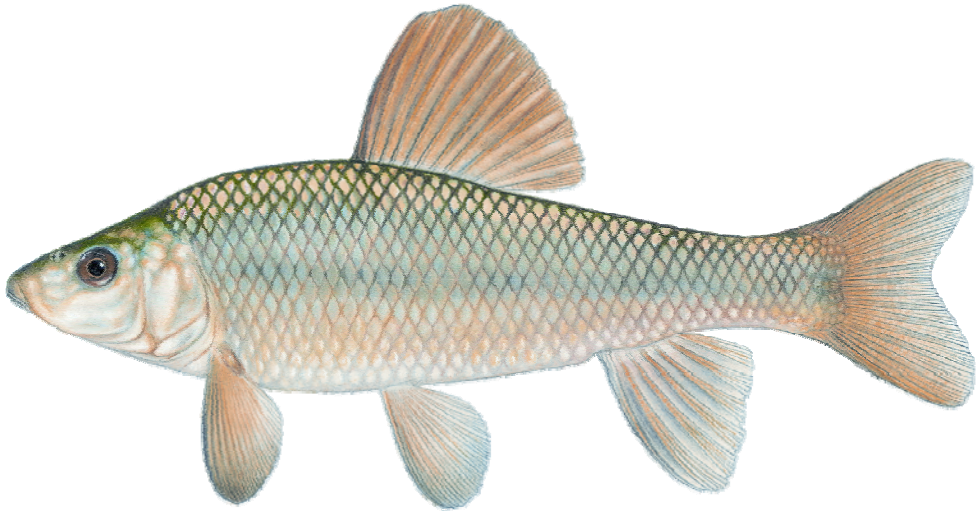
COSEWIC
Assessment and Update Status Report

on the

Lake Chubsucker
Erimyzon sucetta

in Canada



ENDANGERED
2008

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC. 2008. COSEWIC assessment and update status report on the Lake Chubsucker *Erimyzon sucetta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Previous reports:

COSEWIC. 2001. COSEWIC status report on the Lake Chubsucker *Erimyzon sucetta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 12 pp.

Mandrak, N.E. and E.J. Crossman. 1994. COSEWIC status report on the Lake Chubsucker *Erimyzon sucetta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-12 pp.

Production note:
COSEWIC acknowledges Nicholas E. Mandrak, Becky Cudmore and the late E.J. Crossman for writing the provisional status report on Lake Chubsucker, *Erimyzon sucetta*, prepared under contract with Environment Canada. The contractors' involvement with the writing of the status report ended with the acceptance of the provisional report. Any modifications to the status report during the subsequent preparation of the 6-month interim and 2-month interim status reports were overseen by R. Campbell, and C. Renaud, COSEWIC Freshwater Fishes Specialist Subcommittee Co-chairs.

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Lake Chubsucker — Illustration by Joseph Tomelleri. Used under licence to DFO.

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COSEWIC
Assessment Summary

Assessment Summary – November 2008

Common name
Lake Chubsucker

Scientific name
Erimyzon sucetta

Status
Endangered

Reason for designation
A species with a restricted geographic Canadian range with small extant populations having very specific and narrow habitat preferences, which are under continued stress. It is extremely susceptible to habitat change driven by urban, industrial and agricultural practices resulting in increased turbidity. Two populations have been lost, and of the 11 extant populations, 3 are in serious decline as a result of the continuing and increasing threats posed by agricultural, industrial and urban development that are expected to impact the remaining populations of Lakes Erie and St. Clair.

Occurrence
Ontario

Status history
Designated Special Concern in April 1994. Status re-examined and designated Threatened in November 2001. Status re-examined and designated Endangered in November 2008. Last assessment based on an update status report.

COSEWIC
Executive Summary

Lake Chubsucker
Erimyzon sucetta

Species information

The Lake Chubsucker is one of 18 sucker species, and the only member of its genus, to be found in Canada. It is a robust, lightly compressed, freshwater fish with a moderately deep-arched back, thick caudal peduncle and wide head with a blunt snout.

Distribution

The Lake Chubsucker exhibits a disjunct distribution in the Mississippi and Great Lakes basins of North America. In Canada, the Lake Chubsucker has been collected only in the drainages of the Niagara River, and lakes Erie, St. Clair and Huron in southwestern Ontario.

Habitat

The preferred habitat of the Lake Chubsucker is clear, still, well-vegetated waters. In Ontario, the Lake Chubsucker has been captured primarily in heavily vegetated, stagnant bays, channels, ponds and swamps with low turbidity and substrates of clay, silt, sand and organic debris.

Biology

The Lake Chubsucker is a warmwater species, usually found in areas where water temperature ranges from 28.2-34^{o}C. Maximum known age of Lake Chubsucker is reported to be 8 years. The maximum known length and weight in Canada is 292 mm and 397 g, respectively. Most females are 3 years of age at the onset of maturity. The Lake Chubsucker likely spawns between late April and June in Ontario. Males clear a spot in sand, silt, or often gravel, and the female deposits between 3000 and 20 000 eggs, depending on her size, over vegetation, filamentous algae, grass stubble or the nest. The Lake Chubsucker is omnivorous. The Lake Chubsucker is tolerant of low O_2 levels and intolerant of siltation, turbidity and high stream gradients.

Population sizes and trends

The Lake Chubsucker has not been collected in a standardized manner, nor have there been any specific studies on population sizes, in Canada. Therefore, it is difficult to assess population sizes and trends. However, substantial sampling has occurred within its historic range over the last 5 years and some inferences on population trends can be made based on the collection of the species over time in Canada. In general, the Lake Chubsucker is currently found at most sites where it was historically present (before 1989).

The Lake Chubsucker has been extirpated from two of 13 known locations, is likely declining at three locations, and the status of a recently discovered location (L Lake) is unknown. Declines have been associated with the continuing and increasing threats posed by agricultural, industrial and urban development.

Limiting factors and threats

Siltation, increased turbidity and loss of habitat are factors attributed to the decline of the Lake Chubsucker throughout its range as they are intolerant of turbidity and highly silted waters.

Special significance of the species

The Lake Chubsucker is declining throughout most of its North American range and is the only representative of its genus presently known in Canada.

Existing protection or other status designations

The Lake Chubsucker was designated by COSEWIC as Special Concern in 1994. In 2001, the status was re-examined and uplisted to Threatened. It is currently on Schedule 1 of the Canadian *Species at Risk Act*. The national rank is N2 meaning the species is considered very rare in Canada. The national general status rank is 1, meaning it is at risk in Ontario, the provincial rank is S2, and the Ontario Endangered Species Act lists the species as Threatened. In the Great Lakes states, it has a subnational rank of S4 (MI), S2 (OH), SH (NY) and SX (PA).

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2008)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
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SPECIES INFORMATION

Name and classification

Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Cypriniformes
Family Catostomidae
Species: *Erimyzon sucetta* (Lacepède, 1803),

Common English Name: Lake Chubsucker (Nelson *et al.* 2004)
Common French Name: Sucet de lac (Coad 1995)

Morphological description

The Lake Chubsucker, *Erimyzon sucetta* (Lacepède, 1803), belongs to a genus of suckers (family Catostomidae) that includes only three species (Nelson *et al.* 2004).

It is a robust, lightly compressed fish with a moderately deep-arched back, thick caudal peduncle and wide head with a blunt snout (Figure 1). It has a small, slightly inferior, suctorial, protrusible mouth and lacks a lateral line (Scott and Crossman 1973). The dorsal surface of its body is deep olive to greenish-bronze; the ventral surface is green-yellow to yellow-white. Scales on the upper half of the body are dark-edged giving a cross-hatched appearance. A lateral stripe, if present, has been documented as continuous in adults (Pflieger 1975; Trautman 1981; Rutherford *et al.* 1985; Robison and Buchanan 1988), or broken into dark blotches or dark lateral stripes (Anonymous 1962; Scott and Crossman 1973; Douglas 1974; Page and Burr 1991). Preserved adult specimens from Ontario exhibit both continuous and blotched lateral stripes when present. Adult size may reach a maximum of 410 mm total length (TL; Page and Burr 1991), although Ontario specimens seldom exceed 254 mm TL (Scott and Crossman 1973).

