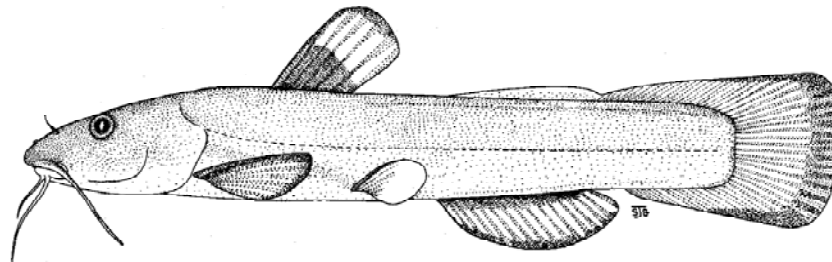


COSEWIC
Assessment and Update Status Report

on the

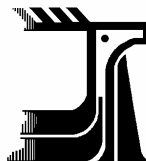
Margined Madtom
Noturus insignis

in Canada



DATA DEFICIENT
2002

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:

Please note: Persons wishing to cite data in the report should refer to the report (and cite the author(s)); persons wishing to cite the COSEWIC status will refer to the assessment (and cite COSEWIC). A production note will be provided if additional information on the status report history is required.

COSEWIC 2002. COSEWIC assessment and update status report on the margined madtom *Noturus insignis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 17 pp.

Phelps, A., and A. Francis. 2002. Update COSEWIC status report on the margined madtom *Noturus insignis* in Canada, in COSEWIC assessment and update status report on the margined madtom *Noturus insignis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-17 pp

Previous report:

Goodchild, C.D. 1989. COSEWIC status report on the margined madtom *Noturus insignis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 26 pp.

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<http://www.cosewic.gc.ca>

Également disponible en français sous le titre Rapport du COSEPAC sur la situation du chat-fou liséré (*Noturus insignis*) au Canada – Mise à jour.

Cover illustration:
Margined madtom — Figure drawn by Sally Gadd, Canadian Museum of Nature.

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COSEWIC Assessment Summary

Assessment Summary – May 2002

Common name

Margined madtom

Scientific name

Noturus insignis

Status

Data Deficient

Reason for designation

The question of whether this species is native or introduced or a mixture of the two could not be resolved using the data available. Testing of an appropriately structured genetic hypothesis is needed to resolve the issue of eligibility.

Occurrence

Ontario and Quebec

Status history

Designated Threatened in April 1989. Status reexamined in May 2002 and placed in the Data Deficient category. Last assessment based on an update status report.



COSEWIC
Executive Summary

Margined Madtom
Noturus insignis

Description

The margined madtom, *Noturus insignis* (Richardson 1836), is a small ictalurid (family Ictaluridae). The official French name is chat-fou liséré, although chat-fou livré is used in older literature. This fish has a light cream-coloured belly, a light brown to grey back and chin barbels. Its dorsal and caudal fins are light brown with black edges. Its adipose fin is attached along the length of the body and is continuous with the square caudal fin. Adults are commonly 100 mm in total length. Specimens of margined madtom are rarely captured and may be easily misidentified.

Distribution

The native U.S. range of the margined madtom includes the Finger Lakes region south towards the Appalachian Highlands and includes most of the Atlantic coastal streams from New York to Georgia. Individuals have also been found in New Hampshire and Michigan (Lee *et al.* 1980). In Pennsylvania, margined madtom is the most commonly captured madtom species throughout the Susquehanna, Potomac, and Delaware River drainages (Gutowski and Raesly 1993).

Canadian populations are limited to Ontario and Quebec. In Quebec, this fish is found in Gatineau Park, Gatineau County, the Gatineau River, Hull County, the Ottawa River, Hull and Papineau counties and Rivière Lapêche, Gatineau County. There is also an unconfirmed record of capture in the Cole Lake area of Buckingham County. In Ontario, specimens of margined madtom have been found in the Fall River, Mississippi River and Bolton Creek located in Lanark County. Also, specimens have been captured in Lake Joseph, Lake Rosseau, and Lake Muskoka in the Muskokas.

The disjunct distribution of the margined madtom has led to skepticism as to whether the margined madtom is a native or an introduced species. Goodchild (1990) discussed both hypotheses in the original status report and the consensus of the author and the Committee at the 1989 assessment meeting was that it was a native species. *Noturus insignis* may have immigrated through interconnecting post-glacial lakes 8 000 – 10 000 years ago. Margined madtom is known from several lakes, rivers and streams in separate locations in Muskoka, Lanark, Hull, and Papineau counties. Similar disjunct populations are known in the U.S. from New York State and New Hampshire. The

alternative hypothesis is that the distribution of margined madtom has expanded into Canada as a result of its use as baitfish. Margined madtom is a popular baitfish in the United States and survives transportation well (Coad 1986).

