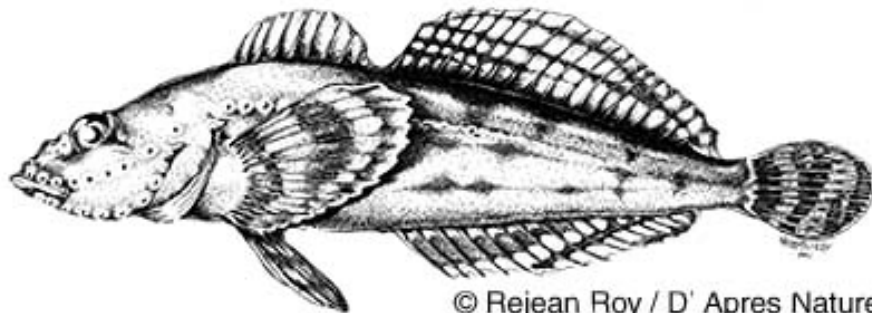


COSEWIC
Assessment and Status Report

on the

Cultus Pygmy Sculpin
Cottus sp.

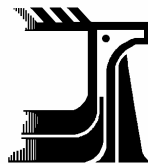
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THREATENED
2000

COSEWIC
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COSEPAC
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AU CANADA

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COSEWIC 2000. COSEWIC assessment and status report on the Cultus pygmy sculpin *Cottus* sp. in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 9 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

Coffie, P.A. 1997. COSEWIC status report on the Cultus pygmy sculpin *Cottus* sp. in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-9 pp.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur la situation du chabot pygmée du lac Cultus (*Cottus* sp.) au Canada

Cover illustration
Cultus pygmy sculpin — Réjean Roy – D'Après Nature.

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COSEWIC Assessment Summary

Assessment Summary – November 2000

Common name

Cultus pygmy sculpin

Scientific name

Cottus sp.

Status

Threatened

Reason for designation

Endemic to British Columbia, this species is restricted to one small lake, which is in an area subject to industrial and urban development. The species is also preyed on by salmonids co-existing in the lake.

Occurrence

British Columbia

Status history

Designated Special Concern in April 1997. Status re-examined and designated to Threatened in November 2000. Last assessment based on an existing status report.



COSEWIC
Executive Summary
from the 1997 Status Report

Cultus Pygmy Sculpin
Cottus sp.

Description

The Cultus Pygmy Sculpin (*Cottus* sp.) is a limnetic population of minute cottids that has apparently evolved from *Cottus aleuticus* and appear to be endemic to the deep waters of Cultus Lake in the Fraser River watershed of southwestern British Columbia.

The form has been inadequately described and the original application of the common name is not known, except that it is known only from Cultus Lake, but it appears to have become accepted locally. The parent form, *Cottus aleuticus*, is typical of the genus with a broad heavy head, decreasing in size posteriorly to a moderately deep laterally depressed caudal peduncle. The elongated body averages 7.6 to 10.2 cm. There is a well developed preopercular spine and there are a number of preoperculo-mandibular pores, one pore being on the tip of the chin. The pectoral fins are large and fan-like while the pelvic fins are small. There are two dorsal fins, the caudal fin is slightly rounded, and a long anal fin. There are no typical scales but small prickles remain behind each pectoral fin. The fish (*Cottus aleuticus*) are brown to grey with darker blotches, being lighter on the sides and almost white ventrally. There are usually two or three dark saddle-like blotches on the sides under the second dorsal fin. The fins are pigmented, usually in the form of bars. Young fish lack pigmentation on the fins and spawning males are generally darker in colour with an orange band on the edge of the first dorsal fin.

The morphology of the Cultus Lake limnetic form is significantly altered from that of *Cottus aleuticus*. The Cultus Lake fish are considerably smaller, resembling larvae, with a maximum length of 50 mm, the density of the bone is reduced, subcutaneous lipids are increased and there are large pores on the head.

Distribution

The Cultus Pygmy Sculpin appears to be endemic to the deep waters of Cultus Lake, in the Fraser River watershed of southwestern British Columbia.

Population size and trends

There is no information available on population size, and no evidence for determining trends in the population. It appears that the species is common (3000 - 10 000 individuals) in Cultus Lake and reproducing successfully.

Habitat

This is a limnetic form restricted to the deeper waters of a low level montane lake. Direct evidence of spawning has not been observed, but probably occurs in the deeper waters of the lake. The fish have not been observed in the shore waters and probably do not spawn there or in feeder or tributary streams since most of these are seasonal and dry up during the summer.