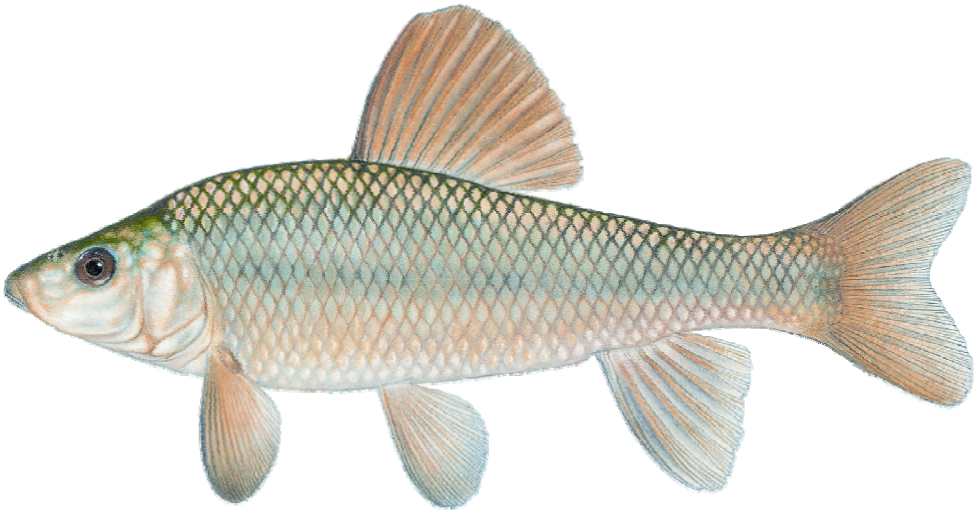

Figure 1. The Lake Chubsucker *Erimyzon sucetta*. Illustration by Joe Tomelleri. Used under licence to DFO.

The Lake Chubsucker is one of 18 (19 if smallmouth buffalo (*Ictiobus bubalus*) is present in Canada; see Mandrak and Cudmore 2005) sucker species found in Canada (Scott and Crossman 1998), and one of 13 (14) sucker species found in the Canadian Great Lakes basin (Cudmore-Vokey and Crossman 2000).

A dorsal fin with a short base, fewer than 20 rays and without a rounded or pointed anterior lobe differentiates the genus *Erimyzon* from the genera *Carpiodes, Cycleptus* and *Ictiobus*. *Erimyzon* differs from other genera of Catostomidae by the presence of an oblique mouth and absence of a lateral line.

The Lake Chubsucker most closely resembles the creek chubsucker, *Erimyzon oblongus*, a species that has not been reliably reported from Canada[1], but which might be expected to occur given its presence in American tributaries of lakes Ontario and Erie. Given the morphological similarities between the two species and the close proximity of American populations of creek chubsucker, all Ontario specimens of *Erimyzon* should be closely examined. The Lake Chubsucker differs from the creek chubsucker in its larger eye diameter, lower lateral line scale count, higher dorsal ray count and generally stouter body form.

Genetic description

The genetic population structure of the Lake Chubsucker in Canada is unknown.

1 *Erimyzon oblongus* had been reported in New Brunswick in 1873 (Cox 1896). Cox (1896) erroneously listed this record as *E. sucetta* based on Adams (1873) who listed it as *Moxostoma oblongus* (=*Erimyzon oblongus*). Scott and Crossman (1959) concluded “it seems highly unlikely that it [*Erimyzon oblongus*] ever occurred in New Brunswick.

Designatable units

All Canadian populations are found within the Great Lakes-Upper St. Lawrence ecozone of the freshwater ecozone classification adopted by COSEWIC. The population structure within this ecozone is unknown. There is no evidence supporting the identification of designatable units below the species level.

Eligibility

The Lake Chubsucker is recognized as a native species (Mandrak 1990; Nelson *et al*. 2004), although no Canadian records exist prior to 1949. Mandrak (1990) felt that it was present in Canada previous to 1949, but had not been previously collected due to low population numbers and the difficulty of sampling preferred habitat. Scott (1952), and Mandrak (1990) stated that its presence here is the result of recent natural northward migration. Extant, reproducing populations are known from 11 locations, and are believed to be extirpated at two locations.

DISTRIBUTION

Global range

The Lake Chubsucker exhibits a discontinuous distribution in North America (Figure 2). A southern element is centred on the Gulf States and extends northward from the Arkansas River through the Mississippi Valley to southern Illinois; east of the Mississippi River to the Atlantic Seaboard northward to southern Virginia; and west of the Mississippi River to eastern Texas. A northern element encompasses the southern Great Lakes drainage. Distribution is fragmented between the two main areas of distribution. Trautman (1981) hypothesized that this fragmentation was the result of northeastern range expansion during the warm Hypsithermal Period (ca. 7000 to 5000 years before present), and subsequent range contraction and fragmentation during the wane of this Period. In recent times, the distribution of the Lake Chubsucker appears to be decreasing in many states, and it is now considered extirpated in Iowa and New York (Becker 1983; Smith 1985). However, it was first recorded in Oklahoma in 1982 (Rutherford *et al.* 1985).

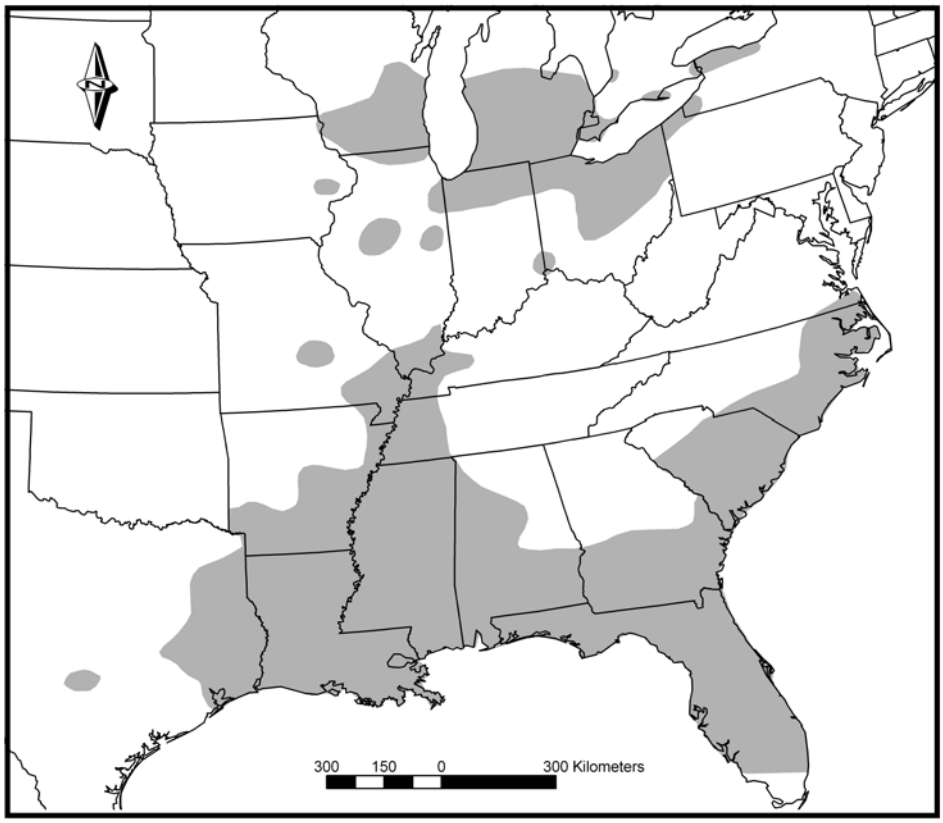

Figure 2. Global distribution of the Lake Chubsucker. Modified from Page and Burr (1991).

Canadian range

In Canada, the Lake Chubsucker has been collected only in the drainages of the Niagara River, and lakes Erie, St. Clair and Huron in southwestern Ontario (Figure 3). Based on the disjunct nature of the reports, records by Small (1883) for “Hartwell’s locks”, Ottawa, and by Halkett (1913) for the St. Lawrence River and tributaries are probably erroneous. Hubbs and Brown (1929) felt that the Lake Chubsucker was probably present in Ontario, although none had been collected. Scott (1952) reported that this species was first captured in Ontario in 1949, and suggested that its presence was the result of recent natural migration northward. Mandrak (1990) stated that the Lake Chubsucker dispersed through glacial waterbodies into the Lower Peninsula of Michigan and along the south shore of Lake Ontario during the late Pleistocene. Through these, and adjacent glacial waterbodies, the Lake Chubsucker would have had the opportunity to disperse into the lower Great Lakes and subsequently into Ontario. Mandrak (1990) suggested that it was not collected prior to 1949 due to low population numbers and the difficulty of sampling its preferred habitat; therefore, he concluded that the species should be considered native to Ontario.