Habitat

The margined madtom prefers clear, high-gradient streams with moderate current among riffles with a boulder, rubble, or gravel substrate (Goodchild 1990). Since the publication of the previous status report, the Ontario Ministry of Natural Resources (OMNR) has captured several specimens of *Noturus insignis* from lakes in Muskoka County in areas with still or slow current with gravel and sand or boulder and sand substrate. As such, the habitat preferences of this fish may not be as restrictive as once thought.

General Biology

The margined madtom is a secretive nocturnal species that hides among the rocks and boulders in rivers and streams. This fish spawns in spring or early summer but very little is known about its spawning habits. Males guard egg masses that are laid in nests located under flat rocks in gently flowing water above and below riffles. Disturbance causes guardian males to abandon or eat the eggs (Stockel and Neves 2000). Margined madtom is a benthic feeder that feeds on insects that live on the stream or river bottom. Due to its scarcity and small size, the margined madtom has not been extensively studied; little is known about its movements or migrations.

Artificial propagation of the margined madtom by egg hatching and induced spawning has been investigated as a means to recover the species (Stoeckel and Neves 2000, 2001). In captivity, optimum hatching success was obtained by using strong agitation to tumble the eggs and high temperatures of 28-30° C. It is possible that high temperatures are required for optimum hatching success in the wild, which would restrict the distribution of this species to warmer water bodies.

Population Size and Trends

Only 49 margined madtom specimens were captured in Canada prior to 1990 (Goodchild 1990). Since this time, at least additional 64 specimens have been captured. The majority of specimens were collected from the Fall River in Lanark County and Lake Joseph in the Muskoka District, Ontario.

Since the original status report, the margined madtom has been captured at all historic locations and at several new locations in Ontario and Quebec. New locations in Ontario include Lake Muskoka and Lake Rosseau in the Muskoka District, and in Bolton Creek and the Mississippi River in Lanark County. In Quebec, the known distribution of the margined madtom has expanded into the Gatineau and Ottawa rivers. These new records of capture may be the result of increased and more rigorous sampling efforts or recent introductions.

Limiting Factors and Threats

The margined madtom is influenced by habitat change. Literature records (Coad 1986, Goodchild 1990) detail the specific habitat requirements of this species although recent captures in the Muskoka Lakes suggest that this species may have a wider tolerance than first reported. Any activity that eliminates riffle areas or slows water flow may limit their population size (Coad 1986). This fish is intolerant of silt covering the rocky substrate (Coad 1986). Siltation caused by erosion or agricultural and urban development also affects the survival of the margined madtom. Low numbers of individuals, fluctuating population sizes and a limited amount of suitable habitat restrict the population size and distribution of the margined madtom, which is at the northern limit of its range in Canada. The collection of specimens may also have contributed to the depletion of populations already low in numbers.

Existing Protection

In Canada, there is no protection specific to the margined madtom. Fish habitat is protected by the federal *Fisheries Act*. The *Ontario Lakes and Rivers Improvement Act* provides additional protection for the habitat of this species. In Quebec, fish habitat is protected by the *Environmental Quality Act*.



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

**Update
COSEWIC Status Report**

on the

Margined Madtom
Noturus insignis

in Canada

Anne Phelps¹
Anthony Francis¹

2002

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K1N 6P1

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SPECIES INFORMATION

Name, Classification and Taxonomy

The margined madtom, *Noturus insignis* (Richardson 1836), is a small ictalurid catfish (family Ictaluridae). Within the catfish family, the *Noturus* genus is characteristically small with an adnate or attached adipose fin. The official French name for the margined madtom is chat-fou liséré, although chat-fou livré is used in older literature. The margined madtom is rare in Canada and is restricted to a few streams, rivers and lakes in Ontario and Quebec.

Description

Goodchild (1990) provided a description of *Noturus insignis* in the original status report and an identification key was developed by Coad (1986). This fish has a light cream coloured belly, a light brown to grey back and chin barbels. Its dorsal and caudal fins are light brown with black edges. Its adipose fin is attached along the length of the body and continuous with the square caudal fin (Fig. 1). Adults are commonly 100 mm in total length. Margined madtom can be distinguished from the stonecat, *Noturus flavus*, since the margined madtom has black-edged median fins, a premaxillary tooth patch without backward extensions and saw teeth on the hind edge of the pectoral spines while the stonecat lacks black-edged median fins, has a premaxillary tooth patch with backward extensions and may or may not have saw teeth along the hind edge of the pectoral spines. The tadpole madtom, *Noturus gyrinus*, differs from the margined madtom and the stonecat by the presence of a rounded caudal fin and absence of saw teeth on the hind edge of the pectoral fins. Other Canadian species of madtom include the northern madtom, *Noturus stigmosus* and the brindled madtom, *Noturus miurus*. Both of these species can be distinguished from the margined madtom by the presence of dark blotches or saddle marks on the back and sides. Madtom catfishes are cryptic fishes that are not often captured and may be easily misidentified. It is possible that this may lead to an underestimation of the number of individuals captured.

