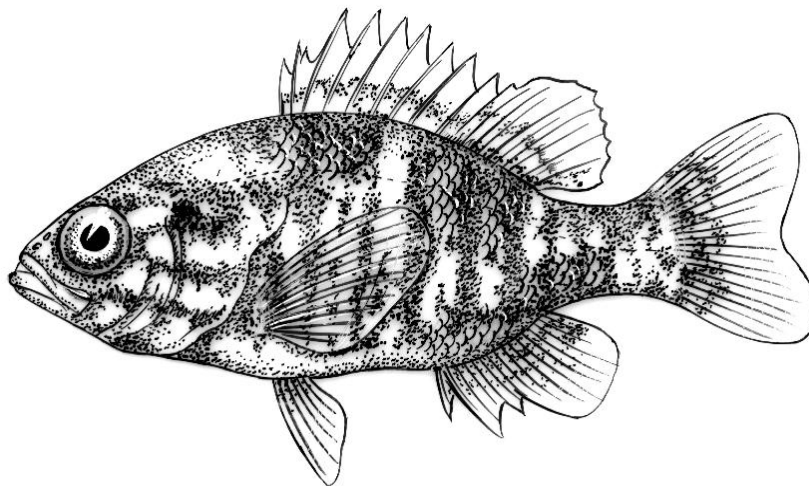


COSEWIC
Assessment and Update Status Report

on the

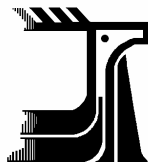
Warmouth
Lepomis gulosus

in Canada



SPECIAL CONCERN
2005

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 2005. COSEWIC assessment and update status report on the warmouth *Lepomis gulosus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 16 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Previous report(s):

COSEWIC 2001 (In Press). COSEWIC assessment and status report on the warmouth *Lepomis gulosus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Crossman, E.J., J. Houston and R.R. Campbell. 1994. COSEWIC status report on the warmouth *Lepomis gulosus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 19 pp.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur le crapet sac-à-lait (*Lepomis gulosus*) au Canada – Mise à jour.

Cover illustration:

Warmouth — Smith, C.L. 1985. The Inland Fishes of New York State. Reproduced with permission from the New York Department of Environmental Conservation.

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COSEWIC Assessment Summary

Assessment Summary – May 2005

Common name

Warmouth

Scientific name

Lepomis gulosus

Status

Special Concern

Reason for designation

This species has a very restricted Canadian distribution, existing only at 4 locations along the Lake Erie shore between Point Pelee and Long Point. It is sensitive to habitat change which results in loss of aquatic vegetation.

Occurrence

Ontario

Status history

Designated Special Concern in April 1994. Status re-examined and confirmed in November 2001 and in May 2005. Last assessment based on an update status report.



COSEWIC
Executive Summary

Warmouth
Lepomis gulosus

Species Information

The warmouth (*Lepomis gulosus*) is a member of the family Centrarchidae and is one of eight sunfish species found in Canada. It can be distinguished from the other sunfishes (*Lepomis* sp.) found in the Great Lakes basin by its large mouth and dark bands radiating backward from the eye.

Distribution

It has a wide distribution in the Mississippi, Atlantic and Great Lakes drainages of eastern North America. It has been collected in Canada at four locations in the Lake Erie drainage.

Habitat

The warmouth is a warmwater species preferring vegetated habitats in lakes and streams at all stages in its life history.

Biology

Maximum known age of warmouth is 8 years and, as size seems to be a more important factor than age for maturation, length at maturity is 89 mm. Although males tend to be larger than females, no sex difference in growth has been shown. Warmouth are spring spawners and make nests on soft, muddy bottoms. At smaller sizes, warmouth consume crustaceans and aquatic insect larvae, moving to crayfishes and molluscs when larger. The warmouth is tolerant of low oxygen levels.

Population Sizes and Trends

The size of Canadian populations of warmouth is uncertain. Based on relatively large numbers collected in Point Pelee National Park in 2002 and 2003, limited immigration potential and the persistence of this population indicate that it is undoubtedly established.

Limiting Factors and Threats

This species would be negatively impacted by the loss of its preferred habitat (heavily vegetated, shallow waters), due to siltation, drainage and other factors. Current distribution in Canada is limited by temperature; however, its range may expand with climate warming.