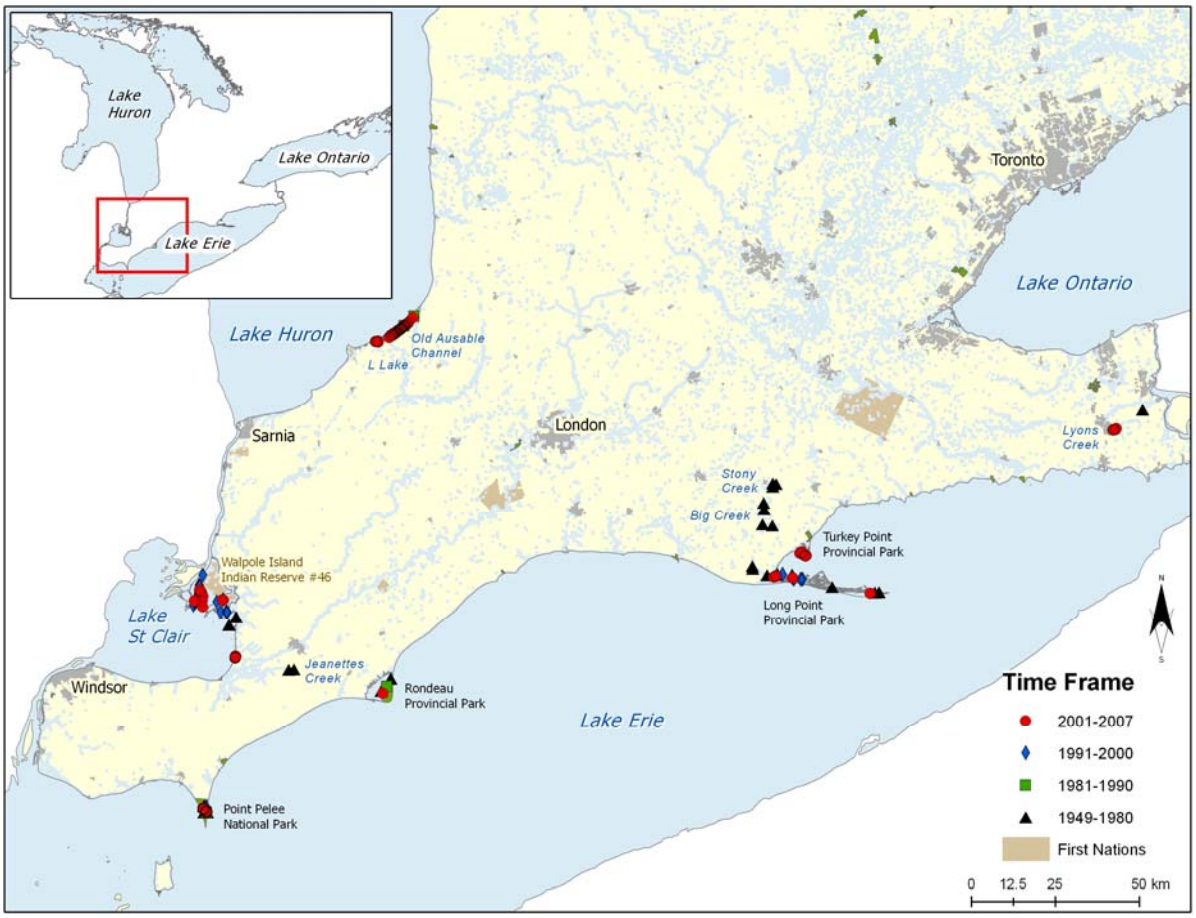

Figure 3. Canadian distribution of the Lake Chubsucker.

Despite more recent sampling, the Lake Chubsucker was collected only prior to 1970 in Jeanette's Creek (Thames River tributary), and Tea Creek (Niagara River tributary). It was collected only prior to 1989 in Big Creek tributaries. It has been recently collected (since 1990) in the Big Creek National Wildlife Area (NWA), Long Point Bay, Old Ausable Channel, L Lake (< 1 km south of the Ausable River mouth) Point Pelee National Park, Rondeau Bay, St. Clair NWA, and Walpole Island, Lake St. Clair.

The extent of occurrence (EO) of the Lake Chubsucker in Canada was estimated to be 22176 km^2 [polygon method, *see* COSEWIC (2007: Appendix F1)], and the area of occupancy (AO) at less than 200 km^2, based on the actual area of aquatic habitat occupied [*see* COSEWIC (2007: Appendix F1)]. The index of area of occupancy (IAO), based on overlaid grid of cell size one km^2 (total IAO is the number of occupied squares that are intersected), was estimated to be 243 km^2 (400 km^2 using a 2 X 2 grid).

Occurrences are based on evidence of historic and/or current likely recurring presence at a given location. Velez-Espino *et al*. (2008) calculated the home range for Lake Chubsucker to be 0.089-2.03 ha. Given its limited dispersal potential [Leslie and Timmins 1997; Velez-Espino *et al*. 2008), occupied sites separated by a gap of 15 km or more of any aquatic habitat that is not known to be occupied, or by separation barriers, are taken to represent different locations (NatureServe 2007). Dispersal between such locations is rare or impossible, and a single threatening event could rapidly affect all individuals (*see* Limiting Factors and Threats; Table 1). Dams, impassable falls and upland habitat constitute separation barriers (Hammerson 2004 as cited in NatureServe 2007); in the case of Lake Chubsucker in Ontario, dykes are a major barrier. Data on dispersal and other movements are generally not available, and separation distances (in aquatic kilometres) for catostomids are arbitrary, but do take into consideration that movements and separation distances generally increase with fish size.

Table 1. Summary of locations and sampling history. Sampling effort described in "Population Status and Trends" section where known.

Location	Populations	Years Collected (No. Captured)	Collection Summary	Current Status	Threats
1. Point Pelee		1949 (7) 1968 (>0) 1972 (>0) 1983 (1) 2003 (25 at 22 of 314 sites)	Collected only in 5 of 15 years of sampling 1913-2003. Most recently collected in 2003. Very limited sampling since 2003.	Stable?	• introduction of exotic species • siltation, increased turbidity, sediment loading, nutrient loading Population in ponds almost always isolated from Lake Erie and in national park; therefore, generally protected from direct human impacts.
2. Long Point Bay Areas directly connected to Long Point Bay with movement between subpopulations possible.	Long Point Bay	1951 (5) 1985 (7) 1999 (1) 2004 (1 at 1 of 30 sites)	Not collected during sampling events in 13 years between 1928 and 1985. Single specimen most recently collected in 2008.	Declining?	• introduction of exotic species • removal of vegetation • incidental harvest as bait fish • siltation, increased turbidity, sediment loading, nutrient loading
	Big Creek NWA	1955 (7) 2008 (1)			
	Turkey Point	1985 (1) 2007 (22)			
3. Big Creek NWA* Dyked Marshes Marshes separated from Big Creek and Long Point Bay by dykes with movement between subpopulations unlikely.		2005 (>0)	Not collected before 2003 when very limited sampling took place. Not collected in 2003-4 during extensive sampling. Several specimens most recently collected in 2005. No sampling since 2005.	Unknown	Population in marshes isolated from Lake Erie and in national wildlife area managed for waterfowl; therefore, generally protected from direct human impacts.

Location	Populations	Years Collected (No. Captured)	Collection Summary	Current Status	Threats
4. Long Point Ponds Ponds separated from Long Point Bay by sand bars with movement between subpopulations unlikely.		1975 (177) 2005 (1)	Specimens caught in only two known sampling events of this remote location.	Declining?	• introduction of exotic species Population in ponds almost always isolated from Lake Erie and in national wildlife area; therefore, generally protected from direct human impacts.
5. Big Creek tributaries Historically, possibly single continuous population throughout watershed, fragmented by habitat alteration and loss.	Silverthorn Creek Stoney Creek Lynedock Creek Trout Creek	1973 (1) 1973 (2) 1974 (1) 1979 (>0)	Not collected since 1979. Sampling in several years since 1979, including all wetted sites in 2006-8 by DFO, failed to collect any specimens.	Extirpated	• habitat alteration and loss Sampling in 2008 revealed that several of these historic sites are now buried agricultural drains or are dry.
6. Rondeau Bay		1955 (14) 1963 (>0) 1983 (12) 2005 (1)	Not collected since 2005. Not collected during sampling events in 4 years sampled 1921-1962, and in 10 years sampled 1964-2004. Extensive sampling by DFO 2002-2008 resulted in only single specimen captured.	Declining?	• introduction of exotic species • removal of vegetation • incidental harvest as bait fish • siltation, increased turbidity, sediment loading, nutrient loading
7. Lake St. Clair Waterbodies directly connected to Lake St. Clair with movement between subpopulations possible.	Lake St. Clair Mitchell's Bay Walpole Island (undyked areas)	1949 (2) 1952 (3) 1952 (>0) 1979 (1) 1999 (117) 2001 (10)	Not collected since 2001. Nearshore of Mitchell's Bay was sampled in 2003 and 2004. No collecting at Walpole Island since 2001.	Declining?	• introduction of exotic species • removal of vegetation • incidental harvest as bait fish • siltation, increased turbidity, sediment loading, nutrient loading
8. Walpole Island* Dyked Marshes Marshes separated from Lake St. Clair and St. Clair River by dykes with movement between subpopulations unlikely.		1999 (39) 2001 (125) 2002 (4)	Collected in only three years sampled.	Stable	Population in marshes isolated from Lake St. Clair and in First Nations area managed for waterfowl; therefore, generally protected from direct human impacts.
9. St. Clair NWA* Marshes separated from Lake St. Clair by dykes with movement between subpopulations unlikely.		2003 (>0) 2004 (.>0)	Collected in only two years sampled.	Stable?	Population in marshes isolated from Lake St. Clair and in national wildlife area managed for waterfowl; therefore, generally protected from direct human impacts.
10. Jeanette's Creek Historically, likely continuous with Lake St. Clair subpopulations. Subsequently fragmented by habitat alteration and pump barrier related to agricultural drainage.		1963 (>0) 1965 (>0)	Not found since 1965 despite repeated sampling.	Extirpated	• loss of habitat (clear, heavily vegetated waters), channelization /altered water flow, draining of wetlands This site is now a highly degraded agricultural drain running near Hwy 401.