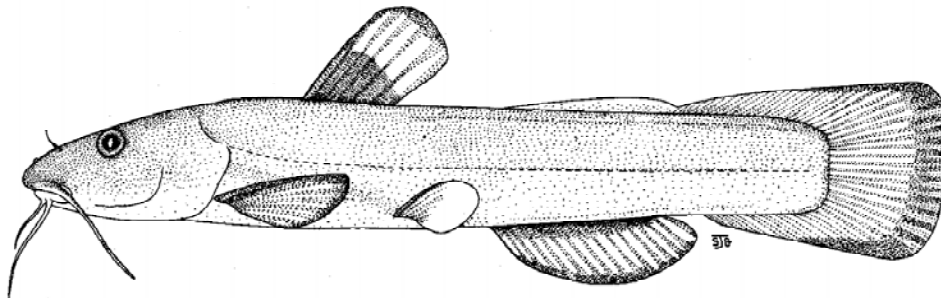


Figure 1. Drawing of a margined madtom, *Noturus insignis*. Figure drawn by Sally Gadd, Canadian Museum of Nature.

DISTRIBUTION

North American Range

The distribution of the margined madtom throughout North America was described in the 1990 COSEWIC report (Goodchild 1990). The native U.S. range of the margined madtom includes the Finger Lakes region south towards the Appalachian Highlands and includes most of the Atlantic coastal streams from New York to Georgia (Fig. 2). Individuals have also been found in New Hampshire and Michigan (Lee *et al.* 1980). In Pennsylvania, the margined madtom is the most commonly captured madtom species throughout the Susquehanna, Potomac, and Delaware River drainages (Gutowski and Raesly 1993).