Special Significance of the Species

This species may be a relatively new native species in Canada.

Existing Protection or Other Status Designations

This species is currently listed as Special Concern on Schedule 1 of the Canadian *Species at Risk Act*.



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 agencies (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 members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The Committee meets to consider status reports on candidate species.

DEFINITIONS (NOVEMBER 2004)

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 wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its 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.



Environment
Canada

Canadian Wildlife
Service

Environnement
Canada

Service canadien
de la faune

Canada

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

**Update
COSEWIC Status Report**

on the

Warmouth
Lepomis gulosus

in Canada

2005

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SPECIES INFORMATION

Name and classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Perciformes
Family:	Centrarchidae
Genus and species:	<i>Lepomis gulosus</i> (Cuvier, 1829)
Common English name:	warmouth (Nelson <i>et al.</i> 2004)
Common French name:	crapet sac-à-lait (Coad 1995)

As the result of possessing teeth on its tongue, the warmouth was previously placed in its own monotypic genus, *Chaenobryttus*. This genus was considered a synonym of the genus *Lepomis* by Bailey *et al.* (1970). Despite more recent attempts to resurrect the genus *Chaenobryttus* (e.g. Wainwright and Lauder 1992, Crossman *et al.* 1996), its synonymy with *Lepomis* has been retained by the American Fisheries Society Names Committee (Nelson *et al.* 2004)

Description

The warmouth (*Lepomis gulosus*) is a member of the family Centrarchidae (Figure 1) (Robins *et al.* 1991). It is characterized by the following features (Trautman 1981): large mouth; posterior end of upper jaw extending well beyond anterior margin of eye, usually to centre or beyond in adults; 3-5 dark bands radiating backward from snout and eye; black opercle flap with whitish edge, no red present; pectoral fin short, tip rounded; and, band of tiny teeth on tongue.



Figure 1. The warmouth (*Lepomis gulosus*). Illustration by Joe Tomelleri. Used with permission of Fisheries and Oceans Canada.

The warmouth is light yellow-olive to dark olive-green with lighter vermiculations and dull bluish, purplish and golden reflections (Trautman 1981). The back and sides have 6-11 chainlike double bands of dark olive or dusky, and 3-5 dark grey or lavender bands radiate backward from the snout and eye. The soft dorsal, caudal and anal fins are boldly vermiculated, and the paired fins are unspotted and transparent or olive. A brilliant orange spot is present at the base of the posterior three dorsal rays in breeding males.

The warmouth is one of eight sunfish species found in Canada (Scott and Crossman 1998), and one of seven sunfish species found in the Canadian Great Lakes basin (Cudmore-Vokey and Crossman 2000). The warmouth can be distinguished from the other sunfishes (*Lepomis* sp.) found in the Great Lakes basin by its large mouth and dark bands radiating backward from the eye (Page and Burr 1991). The warmouth is the only species in the genus *Lepomis* that has teeth on its tongue (Page and Burr 1991). It has fewer anal fin spines (3) than crappies (*Pomoxis* spp.; 5-7) and the rock bass (*Ambloplites rupestris*; 5-7) (Trautman 1981).

Designatable units

All Canadian populations are found within the Great Lakes-Western St. Lawrence ecozone of the freshwater ecozone classification adopted by COSEWIC. The population structure within this ecozone is unknown.

DISTRIBUTION

Global range

The warmouth has a wide distribution in the Mississippi, Atlantic and Great Lakes drainages of eastern North America (Figure 2) (Lee *et al.* 1980, Page and Burr 1991). In the Mississippi drainage, it is found from the Gulf of Mexico northward to Wisconsin, from western New York in the east to New Mexico in the southwest. In the Atlantic drainage it is found from Alabama and Florida northward to North Carolina. In the Great Lakes basin, disjunct populations are found in Illinois, Indiana, Michigan, New York, Ohio, Ontario and Wisconsin. It has been introduced into Mexico (Nelson *et al.* 2004)

