Committee on the Status of Endangered Wildlife in Canada

Comité sur le statut des espèces menacées de disparition au Canada

Ottawa, Ont. K1A 0H3
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STATUS REPORT ON THE FLATHEAD CATFISH *PYLODICTIS OLIVARIS* IN CANADA

BY

CHERYL D. GOODCHILD

STATUS ASSIGNED IN 1993
REPORT ACCEPTED, INSUFFICIENT SCIENTIFIC INFORMATION AVAILABLE ON WHICH TO BASE A STATUS DESIGNATION

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Committee on the Status of Endangered Wildlife in Canada

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STATUS REPORT ON THE FLATHEAD CATFISH *PYLODICTIS OLIVARIS* IN CANADA

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Status of the Flathead Catfish, *Pylodictis olivaris*, In Canada

CHERYL D. GOODCHILD

2168 Harcourt Crescent, Mississauga, Ontario L4Y 1W1

Goodchild, Cheryl D. 1992. Status of the Flathead Catfish, *Pylodictis olivaris*, in Canada. Committee on the Status of Endangered Wildlfie in Canada (COSEWIC). Canadian Wildlife Service, Ottawa, Ontario.

The Flathead Catfish, *Pylodictis olivaris*, is a large catfish only recently discovered in Canada. There have been only two reported captures both from Ontario; from Lake Erie in 1978 and the Thames River in 1989. Data are insufficient to determine if breeding populations exist in Canada or if its occurrence resulted from accidental introductions. Alternately, Flathead Catfish may be dispersing into southwestern Ontario due to more favourable climatic conditions. There is insufficient scientific information for assignment of COSEWIC status to this species.

La barbue à tête plate, Pylodictis olivaris, *est un gros siluridé signalé récemment au Canada. Seules deux captures ont été enregistrées en Ontario; une dans le lac Érié en 1978 et l'autre dans la rivière Thames en 1989. Il n'y a aucune preuve de présence de populations de reproducteurs au Canada ou si sa présence est le resultat d'une introdution accidentelle. On croit que la barbue à tête plate pourrait envahir les eaux canadiennes en période de réchauffement des températures. Il n'y a pas assez des informations scientifique pour assigner un statut de CSEMDC à cette espèce.*

Key words: Ictaluridae, *Pylodictis olivaris*, Flathead Catfish, *barbue à tête plate*, rare and endangered fishes

The Flathead Catfish, *Pylodictis olivaris* (Rafinesque 1819), family Ictaluridae (Figure 1), is a relatively large catfish, first reported from Canadian waters in 1978 (Crossman and Leach 1979). This species is the only member of the monotypic genus *Pylodictis*, and is readily distinguished from other large catfish species, although small fish may resemble some of the madtoms that occur in the same habitats. According to Smith (1979), there is considerable individual variation but little geographic variation in Flathead Catfish. Its recent discovery in Canada, limited distribution, and apparent rarity make this a species of interest to COSEWIC and this report was prepared to summarize the status of the species for that organization.

Description

Flathead Catfish can be distinguished from other ictalurids by the notable flattening of the head between the eyes, the longer projecting lower jaw, adipose fin large and separate from caudal forming free flaplike lobe, relatively short anal fins with 14 to 17 rays, squarish caudal fin, elongate backward extensions on the premaxillary band of teeth, 50 to 51 vertebrae; saw edged pelvic spine and 9 pelvic fin rays.

Although colour is variable with size and habitat, it can usually be described as light brown to yellow mottled with dark brown or black. Mottling tends to disappear in larger adult specimens. The belly is yellowish to cream coloured and the caudal fin is darkly pigmented except for a distinct white patch along the dorsal border that evidently disappears with age. Other fins are similar in colour to adjacent parts of the body. Cross (1967) described specimens from clear water as the most darkly pigmented and those from muddy water as pale.

Sexual dimorphism is more pronounced in adults during the spawning season. Males have a single urogenital opening behind the anus unlike females which have two separate urinary and genital openings (Becker 1983).

