



Committee
on the Status
of Endangered
Wildlife
in Canada

Comité sur le
statut des espèces
menacées
de disparition
au Canada

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**STATUS REPORT ON THE NORTHERN MADTOM
NOTURUS STIGMOSUS
IN CANADA**

BY

CHERYL D. GOODCHILD

**STATUS ASSIGNED IN 1993
REPORT ACCEPTED, INSUFFICIENT SCIENTIFIC INFORMATION
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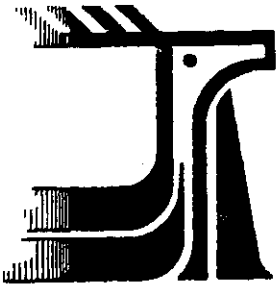
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JUNE 1990

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EXTIRPATED SPECIES: Any indigenous species of fauna or flora no longer known to exist in the wild in Canada but occurring elsewhere.

EXTINCT SPECIES: Any species of fauna or flora formerly indigenous to Canada but no longer known to exist anywhere.

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STATUS ASSIGNED IN 1993

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STATUS OF THE NORTHERN MADTOM, *Noturus stigmosus*, IN CANADA

CHERYL D. GOODCHILD

2168 Harcourt Crescent, Mississauga, Ontario L4Y 1W1

Goodchild, Cheryl D. 1992. Status of the Northern Madtom, *Noturus stigmosus*, in Canada. Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Canadian Wildlife Service, Ottawa, Ontario.

The Northern Madtom, *Noturus stigmosus*, is a secretive fish naturally rare throughout its North American range. It is known in Canada from a single record from Lake St. Clair, Ontario. Northern Madtoms have been reported from nearby locations on the United States side of the Detroit River. Since species of madtoms are elusive and seldom captured except by specialized techniques, there is a slight possibility that a remnant indigenous population exists in Canada, or that one has been extirpated. There is insufficient scientific information for consideration of COSEWIC status designation.

Une seule capture du chat-fou du Nord, Noturus stigmosus, a été signalée au Canada. Le spécimen avait été capturée dans le lac Sainte-Claire, en Ontario, en 1963. Rien ne laisse supposer l'existence d'une population indigène au Canada, bien que le chat-fou du Nord soit une espèce cachottière naturellement rare dans son aire de répartition nord-américaine. Le CSEMDC n'a pas assez d'information scientifique pour le classifier.

Key Words: Ictalurids, *Noturus stigmosus*, madtoms, Northern Madtom, chat-fou du Nord, rare and endangered species

Noturus stigmosus Taylor 1969, the Northern Madtom (family Ictaluridae) has been reported from only one location in Canada and has only recently been recognized as a distinct species (Taylor 1969). A member of the *Noturus furiosus* species group, it is most closely related to *Noturus munitus*,

Frecklebelly Madtom, in geographic distribution and general morphology. It has been misidentified as several other species of *Noturus* most notably: *Noturus eleutherus*, Mountain Madtom, because of presumed sexual dimorphism and *Noturus furiosus*, the Carolina Madtom, particularly in Pennsylvania (Cooper 1983). In Canada, it could potentially be misidentified as *Noturus miurus*, the Brindled Madtom (Scott and Crossman 1973). Since the species was known from a single record in Canada it is of interest to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and this report was prepared for the Committee to summarize the status of the species in Canada.

Description

The Northern Madtom (Figure 1) is very similar in colour and almost identical in meristic characters to the Brindled Madtom, the only species of madtom in Canada with which it is likely to be confused. Northern Madtoms should be watched for in collections of Brindled Madtom from southwestern Ontario (Scott and Crossman 1973). Presence of dark saddles or bars and very strong serrae (barbs) on pectoral spines are characters used to differentiate Brindled Madtoms from other madtoms in Canada. As these are characteristic of the Northern Madtom as well, there is a possibility that specimens of *Noturus stigmosus* might be misidentified.

Northern Madtoms can be distinguished by the interrupted dark saddle-band on the caudal peduncle which does not extend upward to the distal edge of the adipose fin, prominent anterior serrae on the pectoral fin, 11 preoperculo-mandibular pores, and by the almost complete separation of the caudal and adipose fins.

