settings. The cable array was positioned in very close proximity to a 20 fathoms long x 2 fathoms deep x 5 ¼" mesh size test Gillnet. A 15 meter extension lead was used to position the Gillnet / electric deterrent system a short distance away from the test fishing vessel. All the testing occurred in the vicinity of the PSC Whonnock test fishing site. The PSC Whonnock test fisherman and test fishing vessel, *Summer Days*, were used to facilitate testing. Following the initial deployment of the test Gillnet electrical deterrent system Smith-Root technicians measured the electrical field density and verified that each of the 4 sections was operating as designed. Four separate test drifts were carried out between 11:00 and 17:00 hours on August 28, 2006. The duration of each test drift was approximately one hour.

A total of 5 sockeye were caught in the test Gillnet and a total of 6 Harbour Seals were observed in the vicinity of the test location. No Harbour Seals came closer than 50 meters to the test fishing vessel and therefore no electric deterrent tests were conducted on the animals. The observed animals did not appear to have any distinguishing marks, brands and / or tag numbers and there were no observed impacts or disturbances to the Harbour Seals in the vicinity of the test location.

Those present during the initial testing:

Jan Calson, Owner and operator, Whonnock test fishing vessel *Summer Days*, Dave Smith, Founder and President, Smith-Root Inc., Kerry Smith, Research and Development, Smith-Root Inc., Lisa Harlan, Biologist/Scientist, Smith-Root Inc., Peter Olesiuk, Head, Seal and Sea Lion Research Program, DFO Science, Pacific Region, Jim Cave, Head, Stock Monitoring Program, Pacific Salmon Commission, Keith Forrest, Test Fishing Biologist, Pacific Salmon Commission.

Keith Forrest
Test Fishing Biologist
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