Location	Populations	Years Collected (No. Captured)	Collection Summary	Current Status	Threats
11. Lyons/Tea Creek Historically, likely single continuous population, fragmented by habitat alteration and loss.	Tea Creek Lyons Creek	1958 (4) 2004 (5 at 5 of 24 sites)	Not found in Tea Creek since 1958 despite repeated sampling.	Declining	• siltation, increased turbidity, sediment loading, nutrient loading • loss of habitat (clear, heavily vegetated waters), channelization /altered water flow, draining of wetlands
12. Old Ausable Channel Historically, likely single continuous population in lower Ausable River, including Old Ausable Channel (before the Cut was made in early 1900s).		1982 (11) 1997 (7) 2001 (1) 2002 (13) 2004 (54) 2005 (39)	First collected in 1982 and every time sampled since then.	Stable	• introduction of exotic species • siltation, increased turbidity, sediment loading, nutrient loading This site is isolated from the Ausable River by a dam downstream and most of it is in a provincial park; therefore, generally protected from direct human impacts. However, there is a subdivision upstream.
13. L Lake An oxbow lake that, historically, may have been part of single continuous population in lower Ausable River.		2007 (14)	L Lake was first sampled for fishes in 2007 when 14 specimens were collected.	Unknown	Unknown

* The dyked marshes of lakes Erie and St. Clair are consdered as separate locations as they are barriers to immigration and emigration (Keddy 2000). They also differ from the undyked areas in that effects of tides and water level changes are eliminated (Reid *et al*. 1980). All were originally established for waterfowl conversation and have been in place as long as the duck hunting clubs (>50 years). For example, the Long Point Company began construction of dyked marshes at Long Point in the late 1800s (http://www.kwic.com/~pagodavista/lpco.html accessed 25/09/08). If a spill originated outside the dyked marsh, it would be prevented from entering the marsh by the dyke. Conversely, if a spill occurred inside the dyked marsh, it could be contained. Theoretically, a major storm (larger than any previous storms) could breach the dyke, but that in and of itself may not threaten the populations (Mandrak, pers. comm. 2008).

HABITAT

Habitat requirements

The preferred habitat of the Lake Chubsucker is clear, still, well-vegetated waters, such as those provided by backwaters, bayous, drainage ditches, floodplain lakes, marshes, oxbows, sloughs and wetlands, with substrates of gravel, sand and silt mixed with organic debris (Douglas 1974; Pflieger 1975; Smith 1979; Trautman 1981; Burr and Warren 1986; Robison and Buchanan 1988).

In Ontario, the Lake Chubsucker has been captured primarily in heavily vegetated, stagnant bays, channels, ponds and wetlands with low turbidity and substrates of clay, silt, sand and organic debris. In 1974, a single specimen was collected in a Big Creek tributary near Lynedoch, in a habitat described as being moderately flowing with abundant floating vegetation over a clay and silt substrate. It is likely that the number and quality of areas containing the habitat of the Lake Chubsucker are decreasing, as the result of the draining of wetlands and increases in siltation associated with agricultural practices in southwestern Ontario. Most recent (since 2000) samples of

Lake Chubsucker have been found in coastal wetlands that are isolated by dykes or other barriers from lakes Erie, St. Clair and Huron.

Lake Chubsucker is thought to have limited dispersal ability (Vlasman and Staton 2007), thus suitable spawning sites must be close to normal habitat. Spawning sites along the Great Lakes are usually in the shallow waters of bays, the lower reaches of tributaries, or ponds and marshes with beds of aquatic vegetation, dead grass or filamentous algae (Goodyear *et al*. 1982).

Nursery habitat generally is found within the first two metres of vegetated aquatic areas, over sand and clay substrates (Lane *et al*. 1996). In a study of the early life histories of species collected from Long Point's Inner Bay, Lake Erie, Leslie and Timmins (1997) described the habitat in which Lake Chubsucker were found. Age 0+ specimens were found in a vegetated drainage ditch with water temperatures at 24-28^{o}C. This type of habitat is similar for other Canadian members of the Catostomidae family, such as quillback (*Carpiodes cyprinus*), white sucker (*Catostomus commersonii*), and redhorses (*Moxostoma* spp.) (S. Reid, pers. comm.). However, Leslie and Timmins (1997) suggest that most Canadian catostomids are generally found in lotic systems or deeper waters. Specimens were also found on Walpole Island, Lake St. Clair in early January in a roadside ditch, which was intermittently connected to the St. Clair River. These were found in approximately 10 cm of water under a layer of leaves (Leslie and Timmins 1997). Age 1+ Lake Chubsucker were found in marshes on Long Point associated with the plants *Eleocharis*, *Carex* and *Typha*. They were also found near boat ramps with the plant *Potamogeton* (Leslie and Timmins 1997).

Trends

The increase of agricultural land use, resulting in an increase in siltation in the Great Lakes basin, has led to the decline in amount and quality of clear, vegetated habitat required for all life stages of the Lake Chubsucker (Mandrak and Crossman 1994, Leslie and Timmins 1997). This is an area of intensive agricultural, industrial and urban development that has led to increased siltation, turbidity and nutrient loading, and unless these practices are prevented and/or mitigated further declines are inevitable (see Limiting Factors and Threats). For example, channelization of Tea Creek and tributaries of Big Creek for agricultural drainage has turned them into municipal drains (Vlasman and Staton 2007). In the case of at least one Big Creek tributary, Silverthorn Creek, the drain has been tiled and buried (J. Stackhouse, DFO, pers. obs. 2008). Remaining populations are found mainly in coastal wetlands where barriers between wetlands and adjacent lake waters appear to maintain the species' preferred clear, well-vegetated habitat in the wetlands. The increased clarity of water from zebra mussels (*Dreissena polymorpha*) may also have a beneficial effect on Lake Chubsucker populations in the Lake St. Clair and Lake Erie open coastal marshes that are particularly significant for this species (EERT 2007).

In future, climatic change may profoundly affect aquatic communities of the Great Lakes basin. Doka *et al*. (2006) have recorded the vulnerability of 99 fish species based on climate change effects on coastal wetlands and thermal preferences of life history stages and species distributions. In their study (Doka *et al*. 2006), the Lake Chubsucker ranked 4th highest in vulnerability score.

Protection/ownership

In Canada, the Lake Chubsucker occurs in publicly owned waters, and all fish habitat within these waters are protected by the federal *Fisheries Act*. In addition, it is present in the Big Creek NWA, Long Point NWA, St. Clair NWA, Point Pelee National Park, the Pinery Provincial Park and Rondeau Provincial Park. Therefore, its habitat may receive additional protection afforded to national wildlife areas, and national and provincial parks through the *National Parks Act* and *Provincial Parks Act*.

BIOLOGY

General

The Lake Chubsucker is a warmwater species, preferring temperatures of 28.2-34^{o}C (Coker *et al.* 2001). Maximum known age of Lake Chubsucker was reported by Coker *et al.* (2001) to be 8 years. The maximum known length and weight in Canada is 292 mm and 397 g, respectively (Coker *et al.* 2001). Canadian specimens tend to be smaller than those found in the southern portion of their North American range (Coker *et al.* 2001).

Leslie and Timmins (1997) reported possible growth of age 0+ fishes in the Inner Bay of Long Point as 14.3±3.9 mm mean total length (TL) on June 26, 19.1±1.6 mm mean TL on July 4, and 28.8±1.5 mm mean TL on July 24. The number of specimens collected each day was relatively small (19, 17, and 5, respectively); however, this approximate growth rate for a Canadian population concurs with that of 0.5 mm/day reported for Portage Lake, Michigan (Carlander 1969).