Noturus stigmosus may attain a size of 130 mm (Trautman 1981), but specimens examined by Taylor (1969) did not exceed 100.5 mm standard length (SL). In live specimens the body is pinkish, yellowish or medium tan with markings varying from brown to dark grey or black. The Northern Madtom has four prominent saddle-bands, sides heavily mottled with clumps of dark pigment, abdomen dull white except a bridge of brown in front of pectoral

fins, dorsal fin with a whitish margin and sub-distal dusky bar (absent only in small specimens), pectoral fins prominently spotted (usually), and caudal fin with brown bands (mid-caudal crescent most distinct).

In spawning males, the head flattens and broadens, cheeks bulge and the anterior half of the body turns dusky (Taylor 1969). External sexual differences, except in breeding males are slight. Plots of the number of pectoral spine serrae in *Noturus stigmosus* suggest a slight sexual difference, the female possibly averaging more. There is no evident variance in the number of fin rays.

Distribution

North America

The Northern Madtom occurs in freshwater drainages of east-central North America (Figure 2). Absent from the Atlantic slope, its range extends north from tributaries of the Mississippi River in Mississippi and Tennessee and throughout much of the Ohio River Basin in Kentucky, Indiana, the fringe of eastern Illinois, Ohio, and extreme western Pennsylvania. It is also present in the western Lake Erie drainage in Ohio, Indiana and Michigan, but absent from the Lake Michigan drainage basin (Taylor 1969; Rhode 1980).

Denoncourt et al. (1975) suggested that the Northern Madtom might be expected to occur in the Ohio River drainages of west Virginia (ie. Monongahela, Little Kanawha, lower and upper Kanawha, Guyandotte and Big Sandy Rivers). Subsequently, Stauffer et al. (1982) reported the presence of *Noturus stigmosus* in the Kanawha, Big Sandy, Licking, Kentucky, and Green drainages.

Never very common, the Northern Madtom occurs sporadically throughout its native range and is extremely rare in the fringe areas. For instance, in Illinois at the extreme western periphery of its range it is found only in the Vermillion River. It has also been collected near the Illinois border in the Wabash River, Indiana (Smith 1979). Similarly, its distribution is extremely restricted in the northwestern part of Pennsylvania (Cooper 1983).

The zoogeography of members of the genus *Noturus* is discussed comprehensively by Taylor (1969). The centre of their origin probably lies in the upland region of the east central United States. This general area was probably a refuge for several northern species during Pleistocene glaciation. At the end of the Wisconsin glacial period, the Northern Madtom may have used the Wabash River-Maumee Outlet to reach the lakes and streams in the Lake Erie Basin, but its absence from Lake Ontario, Lake Huron and Lake Michigan argue against this hypothesis. Alternatively, it may have been one of the species widely distributed in rivers and streams tributary to the Ohio River from where it simply migrated through minor drainage ways (Underhill 1986).

Canada

A single specimen of *Noturus stigmosus* has been reported from Canada (Figures 3,4). It was taken from a trawl in Lake St. Clair, Ontario near the origin of the Detroit River, July 25, 1963 by H. VanMeter [Ohio State University Museum; OSUM 14324 (Trautman 1981)]. The identity was verified by T. M. Cavender, Curator of Fishes, OSUM and by E. J. Crossman, Curator, Department of Ichthyology and Herpetology, Royal Ontario Museum (ROM) [E.J. Crossman, Royal Ontario Museum, Toronto, Ontario; personal communication].

Northern Madtoms have been reported from the Detroit River in the United States [Oct 29, 1903, junction of Lake St. Clair and Detroit River, Wayne County (University of Michigan Museum of Zoology; UMMZ 132009)]. They are also frequently reported from the Huron River, Michigan. The Huron River flows into the Detroit River at its mouth in Lake Erie (Taylor 1969).

Based on collection records, the Detroit River, Lake St. Clair area is the northern limit of the distribution of *Noturus stigmosus*. Evidently the species has not been able to disperse further into Canadian waters, due to thermal or ecological barriers that have not yet been identified. It is also possible that small populations of Northern Madtoms have gone undetected (see Population Sizes and Trends). In recent times, the ecological degradation of the area may also be a barrier to further dispersal. In a study of potential

invasion of the Great Lakes by various fish species during a period of climactic warming, the Northern Madtom was considered unlikely to invade based on a composite of ecological requirements (Mandrak 1989).

Protection

No specific protection exists in Canada other than that generally afforded by the habitat sections of the federal Fisheries Act.

Since 1988 the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has suggested assigning a vulnerable (Ontario) status designation (Campbell 1988, 1989, 1990).