Adult Flathead Catfish commonly attain up to one metre in length. The largest reported specimen from the Ohio River was 1350 mm long and weighed

37.2 kg (Trautman 1981). Most adults, however, are in the range of 356 to 1140 mm in length and 0.5 to 20.4 kg in weight.

Distribution

North America

The distribution (Figure 2) of *Pylodictis olivaris* includes the large rivers of the Mississippi, Missouri, Ohio and Gulf coast drainages. It is absent from Atlantic coastal streams (Glodek 1980; Cooper 1983).

Its range extends from North and South Dakota, through Iowa, Wisconsin and Illinois, Michigan tributaries of Lake Michigan, Ohio (rare in Lake Erie), and western Pennsylvania, south in the Mississippi Valley (West Virginia, Tennessee) to the Gulf slope of Alabama, through to northeast Mexico, north through Texas, Oklahoma (Arkansas River), to Kansas (Hubbs and Lagler 1967; Becker 1983).

A 'relict' colony has been recorded in the Ohio waters of Lake Erie since 1892 but only four specimens have been collected and preserved from the United States waters of the lake since 1938 (Cleveland Museum collection and Ohio State University Museum; OSUM 1866, 6664, 8467). A small population of Flathead Catfish also exists in the Huron River where they are taken yearly (Trautman 1981).

The Flathead Catfish has been sparingly introduced outside its native range. Cahn (1927) reports unsuccessful introductions of *Pylodictis olivaris* from the Mississippi River into Oconomowoc and Nagawicka lakes, in Wisconsin. Introductions into the Colorado River, Arizona, in 1962, however, appear to have been successful. As a result of the Arizona stocking, it is now established in the Highland Canal, Imperial County, California (Bottroff et al. 1969).

Canada

Pylodictis olivaris was unknown from Canadian waters until 1978 when it was captured in a commercial trapnet in Lake Erie, west of Point Pelee (Royal

Ontario Museum, Toronto; ROM 34561). This constituted a range extension of 30 km north of previous records (Figures 3,4), although Flathead Catfish are caught occasionally in the United States portion of Lake Erie (Crossman and Leach 1979).

Since that time, only one other specimen has been found in Canada. In the summer of 1989, a Flathead Catfish was caught by a commercial longline in the Thames River (Figure 4), 3.2 km (2 miles) from the mouth (ROM 57057). This again is a considerable range extension of this species in Canada.

The shallow waters of western Lake Erie and Lake St. Clair have contributed to most of the records of freshwater fishes that have moved north into Canadian waters in the past 25 years (Crossman and Leach 1979). Temperature is believed to limit the geographic distribution of many freshwater fishes. An increase in temperature that would occur during a period of climatic warming, would result in a northward shift in the boundaries of species' ranges, altering fish communities in the Great Lakes area. Based on several ecological characteristics, Flathead Catfish were judged to have the potential to further invade the Great Lakes basin during a warming trend (Mandrak 1989).

If Flathead Catfish are becoming established in southwestern Ontario, they probably dispersed northward through Lake Erie or around the western periphery of Lake Erie from the Huron River, Ohio. The Huron River is due south of Point Pelee. Subsequently Flathead Catfish may have moved through western Lake Erie to the Detroit River, through Lake St. Clair and the Thames River.

Despite the intensive commercial fishery in that area, it is also possible that a small population similar to that found in southern Lake Erie has been established in the Point Pelee area but was not previously reported.

Protection

No specific protection exists for Flathead Catfish in Canada except that generally provided by the Fish Habitat Sections of the federal Fisheries Act.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) indicated that the status of Flathead Catfish in Ontario was questionable (Campbell 1988, 1989, 1990).

In the United States, the Flathead Catfish is listed as rare in North Dakota and Michigan by Miller (1972) and of special concern in North Dakota by Johnson (1987). Throughout its overall range in the United States, it is not considered in any jeopardy (Deacon et al. 1979; Williams et al. 1989).