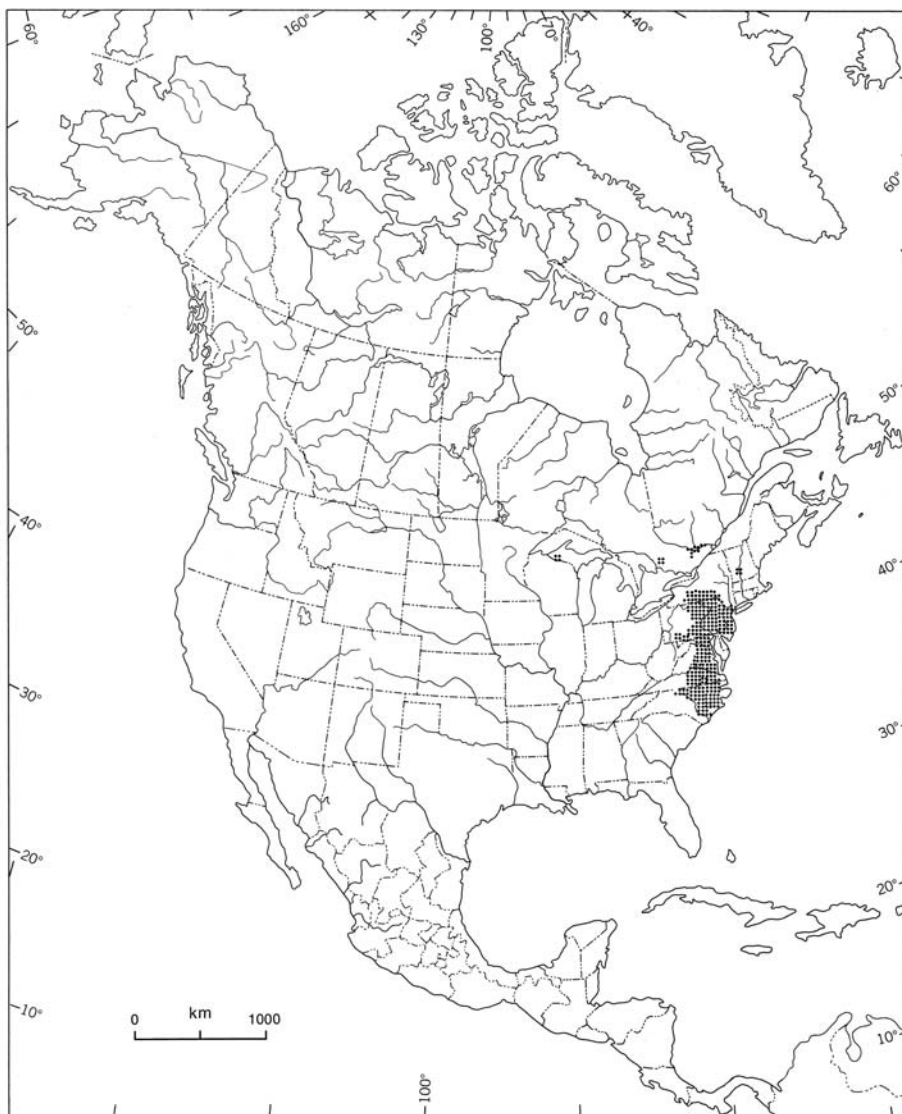


Figure 2. North American distribution of the margined madtom, *Noturus insignis*. The stippled area indicates the known distribution of the margined madtom in North America.

Canadian Range

Canadian populations of the margined madtom are at the northernmost limit of the species' natural range. The margined madtom has a disjunct distribution in Canada, restricted to a few streams, rivers, and lakes in Ontario and Quebec (Fig. 3). The first reported Canadian specimens were captured in Quebec, in a stream draining Lac à la Loutre to Lac Lapêche in Gatineau Park, 45 km northwest of Ottawa. Four specimens were captured in August 1971 and 25 more specimens were captured in November of that same year (Rubec and Coad 1974). These specimens are catalogued in the Canadian Museum of Nature (CMN), in Ottawa [NMC 73-0142, NMC 74-0004]. Elsewhere in Quebec, on 1 September 1982, two margined madtoms were captured in Rivière Lapêche, Saint-Louis-de-Masham, Gatineau County [NMC82-0572] and another specimen was captured 19 July 1983 [NMC83-0S35].

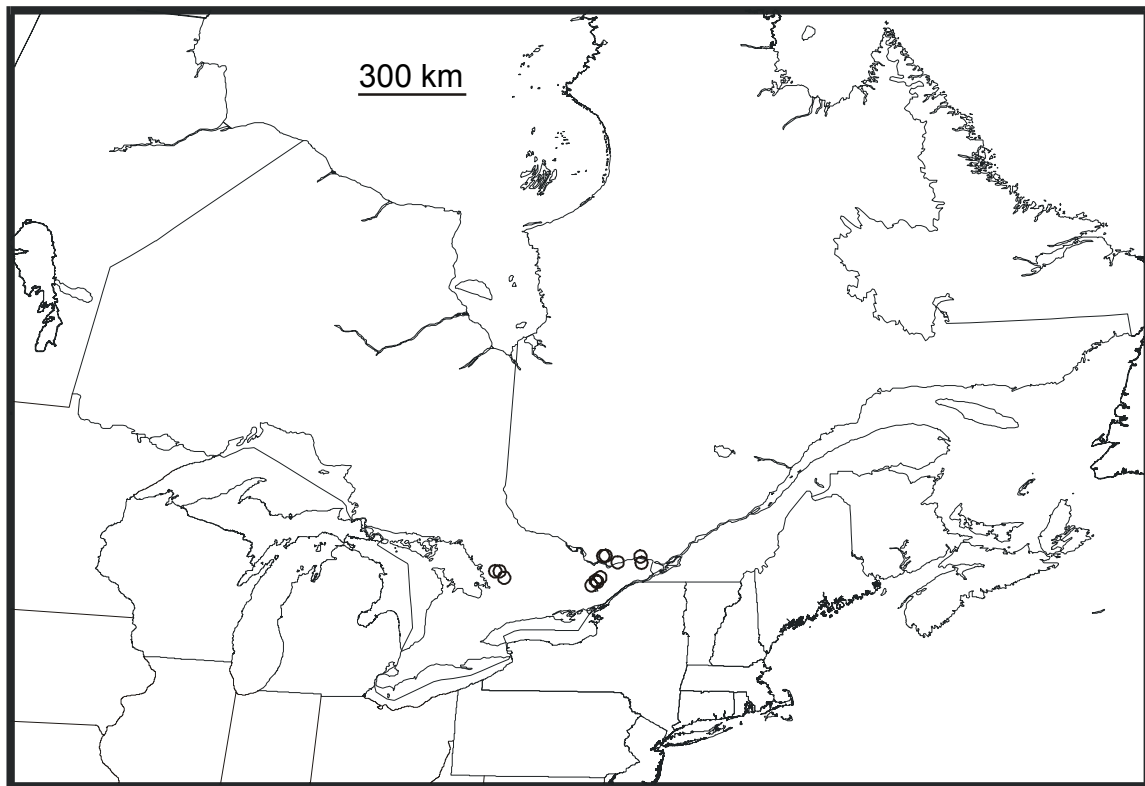


Figure 3. Canadian distribution of the margined madtom, *Noturus insignis*. The open circles represent Canadian records of capture.