In the United States, it was listed as rare in Michigan (Miller 1972), of special concern in Kentucky, Mississippi, Tennessee and West Virginia, and legally protected in Michigan and Ohio (Johnson 1987).

Population Size and Trend

There is no evidence of a reproducing population of *Noturus stigmosus* in Canada. The only specimen that has been captured in Canadian waters was collected near the United States border, at the northern fringe of its range. However, little trawling had previously been done in the Detroit River area. In large streams, few people seine at night when Northern Madtom are active and more likely to be captured. Also, determining population levels of madtoms is complicated by their naturally secretive and nocturnal habits and their extremely disjunct distributions. Madtoms are infrequently captured except by intensive survey work using specialized sampling procedures such as piscicides, electrofishing or night seining (Taylor 1969; Bowen 1980).

Madtom populations are noted for wild fluctuations and varying spawning success from year to year (Trautman 1981; Bauer et al. 1983), complicating the assessment of their numbers and status. Therefore, it is not surprising that only one Northern Madtom has been caught to date and possibly premature to conclude that a viable population does not exist. The presence of the Margined Madtom, *Noturus insignis*, in Canada, was not recognized until the

1970's (Rubec and Coad 1974).

Small viable populations of Brindled Madtom, *Noturus miurus* are present in southwestern Ontario, but numbers are extremely low (McAllister et al. 1985). It is very similar in colour and meristic characters to the Northern Madtom and there is a possibility that collections of Brindled Madtom in Canada contain specimens of Northern Madtom (Scott and Crossman 1973). However, in a cursory look at collections of *Noturus miurus* in the Canadian Museum of Nature (NMC), none appeared to be *Noturus stigmosus* (D. E. McAllister, Canadian Museum of Nature, Ottawa, Ontario; personal communication).

In the United States, the few specimens of *Noturus stigmosus* that have been collected suggest a lack of congregation of individuals particularly as they are found scattered over considerable distances in a stream (Taylor 1969). In the fringe areas of its range in Illinois, Pennsylvania and Michigan, the Northern Madtom is rare or extremely rare (Cooper 1983; Smith 1979; Miller 1972).

The Northern Madtom has only been recognized as a distinct species since 1969, however Taylor (1969) demonstrated that many specimens of *Noturus stigmosus* were originally misidentified as other *Noturus* species. Collection records from Ohio indicate that Northern Madtom were never very abundant as even early collections contained very few specimens. Most populations in Ohio are even declining from those low numbers. Attempts have failed to take Northern Madtom in the turbid Maumee River system. Although it apparently still inhabits the Huron River of southeastern Michigan (Lake Erie tributary), none have been captured in the Great Lakes drainage of Ohio since 1950. Northern Madtom have been collected in only the following few localities in Ohio: Walhonding River, Lower Scioto River, Big Darby Creek and the Little Miami River (Trautman 1981).

Low and declining populations of Northern Madtom in Ohio and Michigan suggest that the species is disappearing from the northern part of its range and therefore it is unlikely to continue to be found in Canada. Either the

species was never indigenous to Canada; its one reported capture a stray or accidental introduction or it existed in extremely low numbers and is now probably extirpated.

Habitat

It is surprising that *Noturus stigmosus* has been found in the Detroit River, Lake St. Clair area. This area has been identified as one of the most polluted water bodies in the Great Lakes region (Great Lakes Water Quality Board 1985) and Northern Madtom presumably have a low tolerance for heavily polluted water or high levels of siltation (Taylor 1969, Rhode 1980).

The Northern Madtom typically inhabits small and sometimes large rivers with sand, sandy mud, gravel or small pebble substrate. It is normally found in areas with little cover although it is sometimes found near fallen logs or debris. Northern Madtoms exhibit a preference for riffle areas or areas with moderate to swift current. Although somewhat tolerant of turbidity, they avoid extremely silty situations (Taylor 1969; Rohde 1980; Trautman 1981).

There is evidence for a north-south variation in size of streams and amount of current preferred by the Northern Madtom. In the southern part of its range, it occupies small rivers and creeks with moderate current. Further north in Illinois it is found in medium to large rivers with strong current, and finally in the northern areas in the Ohio Valley, Michigan and Pennsylvania it is typically collected in large streams with strong current and rocky riffles (Taylor 1969, Smith 1979).