Canadian range

In Canada, the warmouth has been collected at only four localities — all in the Lake Erie drainage. It was first recorded in Canada in 1966 in Rondeau Provincial Park and in Point Pelee National Park in 1983 (Crossman and Simpson 1984) (Figure 3). One young-of-the-year (YOY) specimen was collected in Long Point Bay in 2003, and three adult specimens were collected in the wetland at the mouth of Big Creek (at Long Point Bay) in 2004 (N.E. Mandrak, unpubl. data). It was reported from Cedar Creek, a tributary of Lake Erie, based on a (YOY) specimen collected in 1994 (Leslie *et al.* 1999);

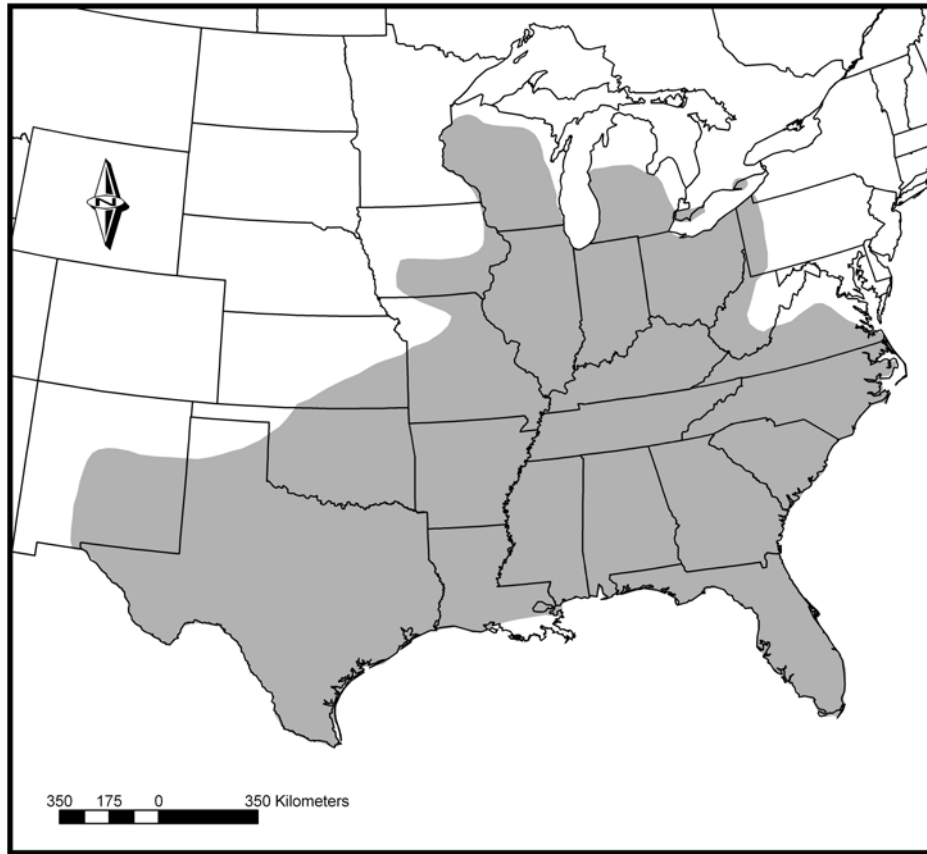


Figure 2. Global distribution of the warmouth. Modified from Page and Burr (1991).

however, this specimen has been reidentified as a longear sunfish (*Lepomis megalotis*) (E. Holm, Royal Ontario Museum, pers. comm.). It was also reported from Duck Creek, a tributary of Lake St. Clair (Leslie and Timmins 1998); however, the voucher specimen for this record cannot be located. Therefore, this record is deemed questionable and excluded from this report.

The relatively recent discovery of this species in Canada raises questions about its origin. Is it native to Canada, or has it been introduced? Crossman *et al.* (1996) concluded that the warmouth naturally colonized Canada in recent times.