Since the original status report, several margined madtom specimens were captured from new locations in Quebec. Chabot and Caron (1996) reported that two margined madtom specimens were captured along the Quebec side of the Ottawa River, between Hull and Lochaber, Hull County and one specimen was captured between Lochaber and Montebello, Papineau County in 1996. In the Gatineau River,

12 km upstream from the confluence with the Ottawa River, Hull County, two margined madtom were captured in May and one in June 1999 by a joint project between the University of Ottawa and the Société de la faune et des parcs du Québec (SFPQ) (Richard Pariseau, SFPQ, personal communication). During 2000 or 2001, an unknown number of margined madtom specimens were collected from the Cole Lake area in Buckingham, Quebec (Michel Lepage, SFPQ, personal communication).

The first specimen found in Ontario was collected in May 1976 by the Ontario Ministry of Natural Resources (OMNR), in the Fall River, Lanark County, 85 km southwest of Ottawa. An additional 14 specimens were captured a month later at the same location. These specimens are catalogued in the Royal Ontario Museum (ROM) in Toronto [ROM 32581].

Since the original status report (Goodchild 1990), several margined madtoms have been collected from new locations in Ontario. In Bolton Creek, Hamlet of Fallbrook, Lanark County, Ontario, on 8 September 1990, one specimen was collected by OMNR [ROM 66063]. On 4 September 1997, one margined madtom was collected from the Mississippi River, Hamlet of Playfairville, Lanark County, Ontario, by the OMNR [ROM 70991]. An additional specimen was captured by the OMNR in the Mississippi River, 22 km downstream from Playfairville, in Innisville, Lanark County, Ontario in September 2000 (Shaun Thompson, OMNR, personal communication). The Fall River, Bolton Creek and Mississippi River are all interconnected and the sampling sites in this area are in relatively close proximity, within 30 km of each other.

Elsewhere in Ontario, a margined madtom was first captured in Lake Joseph, Muskoka District, Ontario, by OMNR 17 October 1988, and the following October, another specimen was captured at the same location [ROM 55839; 58161]. One margined madtom was captured in Lake Muskoka by OMNR in 1993 [ROM 68167] and one specimen was captured by OMNR in 1996 in Lake Rosseau (Alan Dextrase, OMNR, personal communication).

The disjunct distribution of the margined madtom has led to skepticism as to whether the margined madtom is a native or an introduced species. Goodchild (1990) discussed both hypotheses in the original status report and the consensus of the author and the Committee at the 1989 assessment meeting was that it was a native species. *Noturus insignis* may have immigrated through interconnecting post-glacial lakes 8 000 – 10 000 years ago. Margined madtom is known from several lakes, rivers and streams in separate locations in Muskoka, Lanark, Hull, and Papineau counties. Similar disjunct populations are known in the U.S. from New York State and New Hampshire. McAllister (1987) reported that the Canadian capture site in Gatineau Park, Quebec is only 130 km from the margined madtom occurrence in western New York. The closeness of this record makes it plausible that the Canadian occurrence is natural and not due to introductions.

The alternative hypothesis is that the distribution of margined madtom has expanded into Canada as a result of its use as baitfish. This fish is a popular baitfish in

the United States and survives transportation well (Coad 1986). There is evidence of introduced margined madtom populations in Clark Lake, Gogebic County, Michigan [UMMZ 186551] and Merrimack River of New Hampshire (Goodchild 1990).

Since the original status report, several publications have commented on the status of the margined madtom in Canada. Crossman (1991) lists the margined madtom as a non-native species introduced via bait bucket. Mandrak and Crossman (1992) list the margined madtom as an introduced species in their checklist of Ontario freshwater fishes. Litvak and Mandrak (1993) identify the margined madtom as one of 4 exotic species that have been introduced to Ontario through use as bait. Bernatchez and Giroux (2000) were undecided as to the native status of the species.

Regardless of the restrictions on the use of madtoms as baitfish, the new areas of capture are popular angling spots making it difficult to determine if the species is introduced or native. Genetic studies would assist in distinguishing between recent introductions (no genetic drift) and colonized (genetic drift) populations. In the absence of genetic studies and invoking the precautionary principle, it is still assumed that the margined madtom is a native species.