Trautman (1981) suggests there is little competition between Northern Madtom and Brindled Madtom in streams they co-occupy because of different preferred habitat. Brindled Madtom live in pools below sluggish riffles in lowland streams with some current and in lakes over a soft bottom (Taylor 1969). Collections of Brindled Madtom from southwestern Ontario in the 1970s were from shallow lake environments and sluggish streams (McAllister et al. 1985). In contrast, in their discussion of the habitat of Brindled Madtom in Canada, Scott and Crossman (1973) described it as atypical of the species.

Specimens were taken from fast-flowing streams with gravel bottoms, habitat more commonly characteristic of Northern Madtom.

The single location in Canada where Northern Madtom has been collected is not consistent with its habitat profile. In the Lake St. Clair location of capture, the specimen was taken in a trawl which suggests it was collected in deep lake water, habitat not associated with either Northern Madtom or Brindled Madtom.

General Biology

Reproductive Capability

Nothing is known about the reproductive capability of Northern Madtom in Canada. Taylor (1969) gives details of spawning in Michigan, where Northern Madtom spawn a little earlier than Brindled Madtom. Egg masses were found in gravel under stones or in open mouthed cans. Therefore, it is likely that any small cavity serves as a nest. Egg masses were found to contain from 61 to 141 eggs. Species of *Noturus* lay comparatively few eggs probably as a result of small body and large egg size.

Breeding Northern Madtom males have distinctive broadening and flattening of the head, swelling of lips, cheeks, back of head and predorsal region, and a general diffusion of body pigments. As with other madtom species, males guard fertilized eggs and developing young probably remain with them until the yolk sac is absorbed. All are probably solitary nighttime spawners.

Time of spawning probably occurs in middle or late summer, in the north for madtom species. Egg masses were collected in middle and late July in Michigan.

In Ohio, young-of-the-year measured 25 to 58 mm (1.0 to 2.3 inches) in October; 36 to 64 mm (1.4 to 2.5 inches) at one year; and adults were usually 56 to 97 mm (2.2 to 3.8 inches). The largest specimen was 130 mm (5.2 inches) long (Trautman 1981).

Behaviour/Adaptability

Little is known about this rare, secretive fish but its food habits are presumably similar to other related *Noturus* species. No stomach contents have been examined but small insects and invertebrates are probably included in its diet (Cooper 1983) and feeding likely takes place at night.

There are no reported parasites for the Northern Madtom but it could be comparatively free of parasites as is the Brindled Madtom (Hoffman 1967).

The degree of tolerance to human disturbance is unknown for Northern Madtom.

Limiting Factors

It is difficult to speculate what factors are limiting the distribution of Northern Madtom in Canada, based on the single specimen captured.

Apparently the distribution is primarily limited by temperature at the far northern fringe of its North American range where it is naturally rare. Low population numbers and sporadic populations suggest that the species has very specific ecological requirements and it is probably intolerant of habitat degradation.

Special Significance of the Species

Madtoms, genus *Noturus*, are small, secretive fish about which little is known. Many species such as the Northern Madtom have only recently been recognized as distinct species and there exists a fair amount of confusion with identification. The only species in Canada with which the Northern Madtom, *Noturus stigmosus* could be confused is the Brindled Madtom, *Noturus miurus*. Brindled Madtom populations are in jeopardy and the species has been assigned a vulnerable status in Canada (Campbell 1988).

Noturus stigmosus is of interest because, like other madtoms, it is one of a few freshwater species that can inflict a painful, but not dangerous wound from the pectoral spines and associated poison gland (Taylor 1969).

Northern Madtom are of no direct economic importance. However, all

species should be valued with regard for the protection of the biodiversity of native ecosystems.

Evaluation

Southwestern Ontario is at the extreme northern fringe of the range of Northern Madtom and this species is naturally rare throughout its North American range. The single capture record provides inconclusive evidence that an indigenous population ever existed in Canada or if it has now been extirpated.

At present there is insufficient scientific evidence for an evaluation of the status of *Noturus stigmosus* in Canada. The possibility that the species has been extirpated or that a remnant population still exists cannot be completely discounted and therefore the status of the Northern Madtom should be re-examined if any further specimens are reported from Canada.