General biology

Observation of females with large eggs indicates spawning begins in late May or early June and may continue through the summer with the peak in July. The fate of newly hatched fry is not known. In the parent form, the larvae become planktonic and do not take up a benthic life until about 32 to 35 days post-hatch.

The fish become sexually mature in the third year. No growth information is available, but maximum size is about 5.0 cm; maximum age is not known, but the maximum age for the parent form is 4 years.

The diet consists of *Daphnia* sp., chironomid midge larvae and pupae, *Epischura* sp., ostracods, *Bosmina* sp., and *Cyclops* sp., and perhaps smaller cottids. Predator-prey relationships are not certain. The form is eaten by Dolly Varden.

Salvelinus malma, which are also confined to the deeper waters of the lake. Cutthroat Trout, *Oncorhynchus clarki*, and Coho Salmon, *Oncorhynchus kisutch*, may utilize the larvae, but would rarely encounter adults as these species feed closer to the water surface.

The morphological adaptations (reduced bone density and increased subcutaneous lipids) are probably both adaptations to vertical migrations within the upper limnetic zone.

Limiting factors

The species is preyed upon by Dolly Varden and Cutthroat Trout, and any increase in trout populations could deplete or eliminate the population. The major threat to the species may be the transplantation of exotic species such as the Pumpkin Seed (*Lepomis gibbosus*) and the Catfish (*Ameiurus nebulosus*).

Protection

No specific protection exists for the Cultus Pygmy Sculpin.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives 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 Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* 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.

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.



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COSEWIC Status Report

on the

Cultus Pygmy Sculpin

Cottus sp.

P.A. Coffie

1997

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ABSTRACT

The Cultus Pygmy Sculpin, *Cottus* sp., is a limnetic population of minute cottids that has apparently evolved from *Cottus aleuticus*. To date, the form is known to occur only in the deep waters of Cultus Lake in the Fraser River watershed of southwestern British Columbia. Almost no information is available on this fish; no threats to the population are evident except for the inherent risk of the restricted distribution.

SPECIES INFORMATION

Introduction

The Cultus Pygmy Sculpin, (*Cottus* sp.), is only found in Cultus Lake, in the Fraser River watershed of southwestern British Columbia (B.C.). The form is endemic to Canada, although a similar fish is found in Lake Washington, near Seattle, Washington (Larson and Brown 1975; McPhail and Lindsey 1986). These two forms are believed to have evolved independently, a case of dependent parallel evolution (see Cannings 1993). Both forms are derived from the Coastrange Sculpin (*Cottus aleuticus*, Gilbert, 1985), a widespread species that occurs in Pacific coastal streams from central California northward to Kiska Island and the Kobuk River, Alaska (Scott and Crossman 1973, Wallace 1980).

Although mentioned in Scott and Crossman's (1973) discussion on *Cottus aleuticus*, the only known study of the Cultus Pygmy Sculpin is that of Ricker (1960). Given a global rank of G1 and a provincial rank of S1 by the Conservation Data Centre/ Nature Conservancy ranking system and a provincial listing as Red (see Cannings 1993: 2-6), this is a species of concern, not previously considered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This report was undertaken to provide a synopsis of the available information for possible status determination.

Description

The cottids are a distinctive scorpaeniform group of perciformes-like fishes and many of the morphological traits reflect the bottom-living habits which are characteristic of the cottidae. The sculpins are large-headed, heavy-bodied fishes with large pectoral fins. The body tapers from the head to a relatively narrow caudal peduncle. There is a spiny fin and a soft dorsal fin and one or more spines on the preopercule (McPhail and Lindsey 1970). Primarily marine fishes of arctic and temperate seas, species in the genus are widely distributed in fresh waters of the Northern Hemisphere. There are eight species in Canadian fresh waters, six of which are found in British Columbia (Scott and Crossman 1973). The fresh water species are usually small fish, seldom exceeding 18 cm in total length, although the Prickly Sculpin, *Cottus asper*, may reach lengths of up to 31 cm.