Population Sizes and Trends

No population estimates have been made for Flathead Catfish in Canada. Over much of its range in the United States, however, populations are stable with no apparent reduction in numbers. Although considered rare in North Dakota and Michigan, in other areas there is an indication that populations may be expanding slightly. Harlan and Speaker (1956) reported a noteworthy increase of populations in Iowa especially those from the Iowa and Des Moines Rivers. Also, in Missouri and Alabama, Flathead Catfish are common large rivers. They are amoung the most abundant of the larger catfishes in the Missouri and Mississippi Rivers (Smith-Vaniz 1968; Pflieger 1975). Populations of Flathead Catfish may be stable in Illinois, and are probably more prevalent than distribution records would indicate (Smith 1979). Although Flathead Catfish are common in rivers of eastern Kansas, it is scarce in the western part of the state. Cross (1967) hypothesized that occurrence may vary in relation to weather cycles and stream levels. Throughout various localities in Wisconsin, Flathead Catfish are considered rare to common. Large Flathead Catfish are reported yearly from the Lake Michigan basin but represent less than one percent of the total catch of all species (Becker 1983). Commercial fishermen believe that population numbers are declining in the Mississippi River, probably a result of over exploitation (Becker 1983).

Populations in the Muskingum River, Ohio appear to have remained constant from 1955 to 1980. However, there has been a drastic decrease in the number of Flathead Catfish in the Scioto River, Ohio, associated with a major

increase in pollution since 1950. Yet, in the Lake Erie drainage, a small population has tenaciously remained in the Huron River, Ohio, despite severe pollution. Fishermen continue to catch a few individuals each year (Trautman 1981).

Habitat

Pylodictis olivaris is found in a variety of habitats. Flathead Catfish avoid rivers with high gradients or intermittent flow (Pflieger 1975). During the day, adults usually occupy deep pools with submerged cover in low-gradient portions of streams. When the Flathead Catfish is forced to inhabit extremely turbid streams, it is usually found over hard bottoms or where silt deposition is very low and where water is deeper than 15 m (Trautman 1981). In Kansas, Flathead Catfish are abundant in some turbid lakes as well as rivers, indicating an ability to reproduce under diverse habitat conditions (Cross 1967). Although dams and reservoirs are thought to be detrimental by some (Cooper 1983), others have suggested that the deep pools created by swirling current in front of small dams or bridge-supports are favoured locations (Harlan and Speaker 1956; Cross 1967).

Adult Flathead Catfish greater than 400 mm (16 inches) move in a nocturnal cyclic pattern to shallow riffles (depth often less than 1.5 m) to feed. They have been observed feeding at night in water so shallow that their dorsal fins were viewed above the water (Trautman 1981).

In contrast, young Flathead Catfish remain in riffle areas until they attain approximately 100 mm (four inches) in length (Cooper 1983). For example, in a study of habitat partitioning by stream larval fishes, Floyd et al. (1984) captured juvenile *Pylodictis olivaris* at only one station, described as a riffle-chute area, 50 cm deep, with gravel-rubble substrate.

Gradients recorded from two sites on the East River, West Virginia, where Flathead Catfish were collected were two of the lowest recorded in the stream (3.8 m/km and 1.9 m/km) compared to an average stream gradient of 8.56 m/km (Stauffer et al. 1975).

The optimum temperature range preferred by Flathead Catfish is 31.5 to 33.5°C (Becker 1983). Density of Flathead Catfish populations and year class strength increases where heated effluent are released into streams. Floyd et al. (1984) reported increased numbers of Flathead Catfish when water temperature increased accompanied by a decrease in stream flow.