Acknowledgements

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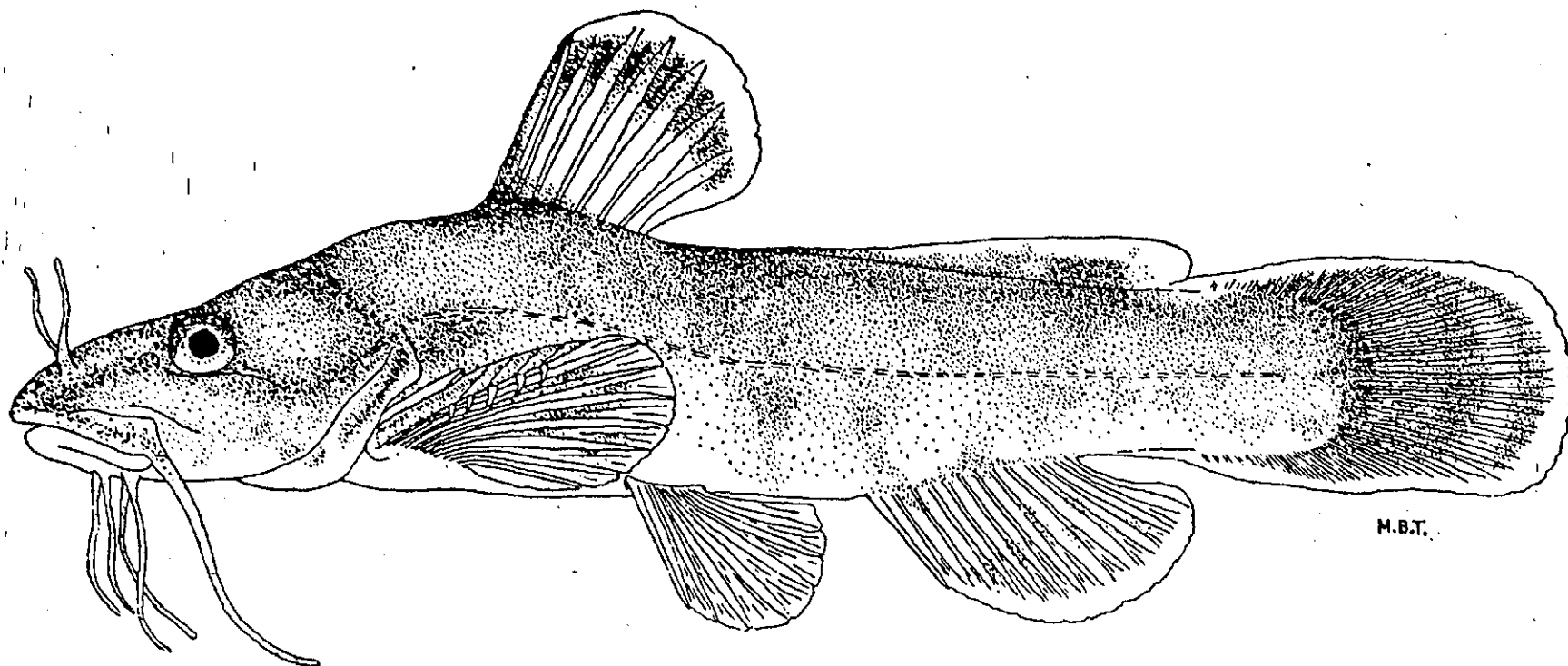


Figure 1. Drawing of the Northern Madtom, *Noturus stigmosus*, [from Trautman (1981) Fishes of Ohio; by permission].

