

PI Name/Short Description: Migratory waterfowl – productivity (Lake St. Louis to Trois-Rivières) [E25]

Technical Workgroup: Environment TWG

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Modeled by: Jean Morin

Performance indicator Metric: Number of young/adult female annually produced according to different average water levels during the plant growing season (April-October) as measured at the Sorel gage.



Ecological Importance/Niche: The fluvial section of the St. Lawrence River (including the adjoining mainland) harbors some 6000 nests. It hosts almost 50% of the total nesting dabbling duck population of the whole St. Lawrence River. Inappropriate water levels could substantially decrease productivity, threaten the population and eventually reduce the economic spin-off associated with hunting in that area evaluated at 10 million dollars (Canadian) annually.

Temporal validity: Valid between April 1 and October 31.

Spatial validity: Valid for the Lower St. Lawrence between Lake St. Louis and Lake St. Pierre.

Hydrology Link: The productivity of waterfowl within the fluvial section of the St. Lawrence River is substantially reduced when the average water levels measured during the plant growing season (April-October) are maintained too low or too high. Inappropriate average water levels during the plant growing season induce the following impacts:

- low average water levels might decrease the dabblers productivity especially because nesting sites become readily available to terrestrial predators;
- low average water levels make the emergent marshes, which are the prime habitat during the brood rearing season, too dry and too dense preventing broods to have easy access to feeding sites and escape cover;
- at very high average water levels, a reduction of productivity is also expected because emergent marshes would become scarcer preventing birds to again have easy access to escape cover. Nests will also become more easily flooded following any sudden substantial increase of the water levels;

Algorithm: The algorithm relies on the mean water level at Sorel from QM13 to QM40. The model is based on 10 years of banding data collected between 1968 and 2002. The dabblers productivity (number of fledged ducklings/reproductive female) will be at its optimum when average water levels registered at the Sorel gage are maintained at levels

higher than 5.4 m (17.72 ft). The annual productivity can be determined with the following correlation: $Y = 3.5178X - 11.933$

Calibration Data: No data available

Validation Data: Historical water levels and productivity data, as provided by banding stations between 1968 and 2002, were used to make the appropriate correlation.

Documentation and References:

Lehoux, D., D. Dauphin, P. Laporte, J. Morin and O. Champoux, 2004. Recommendation of water plans and final management criteria less detrimental to breeding and migrating waterfowl along the St. Lawrence River within the Lake St. Louis and Lake St. Pierre area. Environment Canada, Canadian Wildlife Service.

Risk and Uncertainty Assessment: We are confident that this model will accurately predict which average water levels, as recorded during the April-October period, will provide the best productivity of waterfowl within the fluvial section of the St. Lawrence River. The real impact on productivity of very high average water levels (>5.5 m or >18.04 ft) remains however less obvious. Data used to correlate the productivity and the water levels are somewhat limited. We only have 10 years of banding data collected mainly between 1990 and 2002 to do so. We have a relatively weak correlation between productivity and the average water levels registered during the plant growing season ($r^2 = 0,30$). However that performance indicator is one the rare indicator which correlates water levels and productivity. Long term inappropriate water levels during the breeding season could eventually have a serious threat on the dabbling ducks population found in the lower St. Lawrence and induce some important economic losses.