General Biology

Reproductive Capability

In the United States, Flathead Catfish normally attain sexual maturity by three to six years of age but size at maturity may vary considerably. Minckley and Deacon (1959) suggest that maturity may be evident morphologically by the loss of the light patch at the tip of the upper lobe of the caudal fin. Males apparently reach maturity earlier and at smaller size; in three to five years at a length of from 375 to 470 mm (15 to 18 inches) total length (TL). Females attained maturity in four to six years at a length of 470 to 500 mm (18 to 20 inches) TL (Minckley and Deacon 1959). Data from Perry and Carver (1977) are similar except they found only five out of 15 females between 490 to 539 mm TL were mature.

Minckley and Deacon (1959) determined a 1:1 sex ratio for Flathead Catfish. Each breeding pair probably spawns only once per year (Cross 1967) and there is evidence that not all mature individuals spawn every year. In Oklahoma, Summerfelt and Turner (1971) estimated that 45% of sexually mature females probably did not spawn and eggs were resorbed.

Spawning occurs in June and July throughout the range of the Flathead Catfish. Cooper (1983) noted that Flathead Catfish spawned somewhat later than Channel Catfish, *Ictalurus punctatus*. Water temperatures of 22.2 to 23.9°C were recorded in Wisconsin during spawning (Becker 1983).

Pairs construct nests in depressions or natural cavities similar to those used by Channel Catfish (Cross 1967; Cooper 1983). Nest construction has been observed in the Dallas Aquarium and the Shedd Aquarium, Chicago. In both instances, the spawning pair used their tails and mouths to prepare a

large (1.5 m) hollow in the sand down to bare gravel and rock (Breder and Rosen 1966).

During spawning the male swims with the female gently rubbing his belly on her back and sides and bringing his barbels into play. Each breeding pair comes to rest on the bottom, the caudal peduncle and caudal fin of the male encircling the female. The female expels the eggs in batches that are then fertilized by the male.

Both males and females actively participate in nest building but after the eggs are laid and fertilized, the male provides parental care of the eggs and larvae. In observations made at the Dallas Aquarium, the male became intensely aggressive toward the female (Breder and Rosen 1966). Observations in Texas hatchery ponds indicate that while guarding eggs, males killed several spent females (Becker 1983).

The number of eggs laid by female Flathead Catfish is directly correlated with body size. An egg mass deposited in the Shedd Aquarium by a large female contained an estimated 100 000 eggs. Females weighing between 1.05 to 11.66 kg contained between 4076 to 31 579 eggs (Becker 1983). In another study of Flathead Catfish, the mean number of eggs per fish was calculated to be 13 250 (Summerville and Crawley 1970). Ripe eggs average 2.8 to 3.7 mm in diameter and eggs hatch in six to seven days at temperatures of 23.9 to 27.8°C (Minckley and Deacon 1959).

Once the young leave the nest they are found in shallow riffles beneath stones or other cover (Cross 1967). An estimated 162 000 larval Flathead Catfish ranging in size from 18 mm and 21 mm were collected in August from the New River North Carolina (Potter et al. 1978).

Growth of Flathead Catfish is rapid. Young may reach a length of 50 to 150 mm (2 to 6 inches) in the first year with substantial gains each following year. Adults can grow to an immense size, specimens up to 45 kg (100 lb) have been reported, and may live 20 years or more (Harlan and Speaker 1956). In Missouri, only the Blue Catfish, *Ictalurus furcatus* attains a greater size (Pflieger 1975).

Species Movement

Tagging studies indicate that Flathead Catfish tend to remain in one area. The following summarizes data gathered during tagging studies by Funk (1957): nearly half of the tagged Flathead Catfish were recaptured less than 1.6 km (1 mi) from point of initial capture, nearly all within 40 km (25 mi), and no fish were recovered more than 80 km (50 mi) from the point of release. Scott (1951) also found a high incidence of local recapture during population studies of tagged fish.

