

Predicting the Spread and Impact of Introduced Fishes in Algonquin Park, Ontario

Nicolas E. Mandrak

Great Lakes Laboratory for Fisheries and Aquatic Science
Department of Fisheries and Oceans
867 Lakeshore Road, Burlington, ON, L7R 4A6
mandrakn@dfo-mpo.gc.ca
(905) 336-4842

Most lakes in Algonquin Park originally lacked large cool and warm-water piscivorous fishes (e.g., pike (*Esox lucius*), walleye (*Stizostedion vitreum*), basses) as the result of early isolation following the last Ice Age. The authorized introduction of smallmouth bass (*Micropterus dolomieu*) began in the late 1800s and continued into the mid-1900s. More recently, the unauthorized introductions of northern pike, rock bass (*Ambloplites rupestris*), largemouth bass (*Micropterus salmoides*) and walleye have led to the establishment of reproducing populations in many Algonquin lakes. The objectives of the current study are to identify lakes in Algonquin Park that have suitable trophic, physical and chemical conditions for these introduced species; and, to identify current and potential impacts of these species on native fish communities.

To identify lakes susceptible to colonization by introduced species, separate discriminant function analyses (DFA), were used to predict the presence or absence on eight trophic, five physical and five chemical parameters measured in 2,809 Ontario lakes (excluding Algonquin lakes) south of 48°N, and applied to data for 245 Algonquin lakes. Lakes predicted to be suitable for an introduced species (i.e. predicted presence) were considered to be susceptible to colonization.

For all introduced species, the trophic data were most important in the discriminant analyses, and the physical and chemical data were of limited importance. The discriminant models correctly predicted the presence of the introduced species in southern Ontario lakes at rates ranging between 88.9% and 92.2%, and at rates between 38.5% (rock bass, *Ambloplites rupestris*) and 100% (walleye) when applied to Algonquin lakes. Northern pike and walleye were predicted to invade the greatest number of Algonquin lakes, 63 and 65 respectively.

To identify the potential impact of the introduced species on native fish communities, the distributional relationships between each introduced species and native species was measured using the Jaccard similarity coefficient based on the Ontario lake dataset. Relationships between an introduced species and a native species with a low Jaccard coefficient (<0.20) were classified as predator-prey, competitive of other (e.g., sample bias). Twenty species native to Algonquin were shown to be negatively associated with all of the introduced species.

Lakes containing fish communities likely to be impacted by introduced species were ranked according to potential introduced colonizers and number of native fishes negatively impacted (i.e. prey, competitor) by the introduced species. Crotch Lake was the only lake predicted to be invaded by all five species considered. Twenty-two lakes contained 10 or more native species likely to be impacted by the introduced species with Lake Travers (19 species), Lake Opeongo (17) and Catfish Lake (15) having