The fishes of Big Creek, Long Point Bay, and Rondeau Bay were extensively sampled, primarily by seining, prior to the first reports of warmouth at these locations. Prior to the first report in the Big Creek wetland in 2004, the wetland was sampled in four years (1979, 1983, 1984, 1985) by the Canadian Museum of Nature (CMN) and Wilfrid Laurier University (Royal Ontario Museum (ROM), unpubl. data). Prior to the first

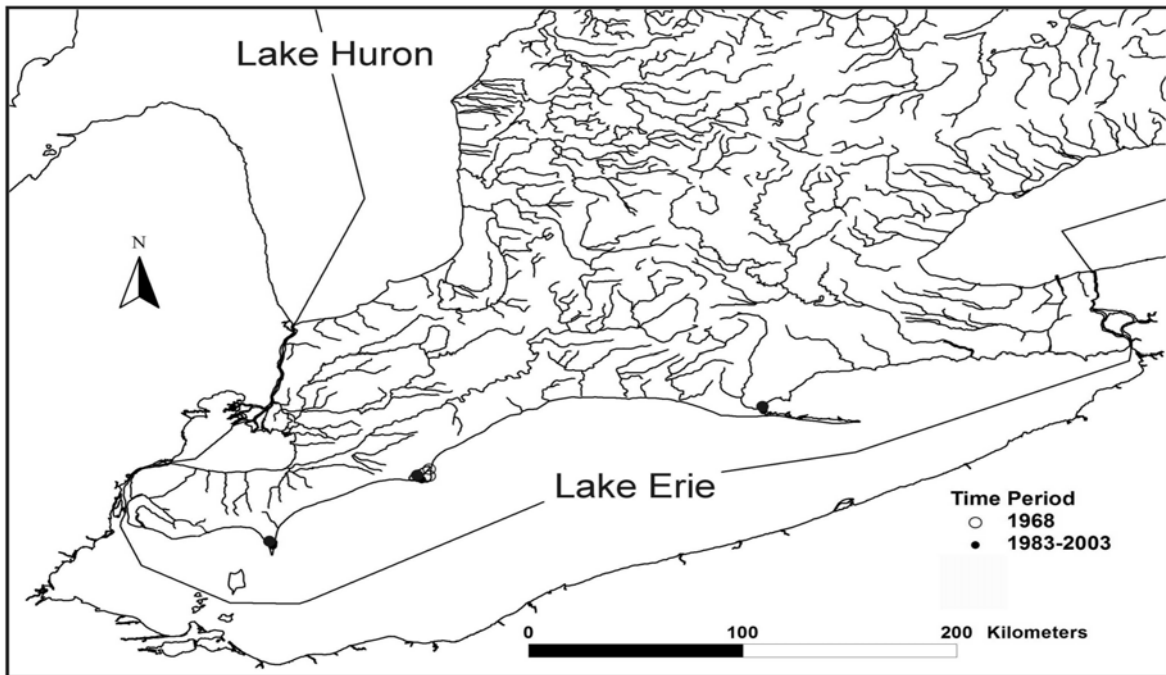


Figure 3. Canadian distribution of the warmouth.

report in Long Point Bay in 2003, the bay was sampled in 18 different years since 1928 by CMN, Ontario Ministry of Natural Resources (OMNR) and ROM (ROM, unpubl. data). In 2004, it was not collected at the same Long Point Bay site using the same gear and effort, nor at 30 other sites in the bay intensively sampled by boat electrofishing (>1000 sec/500m site) (N.E. Mandrak, unpubl. data). Prior to the first report in Rondeau Bay in 1966, the bay was sampled in 14 different years since 1921 by the CMN and ROM (Royal Ontario Museum, unpubl. data). In the summer of 2004, intensive boat electrofishing (>1000 sec/500m site) and hoopnetting (2 nets set overnight) at eight sites failed to capture any warmouth.

Prior to the first report in Point Pelee National Park in 1983, the ponds were sampled in 15 different years since 1913 by the Canadian Museum of Nature, Royal Ontario Museum, Park staff and others (H. Surette, University of Guelph, unpubl. data). At Point Pelee, most historical sampling was done by seining. Due to soft organic substrates, extensive emergent macrophytes and water depths generally greater than 1m, 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 (<2m) 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 warmouth. This conclusion is supported by the collection of only 11 of 657 warmouth specimens collected in Point Pelee National Park in 2002 and 2003 by seining (H. Surette, University of Guelph, pers. comm.). Therefore, it is possible that the warmouth has always been in Point Pelee

National Park but remained undetected until 1983. Similar problematic habitat exists in Big Creek, Long Point Bay and Rondeau Bay.