There appears to be no recorded description of the Cultus Lake form except that of Ricker (1960), and the original application of the common name is not known, except

that it is known only from Cultus Lake, but it appears to have become accepted locally (Peden 1990; McPhail and Carveth 1992; Cannings 1993). The parent form, *Cottus aleuticus*, (Figure 1) is typical of the genus with a broad heavy head, decreasing in size posteriorly to a moderately deep laterally depressed caudal peduncle. The elongated body averages 7.6 to 10.2 cm Total Length (TL) [Scott and Crossman 1973]. There is a well developed preopercular spine and the preoperculo-mandibular pore count is 10-1-10, one pore being on the tip of the chin. The pectoral fins are large and fan-like with 15 to 16 spines, the second larger with 16 to 20 soft rays. The caudal fin is slightly rounded; the anal fin is long with 12 to 16 rays. There are no typical scales but small prickles remain behind each pectoral fin. The lateral line is complete and has 30 to 44 pores (Scott and Crossman 1973).

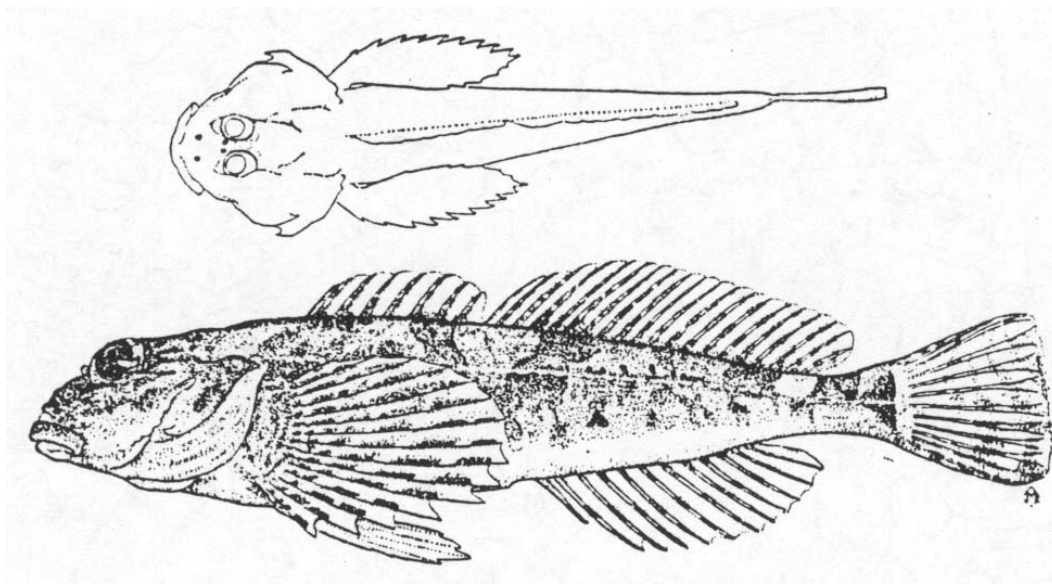


Figure 1. Coastrange Sculpin, *Cottus aleuticus*. The Cultus Lake form is smaller (5 cm as opposed to 7 to 10 cm) with large pores on the head.

The fish (*Cottus aleuticus*) are brown to grey with darker blotches, being lighter on the sides and almost white ventrally. There are usually two or three dark saddle-like blotches on the sides under the second dorsal fin. The fins are pigmented, usually in the form of bars. Young fish lack pigmentation on the fins and spawning males are generally darker in colour with an orange band on the edge of the first dorsal fin (Scott and Crossman 1973).

Apparently the morphology of the Cultus Lake limnetic form is significantly altered from the parent form, *Cottus aleuticus*. The fish are considerably smaller, resembling larvae, with a maximum length of 50 mm, the density of the bone is reduced, subcutaneous lipids are increased and there are large pores on the head (Ricker 1960; Cannings 1993). McPhail (as communicated to Cannings 1993) believes this form to be an example of neotenic evolution. As indicated by Larson and Brown (1975) with the Lake Washington forms, any decision as to specific status has to be deferred until the

degree of reproductive isolation from *Cottus aleuticus* is known. "It can be perhaps be regarded as a population that is "relict" in an ecological sense, though not in the geographical sense" (Ricker 1960: 932).

DISTRIBUTION

The Cultus Pygmy Sculpin appears to be endemic to the deep waters of Cultus Lake, in the Fraser River watershed of southwestern British Columbia (Figure 2).

PROTECTION

No specific protection exists for this form, but general protection, if required, could be provided under provincial wildlife and endangered species legislation.

POPULATION SIZE AND TRENDS

There is no information available on population size, and no evidence for determining trends in the population. It appears that the species is common in Lake Cultus and reproducing successfully. Apparently first collected by Ricker in 1934 (Ricker 1960), specimens from collections in 1942 and 1951 have been preserved in the University of British Columbia Institute of Fisheries collection (BC 55-136, BC 54-433). Cannings (1993) 'guestimated' a population size of 3000 to 10 000 fishes and indicated that no trend was discernible.