HABITAT

Description

The habitat characteristics preferred by *Noturus insignis* were described by Goodchild (1990), McAllister and Coad (1974), and Taylor (1969). This fish prefers clear, high-gradient streams with moderate current among riffles with a boulder, rubble, or gravel substrate (Goodchild 1990). Similar habitat descriptions were provided for the margined madtom specimens captured in the riffle areas of the Fall River, Bolton Creek and the Mississippi River in Lanark County during 1997. The OMNR field collection sheets described the habitat in the Fall River as shallow with a maximum depth of capture of 0.6 m with slow to medium current. The substrate along the riffle area was composed of gravel with some sand and rubble with log debris. Both submergent and floating plants were present. In Bolton Creek, maximum depth of capture was 0.5 m with still to slow current and a gravel substrate with some rubble and boulders. No aquatic plants were present. In the Mississippi River, maximum depth of capture was 0.6 m, and the current was fast with a rubble, gravel and boulder substrate.

Increased beaver (*Castor canadensis*) activity potentially covers riffle areas and slows water flow eliminating riffle areas and margined madtom habitat (Coad 1986). Siltation caused by erosion, agricultural or urban development also affects the survival of the margined madtom; this fish is intolerant of silt covering the rocky substrate (Coad 1986). Goodchild (1990) and Coad (1986) reported that this fish is seldom found in areas with differing habitat conditions and any changes in suitable conditions may severely affect its survival. Since the publication of the original status report, *Noturus insignis* specimens were captured from lakes in Muskoka County, during 1993, indicating that the habitat preferences of this fish may not be as restrictive as once

thought. In Lake Muskoka margined madtoms were captured in still water with a boulder and sand substrate. In Lake Joseph, specimens were captured in slow current with a boulder and rubble substrate with some gravel.

GENERAL BIOLOGY

General

The general biology of margined madtom was summarized by Goodchild (1990) and Taylor (1969). The margined madtom is a secretive nocturnal species that hides among rocks and boulders in rivers and streams. This fish is a benthic feeder, feeding on insects that live on the stream or river bottom. Due to its scarcity and small size, the margined madtom has not been extensively studied. Little is known about its movements or migrations.

The margined madtom spawns in spring or summer but very little is known about its spawning habits. Males guard egg masses that are laid in nests located under flat rocks in gently flowing water above and below riffles. Disturbance causes guardian males to abandon or eat the eggs (Stoeckel and Neves 2000).

It has been observed that males mouth the eggs while guarding the nests (Stoeckel and Neves 2000). This action has been observed in other madtom species and it is speculated that this type of egg manipulation helps to aerate the eggs (Burr and Mayden 1982).

Artificial propagation of the margined madtom by egg hatching and induced spawning has been investigated as a means to recover the species (Stoeckel and Neves 2000, 2001). In captivity, optimum hatching success was obtained by using strong agitation to tumble the eggs and high temperatures of 28-30° C. It is possible that high temperatures are required for optimum hatching success in the wild, which would restrict the distribution of this species to warmer water bodies.

There are no records of juvenile or immature margined madtom captures in Canada. This does not necessarily mean that margined madtom is not reproducing because it is doubtful that all fish caught were introduced specimens. It is likely that the sampling gear does not select for these fish. These elusive, nocturnal fish hide amongst boulders and gravel making them difficult to capture. They are best captured at dusk with chemicals, electrofishing, or seining.

Nutrition and Interspecific Interactions

The margined madtom is known to eat cladocerans, ostracods, gammarids, midges, and debris (Smith 1985). Gutowski and Stauffer (1993) examined the stomach contents of 403 margined madtoms collected throughout 1988 and 1989 in Pennsylvania and found that insects in the families Baetidae, Chironomidae and

Simuliidae were present in stomach samples in proportions higher than those in the environment. The margined madtom ate insects that were most active and most available between midnight and dawn.

POPULATION SIZE AND TRENDS

Only 49 margined madtom specimens were captured in Canada prior to 1990 according to the original status report (Goodchild 1990). Since this time, at least 64 additional specimens have been captured. The majority of specimens were collected from the Fall River in Lanark County and Lake Joseph in the Muskoka District of Ontario.

Biologists have returned to the original locations and several of the new locations of capture in Ontario and Quebec in an attempt to determine the status of the margined madtom in Canada. During July 1982, biologists returned to the Fall River, Lanark County, to collect the margined madtom with a seine net, but their sampling attempts were unsuccessful. However on 4 September 1997, 24 specimens were captured at this location by the OMNR with the use of a backpack electrofisher. Three of these specimens are catalogued in the Royal Ontario Museum (ROM) collection [ROM 70989]; the remainder were released. The use of a backpack electrofisher may have been a more effective type of sampling gear for this location (Alan Dextrase, OMNR, personal communication). There have been no new data on the margined madtom in the Fall River since last observed there in 1997.