Ultrasonic transmitter studies of movements also confirmed a strong tendency for Flathead Catfish to return to the point of capture (Becker 1983). Two out of three fish implanted with transmitters and displaced between 1.3 to 2.7 km returned to their site of capture. There is some indication, however, that portions of larger populations are mobile. These transient fish may be wandering to find suitable prey. Large Flathead Catfish have been collected in open water, over sandbars in uncharacteristic areas that were apparently unsuitable (Minckley and Deacon 1959).

Behaviour/Adaptability

Both juvenile and adult Flathead Catfish are active and feed primarily at night. Collections made during the night with an electric fish shocker obtained greater numbers of Flathead Catfish that presumably resulted from greater nocturnal activity (Minckley and Deacon 1959).

Minckley and Deacon (1959) discuss food and feeding habits of Flathead Catfish in considerable detail. There is a change in preferred dietary items as the species grows. Young-of-the-year Flathead Catfish feed almost entirely on aquatic insects. Juveniles include crayfish and some fishes in their diet while adults are largely piscivorous. In Flathead Catfish measuring more than 250 mm, fishes occurred in 90% of stomachs examined, comprising 70% of the estimated volume. In Wisconsin, large Channel Catfish and Northern Pike, *Esox lucius* have been taken from stomachs of large Flathead Catfish (Becker 1983).

Hoffman (1967) lists the following parasites from *Pylodictis olivaris*: Protozoa, Trematoda, Cestoda, Nematoda, Acanthocephala, Leeches. Over half of the specimens of Flathead Catfish examined for parasites by Minckley and Deacon (1959) contained cestodes and only three specimens contained nematodes. The Flathead Catfish is reportedly host to the glochidia of several freshwater mussels (Becker 1983).

Adult Flathead Catfish are not particularly vulnerable to predators because of their size and secretive habits, however, juvenile survival may be extremely low. Becker (1983) reports that only 0 to 1.5 % of fingerlings stocked in ponds with other fish species survived and mortality was very high in ponds where large numbers of crayfish were present.

Limiting Factors

Water pollution may be one of the primary limiting factors for Flathead Catfish populations. Trautman (1981) correlates the drastic decline of populations in Ohio with concurrent increases in pollution. The effect of pollution may be in severely limiting the amount of available prey. The Lake St. Clair area of Ontario has been identified as one of the most obviously polluted water bodies in the Great Lakes region (Great lakes Water Quality Board 1985).

Despite high fecundity, juvenile survival is very low limiting Flathead Catfish populations. Proportionally far fewer Flathead Catfish are caught by fishermen than other available species. Attempts to artificially propagate Flathead Catfish have been largely unsuccessful as a result of poor pond survival of fingerlings (Cross 1969; Becker 1983).

Flathead Catfish have a low tolerance for fluctuating water levels and they are usually absent from intermittent streams (Minckley and Deacon 1959). In addition, high gradient streams likely present barriers to the distribution of Flathead Catfish because they are commonly found only in low gradient portions of streams.

Low water temperatures may be the primary limiting factor preventing

further distribution of Flathead Catfish into northern Canadian waters. Therefore, the current warming trend may encourage dispersal further north and more captures may be made in Ontario.

Special Significance

In warm water environments, *Pylodictis olivaris* is a commercial species although not one of the most economically rewarding due to its low capture ratio. For instance, in commercial fishery statistics for the Mississippi River, the ratio of Flathead Catfish to Channel Catfish is 1:49 (Becker 1983). Flathead Catfish are difficult to capture using conventional techniques, however, specimens from Canada were caught in a commercial trapnet and by a commercial longline.

In some areas in the United States, Flathead Catfish is valued as a game species due to its large size and reportedly fine flavour. Some sports fishermen specialize in catching it by setline or bank pole, using live or freshly killed bait.

In Canada, the presence of *Pylodictis olivaris* may be indicative of the general trend toward species invading due to more favourable climatic conditions.

