

HABITAT SUITABILITY INDEX FOR LAKE STURGEON, *Acipenser fulvescens*

Dr. R.W. Threader
Ontario Hydro
700 University Avenue
Toronto, Ontario M5G 1X6
Phone: (416) 592-4470
Fax: (416) 592-1937

Introduction

Since 1993, Ontario Hydro, Toronto, Ontario, Canada, has undertaken a study to develop a Habitat Suitability Index (HSI) model for lake sturgeon, in order to assist in efforts to protect and conserve this unique, long-lived species. In particular, this model was specifically designed to assist Ontario Hydro in managing lake sturgeon populations, especially on rivers with existing hydroelectric dams with their related operations, and during any redevelopment of existing stations and new developments.

In Ontario, lake sturgeon are largely confined to freshwater riverine and lacustrine habitats, although a few populations are found in the brackish estuarine waters of Hudson and James Bay. This fish species is considered to be common in fish communities in the northern areas of the province and in the Lake St. Clair area of southwestern Ontario. In fish communities elsewhere in the province, lake sturgeon are regarded as rare.

As the model has been constructed from the author's experience and data on lake sturgeon, from the existing literature, as well as from personal communication from many North American researchers, this model is expected to be applicable to large, slow flowing rivers within the native range of the species.

The structure of the lake sturgeon model is based upon measurable habitat variables. These habitat variables were considered to be important in limiting the distribution, abundance and/or survival of this species within its native range. Knowledge of critical habitat requirements is limited for the early life stages, including juveniles, and may require further model refinement as data becomes available.

HSI Model

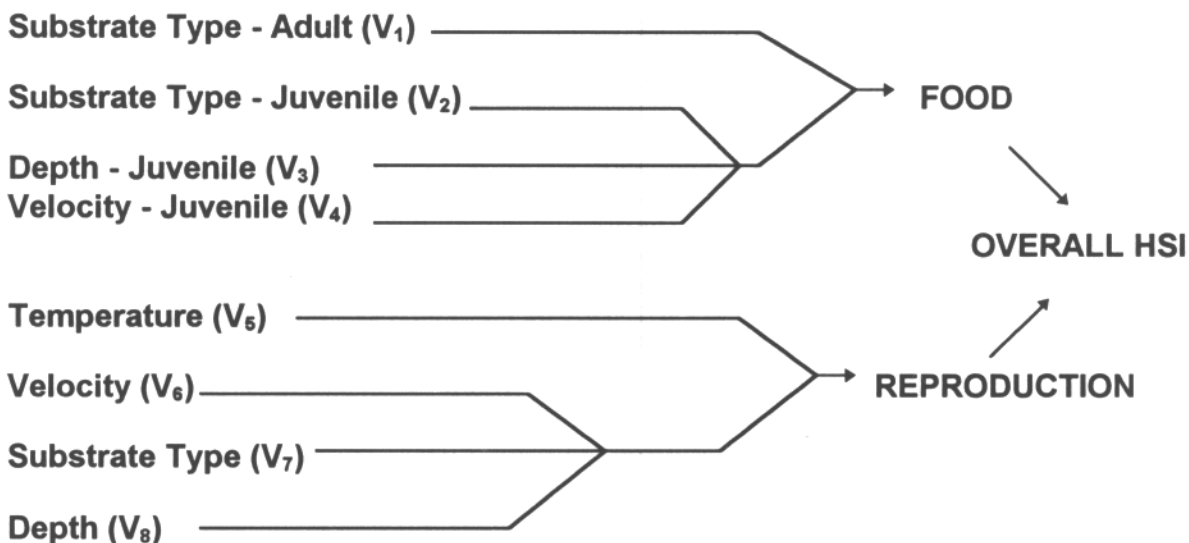
Two model components were used to represent two life requisites of the lake sturgeon. They are: food (summer foraging habitat); and, reproduction (spawning and incubation habitat). Variables were selected for each of these components to represent direct or indirect measures to evaluate the characteristics of a site in meeting lake sturgeon habitat requirements for summer foraging and spawning.

73

Four habitat variables were selected for foraging, these being: foraging substrate type for adults (V_1); foraging substrate type for juveniles (V_2); water depth (V_3); and water velocity (V_4). Likewise, four variables were chosen as indicators of habitat suitability for spawning and incubation, these being: water temperature (V_5); water velocity (V_6); substrate type (V_7); and, water depth (V_8). The structure of the HSI can be described as follows:

HABITAT VARIABLES

LIFE REQUISITE



Suitability Index (SI) graphs for the eight model variables were constructed by converting all habitat information collected into habitat suitability graphs ranging from 0 (ie, unsuitable habitat) to 1 (ie, optimum habitat). The rationale and assumptions used in the development of the HSI model for lake sturgeon have also been addressed.

Ontario Hydro is presently undertaking field research to validate the precision of this model, as well as collecting new information to strengthen the model's predictions.

Acknowledgements

Ontario Hydro would like to thank the following people for their contribution to this project:

Dr. Luther Aadland, Dr. Nancy Auer, Mr. Jim Beyette, Mr. Ron Bruch, Dr. Terry Dick, Mr. George Duckworth, Dr. Rejean Fortin, Ms. Liz Hay-Chmielewski, Mr. Bruce Hood, Mr. Steve LaPan, Mr. Chris Lowie, Mr. Don MacDonald, Mr. Don MacDonnell, Mr. Tom Mosindy, Mr. Richard Pope, Mr. Gary Preston, Mr. Jack Robinson, Mr. Paul Schaap, Mr. John Seyler, Mr. Richard Stiehl, Mr. Gary Swanson, Mr. Jim Terrell, Mr. Laurie Thompson, Dr. Tom Thuemler, Mr. Rob Wallace, Mr. Dennis Windsor.

The model will be made available, on a laptop computer, for use by all in attendance at the Symposium. Real or simulated habitat variables can be employed.

74