USE OF THE LOWER SAINT JOHN RIVER, NEW BRUNSWICK, AS FISH HABITAT DURING THE SPRING FRESHET

Context

The Habitat Protection and Sustainable Development Division in the Maritimes Region has asked Maritimes Science 1) what fish species are present in the lower reaches of the Saint John River, New Brunswick, and its associated watersheds; and 2) do various life-history stages of the fish species present use flooded shoreline areas (i.e., the areas between the low water mark and the high water mark) spatially and temporally during the spring freshet and other periods of flooding?

The response to these questions will be used to assist the Conservation and Protection Branch of DFO to address concerns related to industrial and residential activities, including infilling, that may occur in these areas (i.e., between the low and high water marks of the lower Saint John River and its associated watersheds). This response may also be used to help address similar conservation concerns along other rivers in the Maritimes Region. It was determined that a Science Response would be an appropriate format to address this question.

A related Science Response was produced in 2007 to address concerns about residential infilling that occurred at one location in Belleisle Bay, which is within the lower reaches of the Saint John River (DFO 2007). The current Science Response is intended to expand upon the previous advice and enable its application to a broader area.

Response

The Canadian portion of the lower Saint John River is located in New Brunswick. There are no substantive man-made structures within the section of the lower river lying between the Mactaquac hydroelectric dam (operated by New Brunswick Power and located upstream of Fredericton) to Saint John Harbour (Figure 1) that would alter water levels. Below Fredericton, the Saint John River drainage consists of a well defined main river channel that includes a section known as Long Reach, an interconnected network of lakes that include Grand Lake, French-Indian Lake and Maquapit Lake that flow to the Saint John River via the Jemseg River, three arms (the Kennebecasis, Belleisle Bay and Washademoak Lake), and the Oromocto River-Lakes system. Water levels within these lower reaches of the Saint John River vary seasonally. During the winter, many portions of the entire Saint John River drainage are frozen. In the spring, the combination of rising air temperatures, precipitation events and melting of accumulated snow and ice (i.e., the spring freshet) can result in a substantial rise in water levels throughout the lower river. The high tides of the Bay of Fundy and the narrow channel at the mouth of the river (Reversing Falls) impede the discharge of river water to the bay and these factors can increase the duration and water levels of these flooding events in the lower Saint John River. During the summer months, the water level generally returns to normal and the river remains confined to its bank full width. The Lower Saint John River (below Fredericton) is under tidal influence but the change in water levels within the river associated with tidal forcing

are small relative to the seasonal change. The shoreline varies from sandy to rocky with extensive tree and brush vegetation.

Several sources of information are available to help define the species composition of the fish assemblage that exists within both the tidal and the non-tidal freshwater portions of the lower Saint John River. These include the results of beach seine surveys of the lower Saint John River during the summers of 2000 and 2001 (Figure 1), juvenile salmonid electrofishing surveys, and sampling/monitoring of both the directed catch and bycatch of commercial harvest fisheries for diadromous species.