Reproduction

Most females are 3 years at the onset of maturity and the median length of age 3 individuals of both sexes in New York populations was 208 mm (Coker *et al.* 2001).

In North America, the annual spawning season of the Lake Chubsucker varies from March to July (Cooper 1983). Examination of the gonads of several preserved specimens from Ontario indicated that the Lake Chubsucker likely spawns between late April and June in Ontario (Mandrak and Crossman 1994). Using the length of the smallest specimen collected from the Inner Bay of Long Point, Leslie and Timmins (1997) estimated spawning to have occurred in late May at approximately 20^{o}C. They also estimated hatching to have occurred in early June.

At spawning time, the Lake Chubsucker moves to marshes to spawn (Loftus and Kushlan 1987). Males clear a spot in sand, silt, or often gravel. And the female deposits between 3 000 and 20 000 eggs, depending on her size, over vegetation, filamentous algae, grass stubble or the nest (Bennett and Childers 1966, Carlander 1969, Scott and Crossman 1973, Lane *et al.* 1996b, Coker *et al.* 2001). The eggs hatch at water temperatures between 22ºC and 29ºC (Cooper 1983). There is no parental care of the eggs (Coker *et al.* 2001).

Lane *et al.* (1996a) stated that nursery habitat for Lake Chubsucker was the first 2 m in depth of water among submergent and emergent vegetation, preferably over silt, or often sand and clay.

Movements/dispersal

Although the Lake Chubsucker has been noted to move to marshes to spawn (Loftus and Kushlan 1987), Leslie and Timmins (1997) stated that the Lake Chubsucker's ability to disperse seemed to be limited.

Diet

The Lake Chubsucker is omnivorous and its diet consists of plankton, small crustaceans and molluscs, aquatic insects, and filamentous algae and other plant matter that sometimes comprise over 70% of its diet (Cooper 1983; Robison and Buchanan 1988).

Interspecific interactions

Lake Chubsucker is generally found with other species that also prefer clear, well-vegetated habitats such blackchin shiner (*Notropis heterodon*), blacknose shiner (*N. heterolepis*), and pugnose shiner (*N. anogenus*) (N.E. Mandrak, unpubl. data). Carlander (1969) stated that Lake Chubsucker is an ideal forage fish for bass.

Adaptability

The Lake Chubsucker is tolerant of low O_2 levels (Odum and Coldwell 1955; Copper 1983) and intolerant of siltation, turbidity and high stream gradients (Trautman 1981). As Lake Chubsucker was found in drainage ditches and near camping areas, Leslie and Timmins (1997) questioned whether Lake Chubsucker could actually benefit from minor disturbances. However, the recent collection of Lake Chubsucker only in remote or isolated waterbodies suggests that it might only survive in areas where it is protected from environmental degradation (e.g. increased turbidity, invasive species).

POPULATION SIZES AND TRENDS

The Lake Chubsucker has not been collected in a standardized manner, nor have there been any specific studies on population sizes, in Canada. Therefore, it is difficult to assess population sizes and trends. However, some inferences on population trends can be made based on the collection of the species over time in Canada. In general, the Lake Chubsucker is currently found at most sites where it was historically present (before 1989), except for sites on Jeanette's and Tea creeks, and upstream sites on Big Creek (Table 1).

The Lake Chubsucker was first collected in Canada in Point Pelee National Park (PPNP) in 1949. However, it was collected in PPNP only in five (1949, 1968, 1972, 1983, 2003) of 15 different years since 1913 in which fish surveys were conducted by the Canadian Museum of Nature (CMN), Royal Ontario Museum (ROM), Park staff and others (H. Surette, University of Guelph, unpubl. data). At Point Pelee, most historic sampling was done by seining. Due to soft organic substrates, extensive emergent macrophytes and water depths generally greater than 1 m, seining can only be undertaken in very small portions of the ponds (H. Surette, University of Guelph, pers. comm.). These seinable portions are typically narrow (<2 m) nearshore areas with sandy substrates and limited aquatic macrophytes along the eastern shores of the ponds bounded by the eastern beach. Such habitat is not preferred by Lake Chubsucker. The difficulty of collecting Lake Chubsucker at Point Pelee is exemplified by no specimens being caught at 320 sites sampled in 2002 using a variety of gears (hoop nets, minnow traps, Windermere traps, trap nets, bag seines, straight seines), but 25 specimens were collected at 22 (same as 2002 sites) of 314 sites sampled in 2003 (H. Surette, University of Guelph, pers. comm.). The size range of these specimens (46 – 247mm TL) suggests that multiple year-classes are present and that natural reproduction is occurring.

The Lake Chubsucker was first collected in Lake St. Clair in 1949, and was collected in Mitchell's Bay in 1952 and 1979, in the unyoked areas of Walpole Island in 1999 and 2001. Sampling of Mitchell's Bay using fine mesh hoop nets and boat electrofishing in 2003 and 2004 failed to collect any Lake Chubsucker (L. Bouvier, University of Guelph, unpubl. data). The dyked wetlands of Walpole Island and St. Clair National Wildlife Area (NWA) should be considered two locations separate from Lake St. Clair, as movement between these locations is prevented by the dykes. The species was collected in the dyked wetlands of Walpole Island in 1999, 2001 and 2002, and of St. Clair NWA in 2003 and 2004. There are no earlier records for the species in Walpole Island and St. Clair NWA as there are no known earlier fish surveys of these areas.

Lake Chubsucker was caught in Jeanette's Creek, a tributary of the Thames River, in 1963 and 1965. Several resamplings of this site failed to catch any additional specimens (ROM, unpubl. data). Recent examination of this site revealed that it is very turbid, channelized and forms part of an agricultural drain, and lacks habitat characteristics preferred by the Lake Chubsucker (N.E. Mandrak, pers. obs.).

It was collected in Rondeau Bay in 1955, 1963, 1983 and 2005. Prior to the first report in Rondeau Bay in 1955, the bay was sampled in 14 different years since 1921 by the CMN and ROM (Royal Ontario Museum, unpubl. data), and in 10 different years since the last reported capture in 1963 (DFO, ROM, unpubl. data). In 1983, 12 specimens were electrofished in the outer marshes. Recent sampling included boat electrofishing (>1000 sec/500 m site) and fine-mesh hoopnetting (2 nets set overnight) around Rondeau Bay in 2002 (10 sites, electrofishing only) and 2004 (16 sites). In 2005, only a single specimen was caught despite extensive sampling of the inner marshes of Rondeau Provincial Park by seining, fine-mesh hoopnetting and electrofishing (N.E. Mandrak, unpubl. data; T. MacDougall, Ontario Ministry of Natural Resources, unpubl. data).

Prior to the first collection in Long Point Bay in 1985 (Leslie and Timmins 1997), the bay was sampled in 13 different years since 1928 by CMN, Ontario Ministry of Natural Resources (OMNR) and ROM (ROM, unpubl. data). In 2004, Lake Chubsucker were collected at only one of 30 sites in the Inner Bay intensively sampled by boat electrofishing (>1000 sec/500 m site) (N.E. Mandrak, unpubl. data). It has been collected at Turkey Point (the northeastern boundary of Long Point Bay) in 1985 and 2007 (ROM, DFO, unpubl. data). The Lake Chubsucker was first caught at the mouth of Big Creek in 1955, and again in 2008.

The dyked marshes of Big Creek NWA should be considered a separate location from Big Creek itself as movement between these locations is prevented by the dykes. No specimens were collected in the dyked marshes at Big Creek using boat electrofishing and fine-mesh hoopnetting in 2003 and 2004 (L. Bouvier, University of Guelph, unpubl. data); however, several specimens were collected by seining in 2005 (N.E. Mandrak, unpubl. data). The Lake Chubsucker was also collected in tributaries further upstream in the Big Creek watershed between 1960 and 1979 but never at the same site twice. Although limited resampling has occurred at these upstream sites, DFO sampled in 2008 all the sites, not now buried drains, and did not collect any Lake Chubsucker (DFO, unpubl. data).

The ponds on the large spit forming the southern boundary of Long Point Bay should be considered a separate location from Long Point Bay, as movement between these locations is unlikely. The Lake Chubsucker was only collected in the ponds on Long Point in 1975; however, there was no subsequent sampling (Jeff Robinson, Environment Canada, pers. comm.) until June 2005 when DFO collected a specimen in one pond at the tip of Long Point (N.E. Mandrak, unpubl. data).