HABITAT

This is a limnetic form restricted to the deeper waters of a low level montane lake. Direct evidence of spawning has not been observed, but probably occurs in the deeper waters of the lake (Ricker 1960). The fish have not been observed in the shore waters and probably do not spawn there or in feeder or tributary streams since most of these are seasonal and dry up during the summer (Ricker 1960).

GENERAL BIOLOGY

Spawning has not been observed and the location of spawning is not known. Observation of females with large eggs indicates spawning begins in late May or early June and may continue through the summer (Ricker 1960) with the peak in July. The fate of newly hatched fry is not known. In the parent form, the larvae become planktonic and do not take up a benthic life until about 32 to 35 days post-hatch (Scott and Crossman 1973).

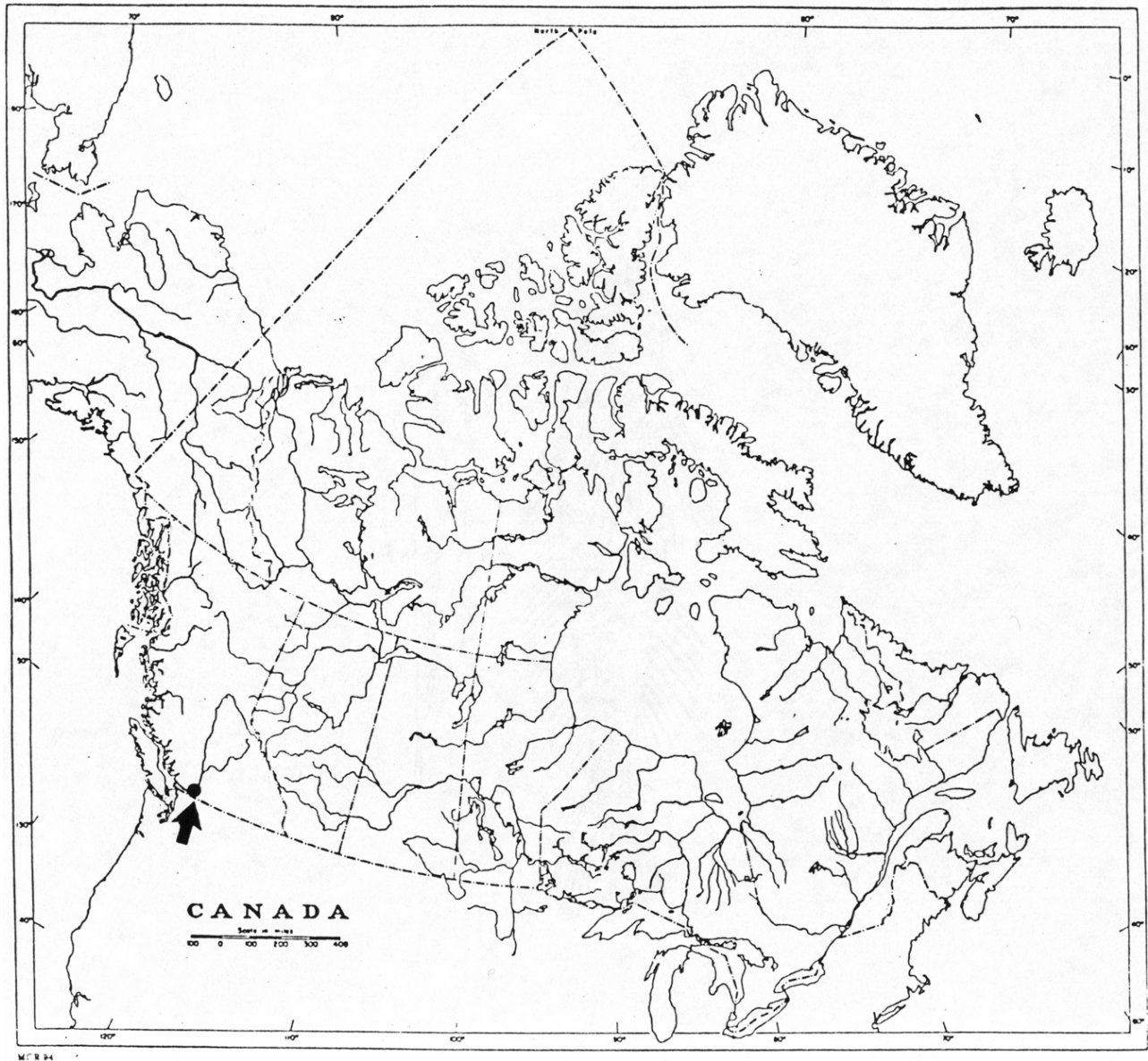


Figure 2. Canadian distribution of the Cultus Lake Pygmy Sculpin (*Cottus* sp.).