It is unlikely that warmouth was deliberately or accidentally (i.e. through bait-bucket release) introduced as limited angling occurs in the Point Pelee National Park (Vicki McKay, Parks Canada, pers. comm.) and sunfishes are neither legal nor preferred baitfishes. It is possible that warmouth has naturally colonized the north shore of Lake Erie recently (e.g. within the last 50 years) from the south shore where it is relatively common. However, one would expect to find it in other suitable habitats that would have acted as stepping stones for dispersal along the north shore between Pelee and south shore populations. For example, it is absent in the coastal wetlands in the Michigan portion of Lake Erie which have been sampled (Bailey *et al.* 2004) and in the Big Creek wetland (Holiday Beach, Essex Co.) that has been intensively sampled using boat electrofishing and hoopnets twice a year in 2003 and 2004, and absent from the Cedar Creek wetland (Essex Co.). In addition, the ponds in Point Pelee National Park are usually isolated from Lake Erie by the eastern barrier beach that is only rarely breached (breaches known in 5 years before 1983, and predicted (based on water levels) in two additional years) (H. Surette, University of Guelph, pers. comm.); therefore, colonization opportunities were, and are, infrequent. However, the barrier beach was breached in successive years between 1973 and 1977, providing an extended window of opportunity for colonization from nearby Rondeau Bay if present during this period.

Therefore, the absence of warmouth in potential stepping stone habitats, limited recent colonization opportunities at Point Pelee, and the unlikelihood of introduction suggest that the warmouth is native to Canada, having naturally colonized the Canadian waters of the Lake Erie watershed in the more distant past.

HABITAT

Habitat requirements

The warmouth is a warmwater species preferring vegetated habitats in lakes and streams (Carlander 1969, Scott and Crossman 1998, Coker *et al.* 2001). Adults are found in areas with depths of 0.1-5m and submergent and emergent vegetation over sand or silt substrates (Lane *et al.* 1996b, Page and Burr 1991). Nursery habitat consists of the top two 2m of the water column with submergent vegetation over sand, silt or gravel (Lane *et al.* 1996a). Spawning habitat consists of the top 2m of the water column with both submergent and emergent vegetation along with stumps, rocks, or clumps of vegetation over gravel and sand, or often rubble and silt (Lane *et al.* 1996c).

Trends

As the result of the lack of historical data, there is little information on changes in habitat in areas where warmouth have been recorded. Since the 1980s, during which

aquatic vegetation cover declined in Rondeau Bay, there has been a substantial increase in aquatic vegetation cover, likely as the result of decreasing water levels and increased water clarity due to the invasion of dreissenid mussels (S. Dobbyn, OMNR, pers. comm.). This has likely resulted in an increase in the amount of habitat preferred by warmouth. However, at Point Pelee, the period between breaching events has increased as a result of declining water levels, and water quality (e.g. dissolved oxygen levels) declines and turbidity increases (H. Surette, University of Guelph, pers. comm.) may be negatively impacting warmouth.

Protection/ownership

In Canada, the warmouth occurs in publicly owned waters, and all fish habitat within these waters is protected by the federal Fisheries Act. In addition, the highest abundance of warmouth is found in Point Pelee National Park, followed by Rondeau Provincial Park. Therefore, its habitat may receive additional protection afforded to national and provincial parks through the National Parks Act and Provincial Parks Act.

BIOLOGY

General

Maximum known age of warmouth is 8 years, and maximum published length and weight is 284mm and 500g, respectively (Coker *et al.* 2001). Warmouth collected in Point Pelee National Park in 2002 and 2003 (n=657) ranged in length from 26mm to 300mm, and weighed 1g to 236g (H. Surette, University of Guelph, pers. comm.). Males tend to be larger than females but no sex difference in growth as been shown (Carlander 1969). A size-frequency histogram for specimens collected at Point Pelee National Park indicates that there are likely at least five age-classes in this population (Figure 4).

Reproduction

Age and length at the onset of maturity is 2 years and 89mm. Size is a more important factor than age for maturation (Carlander 1969, Coker *et al.* 2001).