In 1958, the Lake Chubsucker was collected in Tea Creek, a tributary to Lyons Creek, a tributary to the Niagara River. The site has been sampled repeatedly since the original capture without any additional specimens being found (ROM, unpubl. data). Based on a report of the presence of Lake Chubsucker in Lyons Creek, DFO sampled 24 sites along the entire creek (20 km) in 2004 and found 5 Lake Chubsucker (28-68 mm TL) only at 5 sites along a 1.8 km stretch of creek. The habitat and water quality of most of the creek was considered highly degraded, except for the stretch where the specimens were found. The water in this stretch was clear as it was receiving overflow water from the Welland Canal (N.E. Mandrak, unpubl. data).

The species is assumed to have inhabited the lower Ausable River prior to its diversion in the late 1800s (ARRT 2005). High turbidity and heavy siltation resulting from the diversion have so degraded habitat quality that the species is now confined to the higher quality habitat of the closed system in the Old Ausable Channel (Vlasman and Staton 2007). Despite earlier sampling, the Lake Chubsucker has only been caught in the Old Ausable Channel since 1982 (n = 11) - 1997 (7), 2001 (1), 2002 (13), 2004 (54), and 2005 (39) (ROM, DFO unpubl. data). The size range of the specimens, collected 2002-2005, suggests that multiple year-classes are present and that natural reproduction is occurring (N.E. Mandrak, unpubl. data).

In 2007, 14 Lake Chubsucker were caught by boat electrofishing and seining in L Lake, a habitat similar to the Old Ausable Channel, immediately south (< 1 km) of the Old Ausable River mouth (S. Staton, DFO, unpubl. data). There are no known previous surveys of this lake.

However, areas of the channel outside The Pinery Provincial Park, near Grand Bend, Ontario are now dominated by centrarchids and common carp (*Cyprinus carpio*), and Lake Chubsucker are disappearing from such areas (Ausable River Recovery Team 2005).

Although the Michigan populations of Lake Chubsucker are ranked S4 (Table 1), most extant Ontario populations are isolated from the Great Lakes by dykes or dams, and cannot be colonized. Therefore, the rescue effect for Canadian Lake Chubsucker populations from other Great Lakes populations is low.

LIMITING FACTORS AND THREATS

The Canadian distribution of this species represents the northern limit of its range. The Lake Chubsucker is intolerant of turbidity and siltation, and appears to have limited dispersal capability (Leslie and Timmins 1997) that may hamper re-establishment of extirpated populations.

Siltation, increased turbidity and loss of habitat are factors that have contributed to the decline of the Lake Chubsucker throughout its range, as they are intolerant of turbidity and highly silted waters (Lee *et al.* 1980; Trautman 1981; Burr and Warren 1986). Some populations in Ohio are becoming extirpated due to habitat destruction as a result of channelization, siltation, aquatic weed control and pollution (OH DNR 2002). Draining of wetlands and siltation appear to be the leading causes of significant loss of habitat in Canada. Population declines will occur in areas where the Lake Chubsucker is still present unless further drainage or siltation of habitat is prevented. The increased draining of wetlands and increase in siltation as a result of agricultural practices is decreasing the availability and quality of their habitat (Mandrak and Crossman 1994, Leslie and Timmins 1997).

Incidental harvest in commercial and bait fisheries may also be a potential threat worthy of more investigation. A Lake Chubsucker may have incidentally been harvested from a live hoop net fishery in Long Point or Lake St. Clair, accounting for an individual found in a live food fish market in Toronto in 1998 (A. Dextrase, pers. comm.).

Exotic species such as common carp and common reed (*Phragmites australis*) may pose a threat to populations through degradation and alteration of available habitat (Vlasman and Staton 2007).

The extirpation of the Tea Creek population is a result of habitat degradation resulting from increased turbidity and siltation arising from agricultural practices (Vlasman and Staton 2007). The site of the former population is now separated from the declining populations (also affected by agriculture induce siltation and turbidity) of Lyon's Creek (where the species persists in a 1.8 km stretch of clear water maintained by overflow from the Welland Canal) by large distances of unusable habitat.

Threats to the populations in the Lake Erie basin (Rondeau Bay, Long Point Bay, Point Pelee) have been identified as siltation, increased turbidity, loss of preferred wetland habitat (clear, still, well vegetated waters) and possibly exotic species, including common carp and *Phragmites*-related alterations to their habitat (Essex-Erie Recovery Team 2006). Most of the Big Creek tributaries, where it was previously found, have been transformed into channelized municipal drains for agricultural drainage (Vlasman and Staton 2007), and in the case of at least one tributary, Silverthorn Creek, the drain has been tiled and completely buried (J. Stackhouse, DFO, pers. obs. 2008).

Shoreline development is a potential threat to the populations in the undyked areas of Lake St. Clair. The extirpation of the Jeanette's Creek population is thought to be related to increased siltation and turbidity from agriculture, industry and urbanization (TRRT 2005).

In the Old Ausable Channel (OAC), the population is protected by a dam from influxes of suspended solids from the river, and siltation is not currently a serious threat (Ausable River Recovery Team 2005). Threats to the OAC population include ongoing development surrounding the OAC (outside The Pinery Provincial Park) near Grand Bend, shifts in the fish community to one dominated by centrarchids, and negative impacts to vegetation and water clarity due to common carp (Ausable River Recovery Team 2005). Scott and Crossman (1973) noted that adult Lake Chubsucker would be ideal prey for basses and pikes living in the same habitats. With the apparent increase in larger, predatory centrarchids and the recent discovery of northern pike in the OAC (DFO, unpubl. data, 2002), predation could represent an additional threat. Threats for the nearby L Lake population are unknown.

Most climate change scenarios predict increased air and water temperatures, decreased precipitation, and increased evapotranspiration in the Great Lakes region. The impacts of such effects could result in dramatic changes to primary productivity, carbon storage, lake and steam hydrology, and periods of ice cover (Woodwell *et al*. 1995; Schindler 1998; Urquizo 2000). Higher water temperatures, lower water levels, and shifts in seasonal ice cover will no doubt result in an invasion of new and exotic species. Overall, some fish (e.g., warm-water species) would likely benefit, while others (e.g., cold-water species) would suffer. Northward migration of fish species and local extinctions are expected. Higher temperatures and lower water levels would also exacerbate water quality problems, which would increase fish contamination and impair fish health (Lemmen and Warren 2004). Vulnerabliity indices developed to assess the vulnerability of Great Lakes coastal wetlands indicate that many species considered to be at-risk within the Great Lakes show that existing stresses may be exacerbated by climate change. High risk native fishes include species such as the Lake Chubsucker with limited geopgraphic distribution, shallow water spawning, and a preference for vegetated habitat in all life stages (Lemmen and Warren 2004).

SPECIAL SIGNIFICANCE OF THE SPECIES

The Lake Chubsucker is declining throughout most of its North American range and is the only representative of its genus presently known in Canada. Therefore, it can be concluded that the behavioural, ecological and genetic diversity represented by the genus *Erimyzon* is in jeopardy in Canada. Because of its specific habitat requirements declining populations are indicative of deteriorating ecosystem conditions.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

The Global, National (US and Canada), and Subnational (State and Provincial) ranks for Lake Chubsucker are given in the Technical summary.

Lake Chubsucker was designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Special Concern in 1994. In 2001, the status was re-examined and uplisted to Threatened (COSEWIC 2003). It is currently on Schedule 1 of the Canadian *Species at Risk Act*, making it an offence to kill, harm, capture, take, possess, collect, buy, sell or trade Lake Chubsucker, as well as damage or destroy its habitat. A proposed recovery strategy is available for the Lake Chubsucker (Vlasman and Staton 2007). There is currently no recovery action plan for this species, but one is due within five years. The national rank is N2 meaning the species is considered very rare in Canada (NatureServe 2007).

In Ontario, the provincial rank for Lake Chubsucker is S2, meaning that the species is considered imperilled in the province (NatureServe 2007), while the Ontario *Endangered Species Act*, 2007 lists the species as Threatened. The general status ranking of Lake Chubsucker is 1, meaning it is at risk (CESCC 2005).

In the United States, the Lake Chubsucker was given a national rank of secure (N5) in 1996. It is given a subnational rank of S5 (secure) or S4 (apparently secure) in Alabama (S5), Georgia (S5), Louisiana (S5), Michigan (S4), Mississippi (S5), and North Carolina (S4). The Lake Chubsucker in Tennessee has a rank of S3S4. It is given a rank of S3 (rare to uncommon) in Indiana, Oklahoma, Texas, and Wisconsin, and S2S3 in Illinois. It is ranked as S2 in Arkansas (S2?), Kentucky, Missouri, Ohio, and Virginia. Iowa and Pennsylvania have given Lake Chubsucker a rank of SX (considered extirpated with little likelihood of rediscovery), New York has given it a rank of SH (historically known from the state-has not been found in over 20 years-but thought to still be present), and Nebraska a rank of SNA [not considered to be a species suitable for conservation activities (NatureServe 2007)]. The conservation status of the Lake Chubsucker has not yet been assessed (SNR) for Florida or South Carolina (NatureServe 2007).