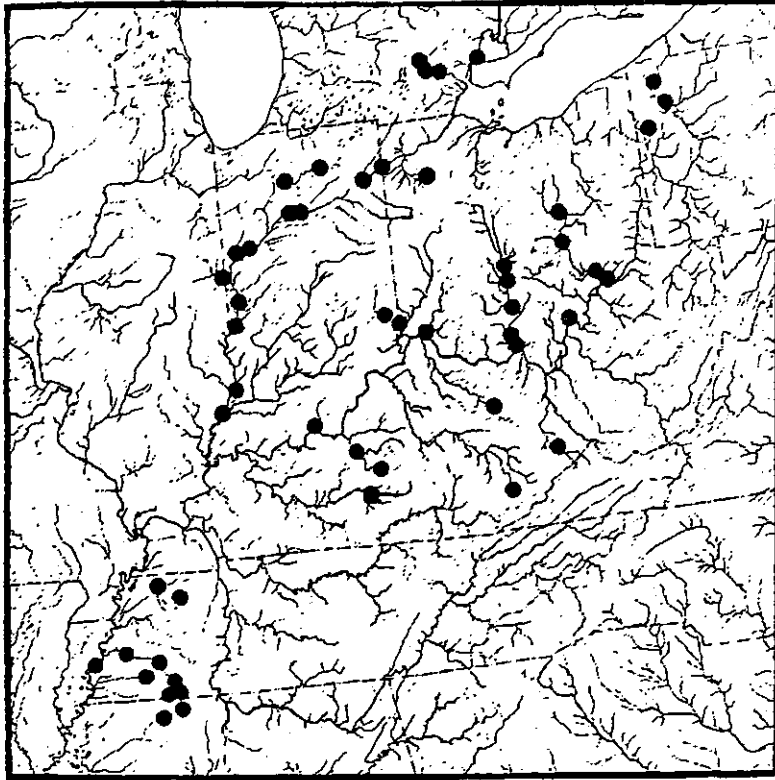


Figure 2. North American distribution of the Northern Madtom, *Noturus stigmosus*, from Rohde (1980).

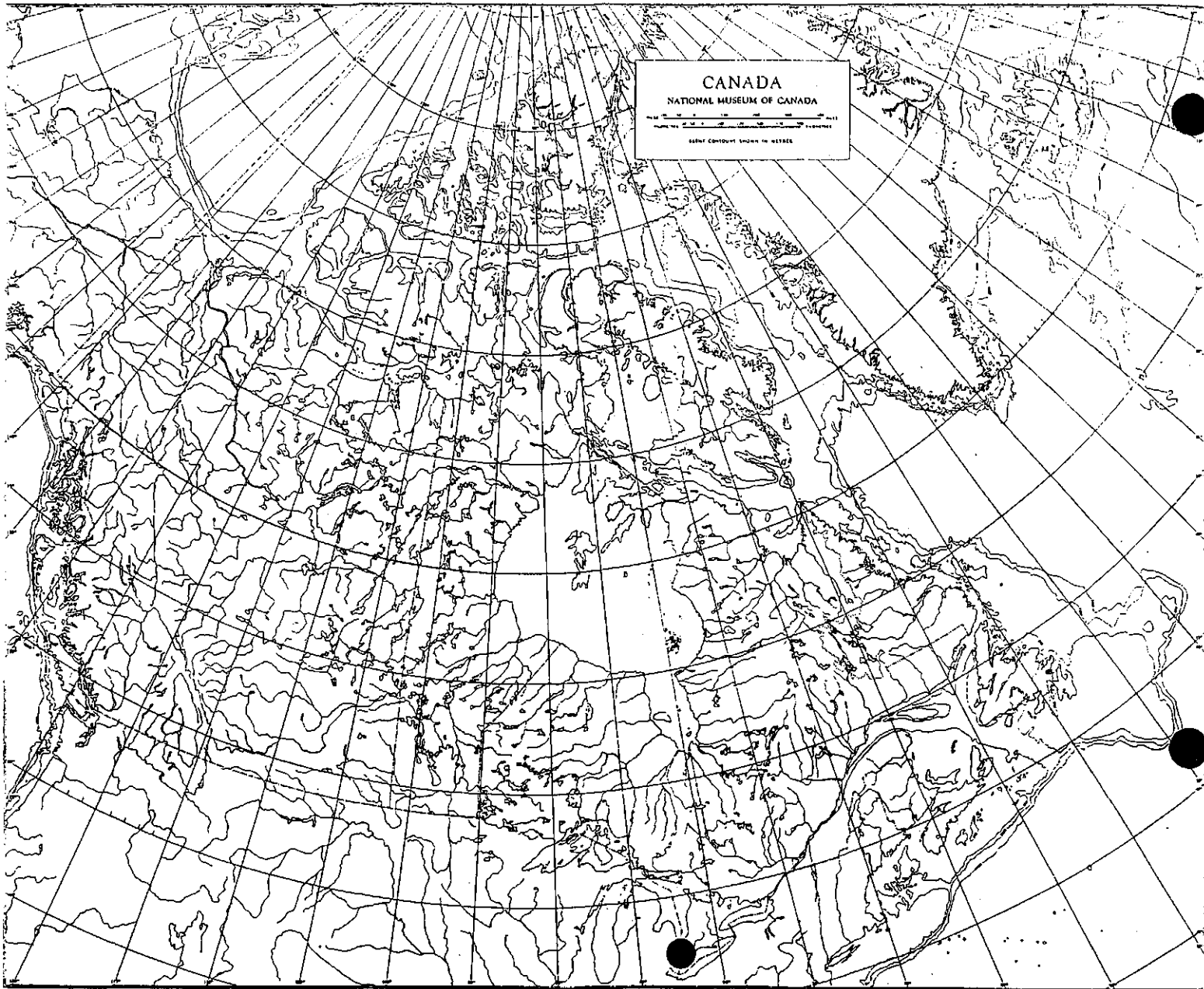


Figure 3. Distribution of the Northern Madtom, *Noturus stigmosus*, in Canada.

