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Devils Lake - Lake Winnipeg Pathogen/Parasite Survey: Lower Red River and Lake Winnipeg (south basin) Sampling Components and Results for Years 2006 and 2007

In 2006 and 2007 of the Devils Lake – Lake Winnipeg Pathogen/Parasite survey, 1155 fish were collected and tested for bacterial and viral pathogens of concern. The pathogens of concern included: infectious pancreatic necrosis virus (IPNV), infectious hematopoietic necrosis virus (IHNV), viral hemorrhagic septicemia virus (VHSV), Onchoryncus masou virus (OMV) channel catfish virus (CCV); Aeromonas salmonicida (furunculosis), Yersinia ruckeri (enteric redmouth), Edwardseilla ictaluri (enteric septicemia of catfish), and Renibacterium salmoninarum (bacterial kidney disease). In the fall 2006, 60 lake whitefish were collected from the south basin of Lake Winnipeg and examined for the presence of the myxosporean parasite Myxobolus cerebralis (whirling disease).

A statistically valid sample of 60 fish was to be collected from ten targeted commercially and/or recreationally valuable species, six of which were identical to those being collected from Devils Lake and other contiguous waters in North Dakota. These included: walleye, white bass, yellow perch, northern pike, fathead minnows, and brook sticklebacks. The remaining four species not present in Devils Lake, but inhabiting Canadian waters included: sauger, channel catfish, emerald shiners, and goldeye. In 2006, 9 of 10 species were statistically sampled (only 7 channel catfish captured). In 2007, 7 of 10 species were statistically sampled (only 38 walleye and 50 pike were captured, no brook sticklebacks were obtained).

Assay Results

No bacterial or viral pathogens of concern have been detected in any of the fish examined. These results coincide with four years of work

conducted in the U. S. As expected, ubiquitous water-borne bacteria such as Aeromonas hydrophila, Pseudomonas fluorescens, and Pseudomonas aeruginosa were isolated. Also, a variety of enteric bacteria were isolated. These findings were not dissimilar to those in the U. S. survey. The detection of enteric bacteria in these fish is not an unexpected finding. The presence of these organisms reflects the quality of the water the fish are inhabiting.

Myxobolus cerebralis was not detected in the sample of 60 lake whitefish collected in the fall 2006.

Quality Assurance/Quality Control of Methods Used for Renibacterium salmoninarum (R. s.) Detection

The respective Canadian and U. S. laboratories used two different methods for the detection of R. s. in harvested kidney tissue preparations. The Winnipeg Fish Health Laboratory (WFHL) prepared kidney smears which were stained using the Indirect Fluorescent Antibody Staining Technique (IFAT). The Bozeman Fish Health Center screened kidney tissue using the Enzyme-Linked Immunosorbent Assay (ELIZA) followed by confirmation using the Polymerase Chain Reaction (PCR) on kidney samples presumptively positive by ELIZA. Because the methods for R. s. detection were significantly different, it was agreed that an exchange of kidney material collected in the respective labs would be exchanged and tested using the methods used in the respective labs. Kidney/spleen tissue from 59 fish representing 7 species was sent to the Bozeman Fish Health Center. The WFHL received from the Bozeman lab 46 kidney smears representing 7 species of fish. R. s. was not detected by IFAT staining in any of the 46 kidney smears obtained from the Bozeman lab.

Discussion

To date, bacterial and viral testing has provided similar findings in both the U. S. and Canadian aspects of this survey. If the targeted pathogens of concern are present in the fish species being tested, their true prevalence could be less than the assumed 5% prevalence level used as the basis for sampling in this survey. If this is the case, there is little likelihood of any of these pathogens being detected using the current sampling strategy.

Also, the detection methods being used (particularly those for virus detection), although widely used and accepted, have detections sensitivities that are less than 100%. To statistically sample 10 targeted species using an assumed prevalence of 1 of 2% would involve collecting a greater number of fish, and it would significantly increase the logistical difficulties and expense to acquire the fish. It should be noted that there was difficulty acquiring 60 fish samples for some species in both the U. S. and Canada during the 2006 and 2007 sampling seasons. Therefore, a repeat of the present sampling strategy is probably not warranted. However, if testing is to continue in some form, perhaps it should be targeted at one or two susceptible species for a specific pathogen such as VHSv which is currently of concern to both the U. S. and Canada. The IVb genotype of VHSv has been detected in the Great Lakes in both the U. S. and Canada as well as inland lakes in New York state, Michigan and Wisconsin. It has been detected in 25 species of fish and it has caused mortality events in at least 10 of these species. Survey work in both the U. S. and Canada is being undertaken in an effort to determine the distribution of this pathogen. Monitoring of targeted susceptible species in the lower Red River and south basin of Lake Winnipeg could be part of an expanded VHSv survey in Canada. This would require cooperation from the Manitoba Department of Natural Resources and/or DFO to acquire the necessary samples for virus screening. The use of a number of different cell lines would increase confidence of detecting VHSv and/or other viral agents.