The habitat sections of the federal *Fisheries Act* may also generally protect the habitat of the Lake Chubsucker. Populations found in Rondeau Bay, Long Point, and in the Pinery Provincial Park are partially protected by the Ontario *Provincial Parks and Conservation Reserves Act (Ontario)*. Those populations in Rondeau Bay and the Pinery are further protected by the Ontario *Wilderness Areas Act (Ontario)*. Populations found in Big Creek NWA, St. Clair NWA, and Point Pelee National Park are partially protected by the *National Parks Act (Canada)*.

TECHNICAL SUMMARY

Erimyzon sucetta
Lake Chubsucker Sucet de Lac
Range of Occurrence in Canada: Old Ausable Channel, L Lake, Lake St. Clair, St. Clair NWA, Walpole Island, Point Pelee, Rondeau Bay, Long Point Bay, Long Point Ponds, Big Creek NWA, Lyons Creek

Demographic Information

Generation time (average age of parents in the population)	4-5 yr
Observed, estimated, inferred, or suspected percent reduction (increase) in total number of mature individuals over the last 10 years, or 3 generations (whichever is greater).	Unknown
Projected or suspected percent reduction (increase) in total number of mature individuals over the next 10 years, or 3 generations..	Unknown
Observed, estimated, inferred, or suspected percent reduction (increase) in total number of mature individuals over any 10-year, or 3-generations period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible? Not Applicable	Unknown
Are the causes of the decline understood? Not Applicable	In part
Have the causes of the decline ceased? Not Applicable	No
Observed trend in number of populations	Decline
Are there extreme fluctuations in number of mature individuals?	Unknown
Are there extreme fluctuations in number of populations?	No

Number of mature individuals in each population

Population	**N Mature Individuals**
Old Ausable Channel Lower Ausable River (extirpated) L Lake Walpole Island (dyked) Walpole Island (undyked) Lake St. Clair Mitchell's Bay (extirpated) St. Clair NWA Jeanette's Creek (extirpated) Point Pelee Long Point Bay Long Point Ponds Turkey Point Big Creek NWA (dyked) Big Creek NWA (undyked) Rondeau Bay Lyons Creek/ Tea Creek (extirpated)	Unknown for all populations except where thought to be extirpated.

Extend and Area Information

Area of Occupancy AO (< 200 km^2) Index of area of occupancy (IAO) 1 X 1 Grid 2 X 2 Grid Extant Locations: Old Ausable Channel (50 m wide x 8 km) L Lake (50m wide x 2.5 km) Lake St. Clair (undyked areas) Walpole Island dyked wetlands (~25 km^2) St. Clair NWA dyked wetlands (~5 km^2) Point Pelee (ponds ~15 km^2) Rondeau Bay Long Point (Inner Bay, Turkey Point, Big Creek mouth) (~50 km^2) Big Creek NWA dyked wetlands (~ 2 km^2) Long Point Ponds Lyons Creek (150 m wide x 1.8 km)	 243 km^2 400 km^2
Observed trend in area of occupancy	Decline
Are there extreme fluctuations in area of occupancy?	No
Is the total population severely fragmented?	Yes
Number of current locations	11
Trend in number of locations	Decline
Are there extreme fluctuations in number of locations?	No
Observed trend in area and quality of habitat	Decline

Quantitative Analysis

Not Applicable	Unknown

Threats (actual or imminent, to populations or habitats)

Predominate and Immediate
•siltation, increased turbidity, sediment loading, nutrient loading
•loss of habitat (clear, heavily vegetated waters), channelization/altered water flow, draining of wetlands

Contributing and Probable
•introduction of exotic species
•removal of vegetation
•barriers to movement
•incidental harvest as bait fish
•climate change

Rescue Effect (immigration from an outside source)

Status of outside population(s)? USA: States adjacent to lakes Erie, Huron and Ontario (M1 - S4; NY -SH; OH - S2; PA - SX)	
Is immigration known?	Unknown
Would immigrants be adapted to survive in Canada?	Unlikely
Is there sufficient habitat for immigrants in Canada?	Unknown
Is rescue from outside populations likely?	Unlikely

Current Status

Nature Conservancy Ranks (NatureServe 2007)
- **Global** – G5
- **National**
  - US – N5
  - Canada - N2
- **Regional**
  - US – AL (S5), AK (S2?), FL (SNR), GA (S5), IL (S2S3), IN (S3), IA (SX), KY (S2), LA (S5), MI (S4), MS (S5), MO (S2), NE (SNA), NY (SH), NC (S4), ND (SNR), OH (S2), OK (S3), PA (SX), SC (SNR), TN (S3S4), TX (S3), VA (S2), WI (S3)
  - Canada – ON – S2

Wild Species 2005 (Canadian Endangered Species Council 2006**)**
- Canada – 1
- Ontario – 1

Ontario
- T (OMNR 2005)

COSEWIC
- Endangered, November 2008

Status and Reasons for Designation

Status:	**Alpha-numeric code:**
Endangered	B2ab(ii,iii,iv)

Reasons for Designation: A species with a restricted geographic Canadian range with small extant populations having very specific and narrow habitat preferences, which are under continued stress. It is extremely susceptible to habitat change driven by urban, industrial and agricultural practices resulting in increased turbidity. Two populations have been lost, and of the 11 extant populations, 3 are in serious decline as a result of the continuing and increasing threats posed by agricultural, industrial and urban development that are expected to impact the remaining populations of Lakes Erie and St. Clair.

Applicability of Criteria

Criterion A (Declining Total Population): Not Applicable – Degree and rate of decline is unknown, although populations at two locations (15%) have been extirpated.
Criterion B (Small Distribution, and Decline or Fluctuation): Meets Endangered B2ab(ii,iii,iv) – the AO and IAO are < 500 km^2, the extant populations at the 11 locations are severely fragmented, and populations at five locations are in decline. Continuing decline has been observed in extent and quality of habitat, at most sites in lakes Erie and St. Clair.
Criterion C (Small Total Population Size and Decline): Not Applicable – Number of mature individuals unknown.
Criterion D (Very Small Population or Restricted Distribution): Not Applicable – Number of mature individuals unknown, number of location > 5, AO > 20 km^2.
Criterion E (Quantitative Analysis): Not Applicable – no data.

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INFORMATION SOURCES

ARRT (Ausable River Recovery Team). 2005. Recovery strategy for species at risk in the Ausable River: an ecosystem approach, 2005-2010. Draft Recovery Strategy, Submitted to the RENEW Secretariat, CWS, Ottawa.

Adams, A.L. 1873. Field and forest rambles, with notes and observations on the natural history of eastern Canada. Henry S. King and Company. London. 333 pp.

Anonymous. 1962. Some North Carolina freshwater fishes. North Carolina Wildlife Resources Commission, Raleigh.

Ausable River Recovery Team. 2005. Recovery strategy for species at risk in the Ausable River: an ecosystem approach, 2005-2010. Draft Recovery Strategy submitted to RENEW Secretariat.

Becker, G.C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

Bennett, G.W., and W.F. Childers. 1966. The Lake Chubsucker as a forage species. Progressive Fish-Culturist 28: 89-92.

Burr, B.M., and M.L. Warren, Jr. 1986. Distributional atlas of Kentucky fishes. Kentucky Nature Preserves Commission. Scientific and Technical Series Number 4. 398 pp.

Canadian Endangered Species Conservation Council (CESCC). 2006. Wild Species 2005: The General Status of Species in Canada. Ottawa: Minister of Public Works and Government Services Canada.

Carlander, K.D. 1969. Handbook of Freshwater Fishery Biology. Vol. 1. The Iowa State University Press, Ames, Iowa.

Coad, B.W. 1995. Encyclopedia of Canadian fishes. Canadian Museum of Nature and Canadian Sportfishing Productions Incorporated.

Coker, G.A., C.B. Lane, and C.K. Minns. 2001. Morphological and ecological characteristics of Canadian freshwater fishes. Can. MS Rpt. Fish. Aquat. Sci. 2554:iv+86 pp.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2003. Species at Risk Database. Available: http://cosewic.gc.ca. Accessed: October 11, 2003.

COSEWIC. 2007. Committee on the Status of Endangered Wildlife in Canada (COSWIC) Operations and Procedures Manual April 2006,CWS, Ottawa.

Cooper, E. L. 1983. Fishes of Pennsylvania and the northeastern United States. The Pennsylvania University Press, University Park. 243 pp.