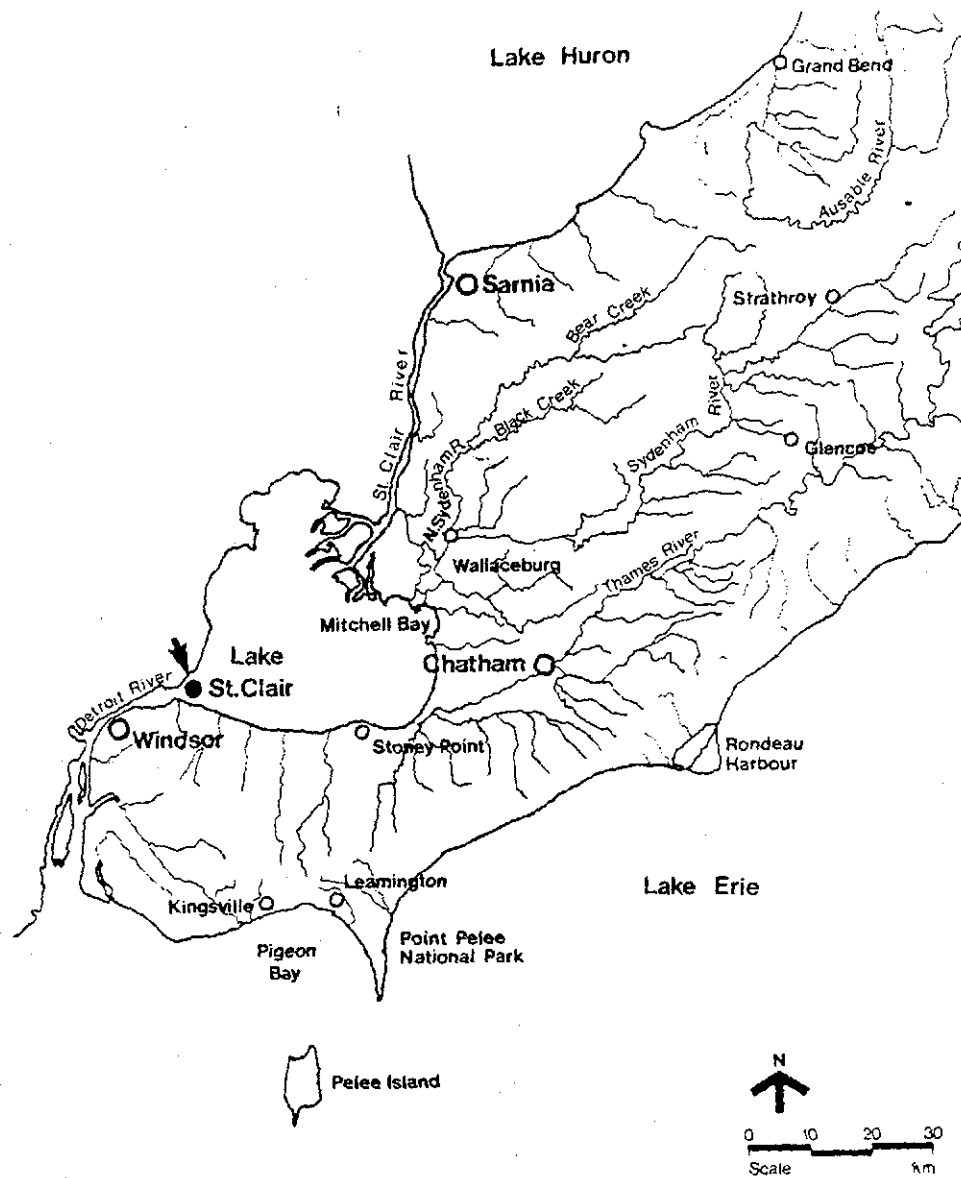


Figure 4. Location of capture of the Northern Madtom, *Noturus stigmosus* in southwestern Ontario, Canada.