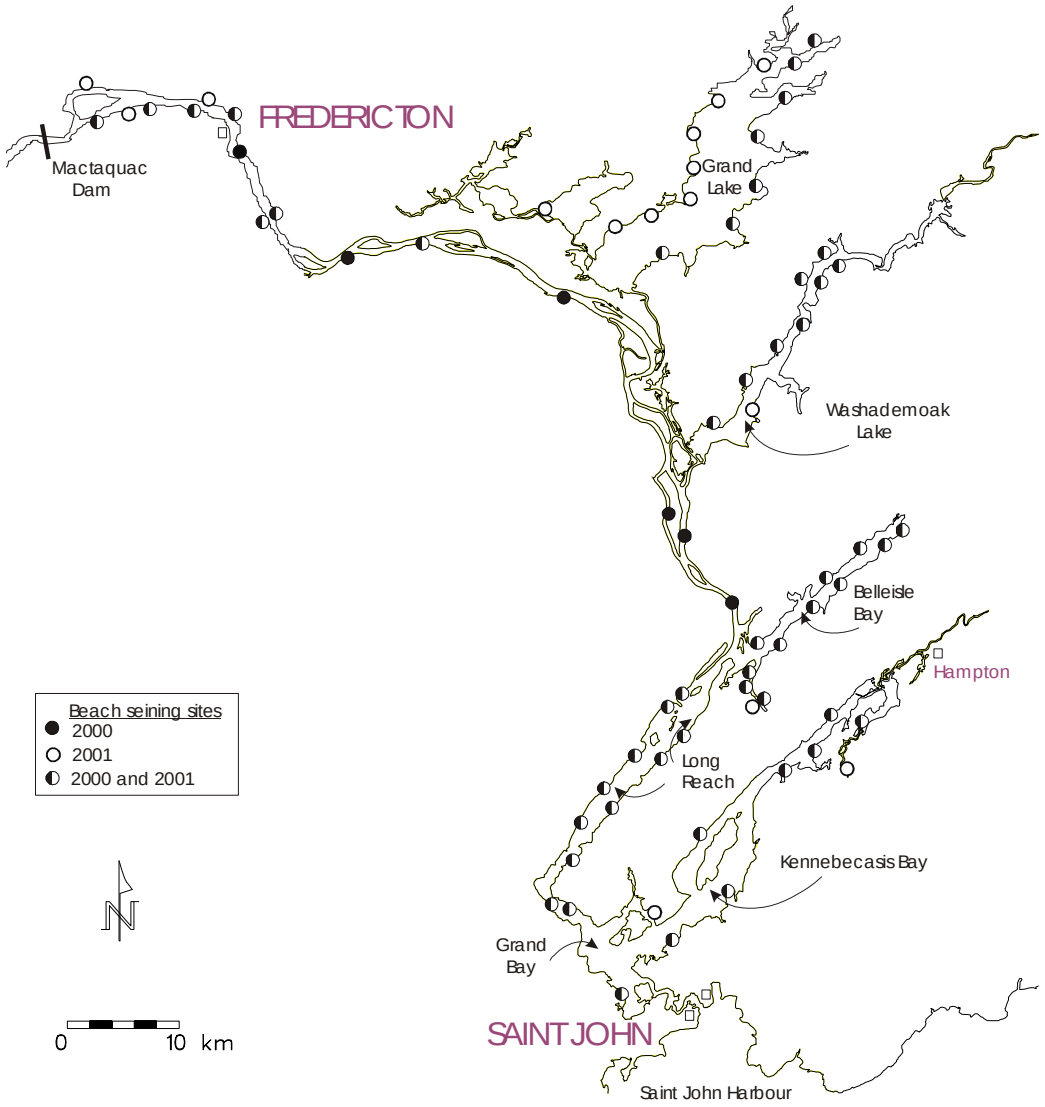

Figure 1. Location of beach seining sites on the Lower Saint John River from 2000-2001.

Species that have been observed or recorded during these activities include: alewife, American eel, Atlantic salmon, American shad, Atlantic sturgeon, banded killifish, blueback herring, brook (trout) char, brown bullhead catfish, burbot chain pickerel, pumpkinseed, rainbow smelt, redbreast sunfish, shortnose sturgeon, smallmouth bass, white perch, white sucker, yellow perch, and several species of minnows (cyprinids) and stickleback.

The life-history stages and likely activity of these species during the time of seasonal flooding is summarized in Table 1 to the extent possible.

Table 1. Information on the life-history stages and likely activity of species present in the area of interest during times of seasonal flooding. Note: The specific life-history function fulfilled by flooded habitat will vary among species for both migrant and resident fishes as a result of species differences in the timing of reproduction, onset of foraging, onset of growth, and as well factors such as their thermal preferences, water velocity tolerances, and susceptibility to predation.