Spawning occurs in the spring at water temperatures of 18-32°C (Lane *et al.* 1996c). Nests are constructed on a soft muddy bottom, often amongst algae or exposed roots of vascular plants. The eggs are deposited in the nests, which are coated with a layer of silt or detritus, and guarded and fanned by the male (Lane *et al.* 1996c, Coker *et al.* 2001). Eggs hatch in 34.5 hours at 25-26° C (Becker 1983).

Warmouth can hybridize with other *Lepomis* species, such as pumpkinseed (*L. gibbosus*) and bluegill (*L. macrochirus*), and with rock bass (Lane *et al.* 1996a, 1996c). A warmouth was observed on a nest with a pumpkinseed in Point Pelee National Park in 2002 (H. Surette, University of Guelph, pers. comm.).

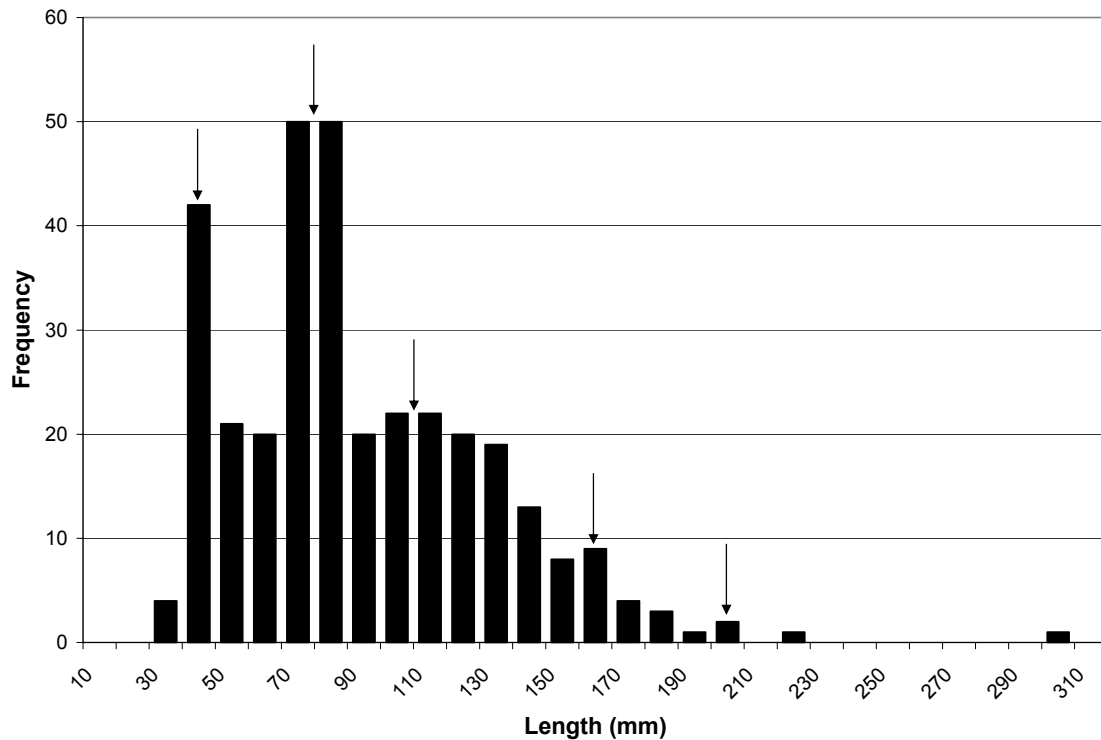


Figure 4. Length-frequency histogram for warmouth (n=332) caught (and released alive) in Point Pelee National Park in 2002 and 2003. The five modes indicated by arrows likely represent year-classes aged 0-4.

Survival

Maximum known age of warmouth is 8 years (Coker *et al.* 2001). Survival rates are unknown.

Movements/dispersal

Based on a study of movement patterns of the warmouth and four other centrarchids in a Tennessee stream, warmouth were relatively sedentary compared with the other centrarchids (Gatz and Adams 1994).

Nutrition and interspecific interactions

The warmouth feeds in both the pelagic and benthic zones on crustaceans and aquatic insect larvae when small, and on fishes, crayfishes and mollusks when larger (Carlander 1969, Becker 1983, Coker *et al.* 2001).