Between 1991 and 1996 in the Muskoka District, OMNR captured 18 margined madtom specimens in Lake Joseph [ROM 68174], 5 in Lake Muskoka [ROM 68167], and one margined madtom in Lake Rosseau (Alan Dextrase, OMNR, personal communication), as part of their smallfish survey (most caught) and near-shore index netting program. Minnow traps were used for the smallfish survey and 6' trap nets were used for the near-shore index netting survey. It is suspected that this species is now established in the Muskokas as it has been captured regularly (Alan Dextrase and Warren Dunlop, OMNR, personal communication). Elsewhere in Ontario, scientists from the OMNR returned to Bolton Creek, Hamlet of Fallbrook, Lanark County, on 4 September 1997 and two specimens were captured [ROM 70988].

In Quebec, biologists returned to the stream draining Lac à la Loutre to Lac Lapêche in Gatineau Park, where the margined madtom was originally captured in 1971. The area was re-sampled in 1982, 1983, and 1984; these efforts did not result in the collection of this species, although in 1982, two specimens were captured further upstream [NMC 82-0321]. On 1 September 1982, two margined madtoms were captured in Rivière Lapêche, Saint-Louis-de-Masham, Gatineau County [NMC82-0572], and another was collected on 19 July the following year [NMC83-0S35]. Several specimens were captured in this area during the early 1990s (Brian Coad, Canadian Museum of Nature, personal communication).

Population sizes of the margined madtom may fluctuate due to low numbers of individuals and their dependence on the spawning success of the previous year. These fluctuations may be evident in the Fall River, Ontario. Fourteen specimens were captured in 1976 but, none were captured at the same site in 1982 (Coad 1986). In 1997, 24 specimens were captured [ROM70989]. However, these differences may also be explained by the use of different sampling gear.

In the original status report, it was reported that 49 margined madtom specimens were captured prior to 1990. Since this report, at least 64 specimens have been captured in Ontario and Quebec. The margined madtom has been captured in four new locations in Ontario in Lake Muskoka and Lake Rosseau in the Muskoka District, and in Bolton Creek and the Mississippi River in Lanark County. In Quebec, the distribution of the margined madtom has expanded into the Gatineau and Ottawa Rivers, Hull and Papineau County and also into the Cole Lake area in Buckingham County. It is possible that these new records of capture may be the result of increased and more rigorous sampling efforts or recent introductions.

LIMITING FACTORS AND THREATS

The margined madtom may be influenced by habitat change. Literature records (Coad 1986, Goodchild 1990) detail the specific habitat requirements of this species although recent captures in the lakes in Muskoka County suggest that this species may have a wider tolerance than first reported. Any activity that eliminates riffle areas or slows water flow may limit their population size (Coad 1986). This fish is intolerant of silt covering the rocky substrate (Coad 1986). Siltation is caused by erosion or agricultural and urban development. Low numbers of individuals, fluctuating population sizes and a limited amount of suitable habitat restrict the population size and distribution of the margined madtom, which is at the northern limit of its range in Canada. The collection of specimens may also have contributed to the depletion of populations already low in numbers.

SPECIAL SIGNIFICANCE OF THE SPECIES

In Canada, there is little interest in this virtually unknown species although it is a commonly used baitfish in the United States. Margined madtom is not economically important; however, it contributes to the biodiversity of aquatic ecosystems.

EVALUATION

Existing Legal Protection or Other Status

In Canada there is no protection specific to the margined madtom. Fish habitat is protected by the federal *Fisheries Act*. The *Ontario Lakes and Rivers Improvement Act*

provides additional protection for the habitat of this species. In Quebec, fish habitat is protected by the *Environmental Quality Act*.

Current COSEWIC status in Canada: Threatened (Nov. 2000)

Current COSSARO status in Ontario: Indeterminate (May 2001)

Natureserve:

Global Heritage Status Rank: G5 (Sept. 1996) - Demonstrably widespread, abundant and secure

National Heritage Status Rank Canada: N1 (Oct. 2000) - Critically imperiled

National Heritage Status Rank United States: N5 (Dec. 1996) - Demonstrably widespread, abundant and secure

Provincial Heritage Status Rank Ontario: S1 - Critically imperiled (date unknown)

Provincial Heritage Status Rank Quebec: S1 - Critically imperiled (date unknown)

TECHNICAL SUMMARY

Distribution

Extent of occurrence in Canada: 43 500 km²

Extent of occurrence in North America: 280 000 km²

Area of occupancy in Canada: 120 km²

Area of occupancy in North America: unknown

Population Information

Total number of individuals captured in Canada prior to 1990: 49

Total number of individuals captured in Canada 1990 to 2000: 64+

Generation Time: 2 years

Population Trend: increasing

Number of sub-populations in Canada: 10 (captured in 10 separate waterbodies)

Is the population fragmented? Yes, disjunct population inferred from the lack of connectivity amongst the Muskoka, Lanark, Hull, Gatineau and Papineau county waterbodies and the separation between the Canadian and American distributions.