	Status at time of seasonal flooding	
Common name	**Life-history stage**	**Likely activity**
alewife	adult	Migrating through area
American eel	1) elvers	1) Both recruiting to and migrating through area
	2) sub-adult, adult	2) Resident (feeding, etc.)
American shad	adult	Migrating through area
Atlantic salmon	smolt, adult	Migrating through area
Atlantic sturgeon	uncertain	Present in lake, activity in flooded habitat uncertain
banded killifish	larvae, sub-adult, adult	Resident (feeding, etc.)
blueback herring	adult	Migrating through area
brook (trout) char	sub-adult, adult	Present in lake, activity in flooded habitat uncertain
brown bullhead catfish	sub-adult, adult	Resident (feeding, etc.)
burbot	sub-adult	Resident (feeding, etc.)
chain pickerel	larvae, sub-adult, adult	Resident (feeding, etc.)
minnows (Cyprinid sp.)	uncertain	Resident (feeding, etc.)
pumpkinseed	larvae, sub-adult, adult	Resident (feeding, etc.)
rainbow smelt	larvae, sub-adult, adult	Migrating through area
redbreast sunfish	larvae, sub-adult, adult	Resident (feeding, etc.)
shortnose sturgeon	uncertain	Present in lake, activity in flooded habitat uncertain
smallmouth bass	larvae, sub-adult, adult	Resident (feeding, etc.)
stickleback (Gasterosteus sp.)	uncertain	Resident (feeding, etc.)
striped bass	sub-adult, adult	Present in lake, activity in flooded habitat uncertain
white perch	sub-adult	Probable resident
white sucker	larvae, sub-adult	Resident (feeding, etc.)
yellow perch	larvae, sub-adult, adult	Resident (feeding, etc.)

Several of these species are being considered as potential species-at-risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or have been designated as species-at-risk under the Species-at-Risk Act (SARA). The current COSEWIC designation and status under SARA of these species is provided in Table 2.

Table 2. COSEWIC designation and SARA status of species present in the lower reaches of the Saint John River as of June 2009.

Common name	COSEWIC status	SARA status
American eel	Designated as "special concern" (2006)	Special Concern
Atlantic salmon[1]	Currently under assessment	-
Atlantic sturgeon	Currently under assessment	-
redbreast sunfish	Designated as "data deficient" (2008)	Special Concern
shortnose sturgeon	Designated as "special concern" (2005)	Special Concern
striped bass	Designated as "threatened" (2004)	Threatened
white perch	Currently under assessment	-

[1]Atlantic salmon populations on the Saint John River and tributaries are below conservation levels and harvests and directed catches are prohibited.

It should also be noted that the lower Saint John River is thought to possess the highest freshwater fish diversity east of the Province of Quebec. The lower Saint John River represents the sole Canadian spawning location for the shortnose sturgeon, is one of only a few known spawning locations for Atlantic sturgeon and possibly striped bass, and represents the bulk of the known Canadian range for the redbreast sunfish. While the relative dependence on littoral habitat of the 35+/- species that occur in the river probably varies both among species and seasonally within certain species, there is a strong case to be made for its overall importance as fish habitat at local, regional and national scales. In other locations, seasonally flooded areas are known to be important for such things as pickerel spawning.

Finally, works or undertakings that cause a harmful alteration, disruption, or destruction of fish habitat, such as infilling of seasonally flooded areas (destruction), can represent a loss of fish habitat within the lower Saint John River. These activities can also have offsite impacts on the quality and quantity of fish habitat in other locations by influencing important chemical or physical processes, such as current patterns.

Conclusions

Species that are known to occur in the lower Saint John River at the time of seasonal flooding include: alewife, American eel, Atlantic salmon, American shad, Atlantic sturgeon, banded killifish, blueback herring, brook (trout) char, brown bullhead catfish, burbot, chain pickerel, pumpkinseed, rainbow smelt, redbreast sunfish, shortnose sturgeon, smallmouth bass, white perch, white sucker, yellow perch, and several species of minnows (cyprinids) and stickleback.

Use of these areas during the time of seasonal flooding is described in detail in Table 1. In general, the relative dependence on littoral habitat of the 35+/- species that occur in the river varies both among species and seasonally within species, but this area can represent an important habitat range component for fish.

References

DFO. 2007. Belleisle Bay Fish and Fish Habitat. DFO Can. Sci. Advis. Sec. Sci. Resp. 2007/015.

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