Ricker (1960) used approximations based on size group to develop a possible age structure for the population and concluded that the fish became sexually mature in the third year. No growth information is available, but maximum size is about 5.0 cm (Ricker 1960). Maximum age is not known, but the maximum age for the parent form is 4 years (Scott and Crossman 1973).

The diet consists of *Daphnia* sp., chironomid midge larvae and pupae, *Epischura* sp., ostracods, *Bosmina* sp., and *Cyclops* sp. One fish of 37 mm had consumed a smaller cottid of 14 mm in length (Ricker 1960).

Predator-prey relationships are not certain. The form is eaten by Dolly Varden, *Salvelinus malma*, which are also confined to the deeper waters of the lake. Ricker (1960) reported up to 100 of these sculpins in a Dolly Varden stomach. Cutthroat Trout, *Oncorhynchus clarki*, and Coho Salmon, *Oncorhynchus kisutch*, may utilize the larvae, but would rarely encounter adults as these species feed closer to the water surface (Ricker 1960). No sculpins were found in Dolly Varden stomach contents from December to March (Ricker 1960), but this may reflect differences in Dolly Varden feeding behaviour rather than in sculpin activity. There is no indication that the Cultus Pygmy Sculpins utilize Dolly Varden or salmon eggs and fry as has been noted for the parent form (Scott and Crossman 1973).

The morphological adaptations (reduced bone density and increased subcutaneous lipids) are probably both adaptations to vertical migrations within the upper limnetic zone (Cannings 1993).

No information on parasites in this form is available. Only two parasites have been reported for the parent form, the protozoans *Cryptobia lynchi* and *Cryptobia salmositica* (Hoffman 1967).

LIMITING FACTORS

The population is reproducing successfully and is probably stable although no evidence for trends is available. The species is preyed upon by Dolly Varden and Cutthroat trout and any increase in trout populations could deplete or eliminate the population.

Ultimately, the major threat to the species is the transplantation of exotic species such as the Pumpkin Seed (*Lepomis gibbosus*) and the Catfish (*Ameiurus nebulosus*) which could extirpate populations of small fish in diminutive lakes in two years (McPhail 1989).

SPECIAL SIGNIFICANCE OF THE SPECIES

This form is of interest to man as it serves (or served) as a forage fish for salmonids and of considerable scientific interest as an example of neotonic evolution. The existence of a similar fish in a Washington Lake is also of interest as a possible case of independent parallel evolution.

EVALUATION

The form is confined to the Cultus Lake and is a unique Canadian endemic. As a rare species, it is inherently at risk because of its restricted distribution.

TECHNICAL SUMMARY

SPECIES: Cultus Pygmy Sculpin, *Cottus* sp. (Chabot Pygmée du Lac Cultus)

DISTRIBUTION	
<ul style="list-style-type: none"> • Extent of occurrence: • Area of occupancy: 	<p>< 100 km² < 100 km²</p>
POPULATION INFORMATION	
<ul style="list-style-type: none"> • Total number of individuals in the Canadian population: • Number of mature individuals in Canada (N) • Generation time: • Population trend: • Rate of population decline: • If data are only available for a period shorter than 10 years or three generations, 	<p>Unknown Unknown 3 years thought to be stable __% __years/generations __% decline in __years</p>
<ul style="list-style-type: none"> • Number of sub-populations: • Is the population fragmented? <ul style="list-style-type: none"> • number of individuals in each subpopulation: • number of extant sites: • number of historic sites from which species has been extirpated: • Does the species undergo fluctuations? • Fluctuations in? 	<p>0 No 1 0 Unknown</p>
RESCUE POTENTIAL	
<ul style="list-style-type: none"> • Does species exist outside Canada? • Is immigration known or possible? • Would immigrants survive in Canada? • Is suitable habitat available for immigrants? 	<p>No</p>

ACKNOWLEDGEMENTS

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THE AUTHOR

P.A. Coffie is a freelance computer programmer and avid angler. His passion for fishing led to a lifelong interest in freshwater sport fishes. In an attempt to understand more about the fish he has developed a broad background in the knowledge of the freshwater fishes of eastern Canada and their habitat.