The warmouth is very abundant in Point Pelee National Park where the green sunfish (*L. cyanellus*) is absent, but is absent in the adjacent Hillman Marsh where the green sunfish is abundant (N.E. Mandrak, unpubl. data). Unlike most sunfish species,

these two species exhibit a high degree of piscivory as adults (Coker *et al.* 2001). Further study is required to determine if this observation is the result of interspecific interactions, abiotic factors (e.g. different turbidity and siltation tolerances, Trautman 1981) or different colonization histories.

Behaviour/adaptability

The warmouth is tolerant of low oxygen levels characteristic of polluted waters (Carlander 1969, NatureServe 2003).

POPULATION SIZES AND TRENDS

Little is known about the size of warmouth populations in Canada. A fish community survey conducted in Point Pelee National Park in 2002 and 2003 captured 657 warmouth at 87 of 117 sites. Most of these individuals were juveniles and many were likely recaptures (see Figure 4 for size-frequency histogram). Larger warmouth were PIT-tagged (n=93); however, too few fish were recaptured (n=3) to estimate the population size. Based on the relatively large numbers collected in 2002 and 2003, limited immigration (may occur during infrequent breaching of barrier beach) and the persistence of the population since its first discovery, the Pelee population undoubtedly represents an established population.

Since it was first collected in 1966, only 10 individuals have been caught in Rondeau Bay [1966 (1 specimen), 1967 (2), 1968 (5), 1999 (2)]. The absence of warmouth in the intensive sampling of Rondeau Bay in 2004 may indicate that an established population does not currently exist there; however, very shallow (<1 m) suitable habitat was not sampled.

Too few individuals have been collected in Long Point Bay (1 YOY, 3 adults) to determine if an established population exists there.

LIMITING FACTORS AND THREATS

Based on its preference for heavily vegetated, shallow waters, decline in the quality and quantity of vegetated areas due to siltation, drainage and other factors would have a negative effect on warmouth. Trautman (1981) indicates that the warmouth seems to be less tolerant to turbidity and siltation than the green sunfish. At Point Pelee, where green sunfish is absent, water quality declines and turbidity increases as the period between breaching events increases (H. Surette, University of Guelph, pers. comm.).

The current distribution of warmouth in Canada is limited by temperature (Crossman *et al.* 1996). However, its range may expand under the projected climate warming (Mandrak 1989). Recent warming trends in southwestern Ontario may have

been responsible for its spread to Long Point Bay. Temperature likely limits its distribution in Canada, and it is likely threatened by loss of its preferred heavily vegetated habitat. Warmouth, at all stages in their life history, depend on quiet, vegetated, shallow habitats.

SPECIAL SIGNIFICANCE OF THE SPECIES

The warmouth is a naturalized Canadian species having colonized Canadian waters in recent times (Crossman *et al.* 1996). Its presence here may be indicative of the subtle effects of the recent period of global warming, and/or continuing range expansion following the last period of glaciation.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

The warmouth and its habitat are protected by the federal *Fisheries Act*. In Canada, it is currently listed as Special Concern by COSEWIC, Vulnerable by the Ontario Ministry of Natural Resources (OMNR), and S1 by the Natural Heritage Information Centre (2003). In the United States, it is listed as S3, S4 or S5 by most states (Table 1). The Global, National (US and Canada), State and Provincial ranks for warmouth are provided in Table 1. It is currently listed as Special Concern on Schedule 1 of Canada's *Species at Risk Act*, which does not confer any protection but requires the preparation of a management plan.

Table 1. Global (G), National (N), and Subnational (S) (State and Provincial) ranks and status for warmouth (*Lepomis gulosus*) (from CESSC 2001, NHIC 2003, NatureServe 2005).

Global	US National	Canadian National	Subnational	
			US States	Ontario
G5*	N5*; Not found in TESS (USFWS database of Threatened and Endangered Species)	N1*; COSEWIC= Special Concern	S1S2*=PA S2*=WV S3* = MD S3S4*=IL S4*= AR, IN, WI S4S5*=GA, KS, KY S5*=AL LO, MS, MI, NC, OK, TN, TX, VI SNA*=AZ, DE, DC, ID ,NV, NJ, NM,NY, OR, WA S?* = NR = FL, IA, MD, MO, OH, SC	S1*; OMNR Status= Special Concern; General Status=3

*G/S ranks: 1=critically imperiled; 2=imperiled; 3=vulnerable to extirpation or extinction; 4=apparently secure; 5=demonstrably widespread, abundant and secure; NA =Not applicable – in this case exotic; NA = unranked, conservation status not yet assessed.