Cox, P. 1896. Catalogue of the marine and freshwater fishes of New Brunswick. Bulletin of the Natural History Society 13: 62-75.

Cudmore-Vokey, B.C. and E.J. Crossman. 2000. Checklists of the fish fauna of the Laurentian Great Lakes and their connecting channels. Can. MS. Rpt. Fish. Aquat. Sci. 2550:v+39 pp.

Doka, S., C. Bakelaar, and L. Bouvier. 2006. Chapter 6. Coastal wetland fish community assessment of climate change in the lower Great lakes. Pages 101-127 in L. Mortsch, J. Ingram, A. Hebb, and S. Doka (eds.), *Great Lakes Wetland Communities: Vulnerability to Climate Change and Response to Adaptation Strategies.* Environment Canada and the Department of Fisheries and Oceans, Toronto, Ontario.

Douglas, N.H. 1974. Freshwater fishes of Louisiana. Louisiana Wildlife and Fisheries Commission, Baton Rouge. 443 pp.

Essex-Erie Recovery Team. 2006. Recovery strategy for the fishes at risk of the Essex-Erie region: an ecosystem approach. Prepared for the Department of Fisheries and Oceans. Draft 2 – September 25, 2006. 129 pp.

Essex-Erie Recovery Team. 2007. Recovery strategy for the fishes at risk of the Essex-Erie region: an ecosystem approach. Prepared for the Department of Fisheries and Oceans. Draft 3 – February 2007. 118 pp.

Goodyear, C.S. T.A. Edsall, D.M. Ormsby Empsey, G.D. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great lakes Fishes. U.S. fish and Wildlife Service, Washington D.C. Report FWS/OBS-82/52.

Halkett, A. 1913. Checklist of the fishes of the Dominion of Canada and Newfoundland. King's Printer, Ottawa. 138 pp.

Hammerson, G. 2004. *Erimyzon sucettta* – minimal criteria for an occurrence. Cited in NatureServe 2007 Version 6.2. NatureServe, Arlington, Virginia. Available at: http://www.natureserve.org/explorer. (Accessed: January 7, 2007).

Hubbs, C.L., and D.E. Brown. 1929. Materials for a distributional study of Ontario fishes. Transactions Royal Canadian Institute 17(1):1-56.

Keddy, P.A. 2000. Wetland ecology: *Principles and Conservation.* H.J.B. Birks and J.A. Wiens contributors. Cambridge University Press, New York, NY.

Lane, J.A., C.B. Lane, and C.K. Minns. 1996a. Nursery habitat characteristics of Great Lakes fishes. Can. MS Rpt. Fish. Aquat. Sci. 2338:v+42 pp.

Lane, J.A., C.B. Lane, and C.K. Minns. 1996b. Spawning habitat characteristics of Great Lakes fishes. Can. MS Rpt. Fish. Aquat. Sci. 2368:v+48 pp.

Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. 1980. Atlas of North American freshwater fishes. North Carolina Biological Survey Publication 1980-12. North Carolina State Museum of Natural History, Chapel Hill. 867 pp.

Lemmen, D.S., and F.J. Warren, eds. 2004. Climate change impacts and adaptation: A Canadian perspective. Government of Canada, Ottawa, ON. 174 pp.

Leslie, J.K. and C.A. Timmins. 1997. Early life history of fishes in Long Point Inner Bay, Lake Erie. Can. Tech. Report. Fish. Aquat. Sci. 2150: 18 pp.

Loftus, W.F., and J.A Kushlan. 1987. Freshwater fishes of southern Florida. Bulletin of the Florida State Museum of Biological Sciences 31: 147-344.

Mandrak, N.E. 1990. The zoogeography of Ontario freshwater fishes. MSc. thesis. University of Toronto, Toronto. 190 pp.

Mandrak, N.E. pers. comm. 2008. E-mail correspondence to R. Campbell. Department of Fisheries and Oceans, Burlington, Ontario.

Mandrak, N.E. and E.J. Crossman. 1994. Status report on the Lake Chubsucker, *Erimyzon sucetta*, in Canada. Report to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Canadian Wildlife Service, Ottawa, Ontario K1A 0H3.

Mandrak, N.E. and B. Cudmore. 2005. Update COSEWIC status report on black buffalo, *Ictiobus niger.* Report to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Canadian Wildlife Service, Ottawa, Ontario K1A 0H3.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 7, 2007).

Nelson, J.S., E.J. Crossman, H. Espinosa-Perez, L.T. Findley, C.R. Gilbert, R.N. Lea and J.D. Williams. 2004. Common and Scientific Names of Fishes from the United States, Canada, and Mexico. 6th Edition. American Fisheries Society Special Publication 29. Bethesda MD. 386 pp.

Odum, H.T., and D.K. Coldwell. 1955. Fish respiration in the natural oxygen gradient of an anaerobic spring in Florida. Copeia 1955: 104-106.

Ohio Department of Natural Resources (OH DNR) – Division of Natural Areas and Preserves. 2002. Scenic river fish - western Lake Chubsucker. Available: http://www.dnr.state.oh.us/dnap/rivfish/chubsuck.html. Accessed: October 11, 2003.

Ontario Ministry of Natural Resources (OMNR). 2005. Natural Heritage Information Centre – species tracking database. Natural Heritage Information Centre, Peterborough ON. Available http://www.mnr.gov.on.ca/MNR/nhic. (Accessed: July 2005).

Page, L.M., and B.M. Burr. 1991. A field guide to freshwater fishes, North America; North of Mexico. Houghton Mifflin Company. Boston, Massacheusetts. 432 pp + xii.

Pflieger, W.L. 1975.The fishes of Missouri. Missouri Department of Conservation, Jefferson City. 343 pp.

Reid, R.A., N. Patterson, L. Amour, and A. Champagne. 1980. A Wetlands Evaluation model for southern Ontario. Federation of Ontario Naturalists. 140 p.

Robison, H.W., and T.M. Buchanan. 1988. Fishes of Arkansas. University of Arkansas Press. 536 pp.

Rutherford, D.A., A.A. Echelle, and O.E. Maughan. 1985. An addition to the fish fauna of Oklahoma: *Erimyzon sucetta* (Catostomidae). Southwestern Naturalist 30: 305-306.

Schindler, D.W. 1998. A dim future for the boreal waters and landscapes: Cumulative effects of climate warming, stratospheric ozone depletion, acid precipitation and other human activities. Bioscience 48(3): 157-164.

Scott, W.B. 1952. Records of the western Lake Chubsucker, *Erimyzon sucetta kennerleyi*, from Ontario. Copeia 1952: 203.

Scott, W.B. and E.J. Crossman, 1959. The freshwater fishes of New Brunswick: a checklist with distributional notes. Contrib. Roy. Ont. Mus. Div. Zool. Palaeont. 51:37 p.

Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada Bulletin 184. 966 pp + xvii.

Scott, W.B., and E.J. Crossman. 1998. Freshwater fishes of Canada. Revised Edition. Galt House Publishing, Oakville ON. 966 pp.

Small, H.B. 1883. Fishes of the Ottawa district. Transactions of the Ottawa Field Naturalists Club 4, 1882-1885: 31-47.

Smith, C.L. 1985. The inland fishes of New York State. New York Department of Environmental Conservation. 522 pp.

Smith, P.W. 1979. The fishes of Illinois. University of Illinois Press, Urbana. 314 pp.

Trautman, M.B. 1981. The fishes of Ohio. Ohio State University Press, Columbus. 683 pp.

TRRT (Thames River Recovery Team). 2005. Recovery strategy for the Thames River Aquatic Ecosystem: 2005-2010. November 2005. Draft. 146 pp.

Urquizo, N., J. Bastedo, T. Brydges, and H. Shear eds. 2000. Ecological Assessment of the Boreal ecozone. Environmental Conservation Service, Environment Canada, Ottawa, ON. 66 p.

Woodwell, G.M., F.T. Mackenzie, R.A. Houghton, N.J. Apps, E. Gorham, and E.A. Davidson. 1995. Will the warming speed the warming? Pages 393-411 *in:* Biotic feedbacks in the global warming climatic system. Edited by G.M. Woodwell and F.T. Mackenzie. Oxford University Press, New York, NY.

Vélez-Espino, L.A., R.G. Randall and M.A. Koops. 2008. Quantifying habitat requirements of four freshwater species at risk in Canada: Northern Madtom, Spotted Gar, Lake Chubsucker, and Pugnose Shiner. Canadian Science Advisory Research Document 2008/nnn. Submitted.

Vlasman, K.L., and S.K. Staton. 2007. Recovery Strategy for the Lake Chubsucker *Erimyzon sucetta* in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. Vi + 29 pp.

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COLLECTIONS EXAMINED

None.