Number of individuals in each subpopulation (range): 1-24 (number of individuals captured from one sampling location)

Number of extant sites in Canada: 10

Number of historic sites from which species has been extirpated in Canada: 0

Does the species undergo fluctuations? Yes, inferred from the different number of individuals captured when some sites were resampled in subsequent years.

Threats

The margined madtom is influenced by habitat change. Literature records detail the specific habitat requirements of this species although recent captures in the Muskoka Lakes suggest that this species may have a wider tolerance than first reported. Any activity that eliminates riffle areas or slows water flow may limit their population size (Coad 1986). These fish are intolerant of silt covering the rocky substrate (Coad 1986). Siltation may be caused by natural erosion, agricultural or urban development. Low numbers of individuals and a limited amount of suitable habitat restrict the population size and distribution of the margined madtom, which is at the northern limit of its range in Canada. The collection of specimens may also have contributed to the depletion of populations already low in numbers.

Rescue Potential

Does this species exist outside of Canada? Yes

Is immigration known or possible? Yes, immigration is plausible as nearest U.S. site in New York is 130 km away from Canadian site in Gatineau Park Quebec.

Individuals may have been transferred to new locations by anglers using this species as bait.

Would individuals from the nearest foreign population be adapted to survive in Canada? Yes

Would sufficient suitable habitat be available for immigrants? Yes

Assessment of Status

Low numbers of individuals, limited habitat, disjunct distributions, and fluctuating population sizes may affect the continued survival of the margined madtom in Canada. *Noturus insignis* was captured in increasing numbers at all historic sites and at several new locations suggesting stable or possibly increasing population sizes, although the new records of capture may be the result of increased and more rigorous sampling efforts or recent introductions. Also, the possibility of broader habitat tolerances than once thought indicates that the habitat preferences of this species may be less restrictive. It is also possible that the number of individuals appeared to fluctuate due to the difficulty with capturing specimens with inappropriate gear. If there are no adverse changes to the margined madtom's habitat, species numbers should remain stable. Given these considerations, the status of the margined madtom could be downlisted, but it should not be de-listed since few mature individuals have been captured and there are no records of juveniles or breeding from Canadian waters.

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Appendix 1. New Canadian margined madtom, *Noturus insignis*, records of capture since the original status report (Goodchild 1990).

Water Body	County	Province	Capture Date (Y/M/D)	Number Captured	Source
Bolton Creek	Lanark	Ontario	1990/09/08	1	ROM66063
Lake Joseph	Muskoka	Ontario	1990/10/18	?	OFDD'5391-003-02
Lake Joseph	Muskoka	Ontario	1990/10/18	?	OFDD'5391-003-03
Lake Joseph	Muskoka	Ontario	1990/10/22	?	OFDD'5391-003-04
Lake Joseph	Muskoka	Ontario	1991	1	Alan Dextrase, OMNR
Lake Joseph	Muskoka	Ontario	1992	2	Alan Dextrase, OMNR
Lake Joseph	Muskoka	Ontario	1993	2	Alan Dextrase, OMNR
Lake Muskoka	Muskoka	Ontario	1993	1	Alan Dextrase, OMNR
Lake Muskoka	Muskoka	Ontario	1993/07/13	1	ROM68167
Lake Joseph	Muskoka	Ontario	1993/07/19	1	ROM68174
Lake Joseph	Muskoka	Ontario	1994	8	Alan Dextrase, OMNR
Lake Muskoka	Muskoka	Ontario	1994	2	Alan Dextrase, OMNR
Rivière Lapêche	Gatineau	Quebec	mid-1990s	?	Brian Coad, CMN
Lake Joseph	Muskoka	Ontario	1995	4	Alan Dextrase, OMNR
Lake Muskoka	Muskoka	Ontario	1995	1	Alan Dextrase, OMNR
Ottawa River	Hull	Quebec	1996	2	Chabot and Caron 1996
Ottawa River	Papineau	Quebec	1996	1	Chabot and Caron 1996
Lake Rosseau	Muskoka	Ontario	1996	1	Alan Dextrase, OMNR
Fall River	Lanark	Ontario	1997/09/04	24	ROM70989
Bolton Creek	Lanark	Ontario	1997/09/04	2	ROM70988
Mississippi River	Lanark	Ontario	1997/09/04	1	ROM70991
Gatineau River	Hull	Quebec	1999/05/27	2	Richard Pariseau, SFPQ
Gatineau River	Hull	Quebec	1999/06/03	1	Richard Pariseau, SFPQ
Mississippi River	Lanark	Ontario	2000/09	1	Shaun Thompson, OMNR
Lake Cole area	Papineau	Quebec	2000/2001	?	Michel Lepage, SFPQ