TECHNICAL SUMMARY

Lepomis gulosus

warmouth

crapet sac-à-lait

Range of Occurrence in Canada: Ontario - Cedar Creek (Essex Co.), Point Pelee National Park, Rondeau Provincial Park, Long Point Bay.

Extent and Area information	
• <i>extent of occurrence (EO)(km²)</i>	4,395
• <i>specify trend (decline, stable, increasing, unknown)</i>	Stable?
• <i>are there extreme fluctuations in EO (> 1 order of magnitude)?</i>	Cannot measure, only 2 historic locations.
• <i>area of occupancy (AO) (km²)</i> Area of ponds where captured in Point Pelee. Area of suitable habitat (vegetated, less than 5m deep) in Long Point and Rondeau bays.	Point Pelee - 3.5 Rondeau Bay - 35.49 Long Point Bay - 14 Total - 52.99
• <i>specify trend (decline, stable, increasing, unknown)</i>	Unknown
• <i>are there extreme fluctuations in AO (> 1 order magnitude)?</i>	Unknown
• <i>number of extant locations</i>	1 (maybe 4)
• <i>specify trend in # locations (decline, stable, increasing, unknown)</i>	Unknown
• <i>are there extreme fluctuations in # locations (>1 order of magnitude)?</i>	Unknown
• <i>habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat</i>	Increasing at Roneau Decreasing at Point Pelee
Population information	
• <i>generation time (average age of parents in the population) (indicate years, months, days, etc.)</i>	~3 years
• <i>number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)</i>	Unknown
• <i>total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals</i>	Unknown
• <i>if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)</i>	
• <i>are there extreme fluctuations in number of mature individuals (>1 order of magnitude)?</i>	Unknown
• <i>is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?</i>	Yes?
• <i>list each population and the number of mature individuals in each</i>	Point Pelee – unknown, but >90 adults Rondeau - unknown Long Point – unknown
• <i>specify trend in number of populations (decline, stable, increasing, unknown)</i>	Unknown
• <i>are there extreme fluctuations in number of populations (>1 order of magnitude)?</i>	Unknown
Threats	
- loss of its preferred heavily vegetated habitat. Warmouth, at all stages in their life history, depend on quiet, vegetated, shallow habitats.	

Rescue Effect (immigration from an outside source)	Moderate
• <i>does species exist elsewhere (in Canada or outside)?</i>	Yes
• <i>status of the outside population(s)?</i>	Michigan – S5 New York - SE Ohio – S?
• <i>is immigration known or possible?</i>	Yes
• <i>would immigrants be adapted to survive here?</i>	Yes
• <i>is there sufficient habitat for immigrants here?</i>	Yes
Quantitative Analysis	Not applicable

Existing Status

Nature Conservancy Ranks (NatureServe 2005)

See Table 1

Wild Species 2000 (Canadian Endangered Species Conservation Council 2001)

Canada - 3

ON - 3

COSEWIC

Special Concern (May 2005)

Status and Reasons for Designation

Status: Special Concern	Alpha-numeric code: Met criterion for Threatened D2, but there is a possibility of a rescue effect from populations in the United States. Therefore, designated Special Concern.
Reasons for Designation: This species has a very restricted Canadian distribution, existing only at 4 locations along the Lake Erie shore between Point Pelee and Long Point. It is sensitive to habitat change which results in loss of aquatic vegetation.	
Applicability of Criteria	
Criterion A (Declining Total Population): Not applicable, no evidence of decline.	
Criterion B (Small Distribution, and Decline or Fluctuation): Not applicable, although the species has a very restricted distribution, trends are unknown.	
Criterion C (Small Total Population Size and Decline): Not applicable, although the population is undoubtedly small, numbers and population trends are not known.	
Criterion D (Very Small Population or Restricted Distribution): Occurs at only four locations and is known to reproduce at only two.	
Criterion E (Quantitative Analysis): Not assessed.	

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COLLECTIONS EXAMINED

None.