Evaluation

Only two specimens of *Pylodictis olivaris* have been reported from Ontario. There are insufficient data to determine if breeding populations of Flathead Catfish exist in Ontario, or if its occurrence resulted from accidental introductions or strays. It is also conceivable that Flathead Catfish are currently dispersing into southwestern Ontario from Lake Erie and the Huron River, in the United States. The possibility that it has been here all along but avoided capture or was misidentified, likely as Channel Catfish also exists. For instance, very few individuals have been collected from the small populations in the United States portion of Lake Erie and in the Huron River, yet these populations have been known for a long time. If one assumes

that museum specimens represent a minimum of 1% of those occurring in the wild, then at least a hundred Flathead Catfish may have occurred in Ontario in the past few years and it is possible that some spawned successfully (D. E. McAllister, Canadian Museum of Nature, Ottawa, Ontario; personal communication).

There is insufficient scientific information to determine if the Flathead Catfish fits into any COSEWIC designation based on present knowledge. The possibility that a small, viable population exists cannot be completely ignored. Therefore if any additional specimens are reported from Canada, the status of *Pylodictis olivaris* should be re-examined.

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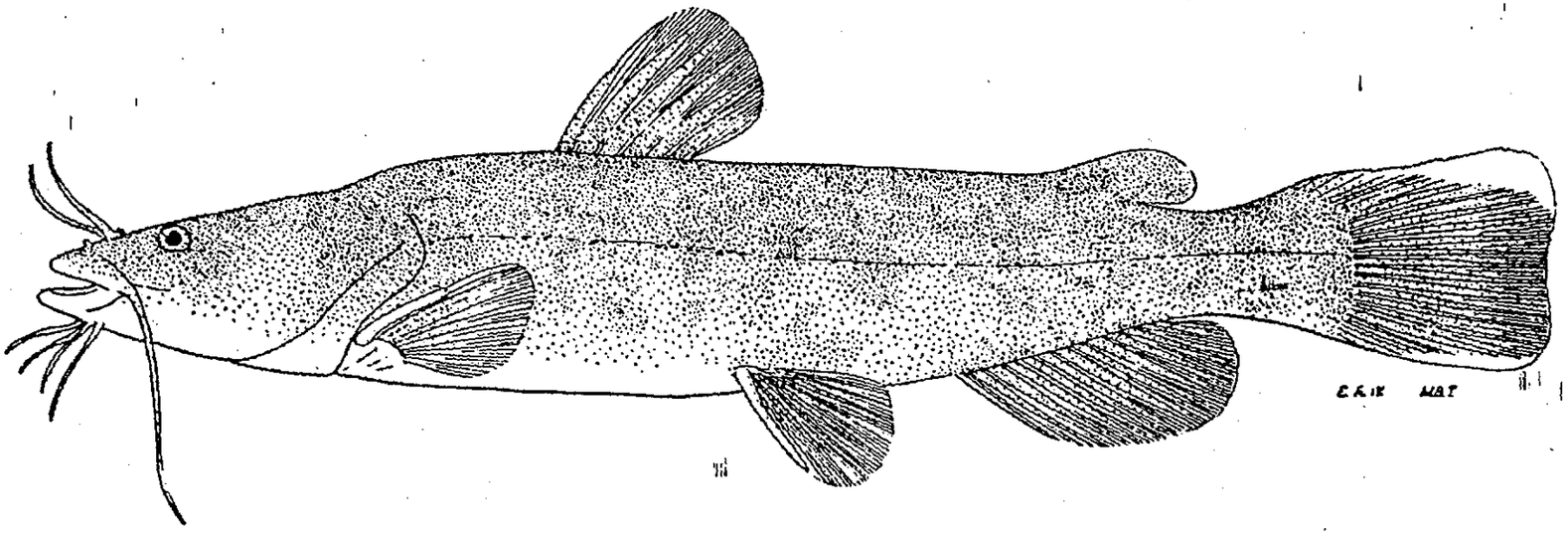

Figure 1. Drawing of the Flathead Catfish, Pylodictis olivaris. [from Trautman (1981) Fishes of Ohio; by permission].

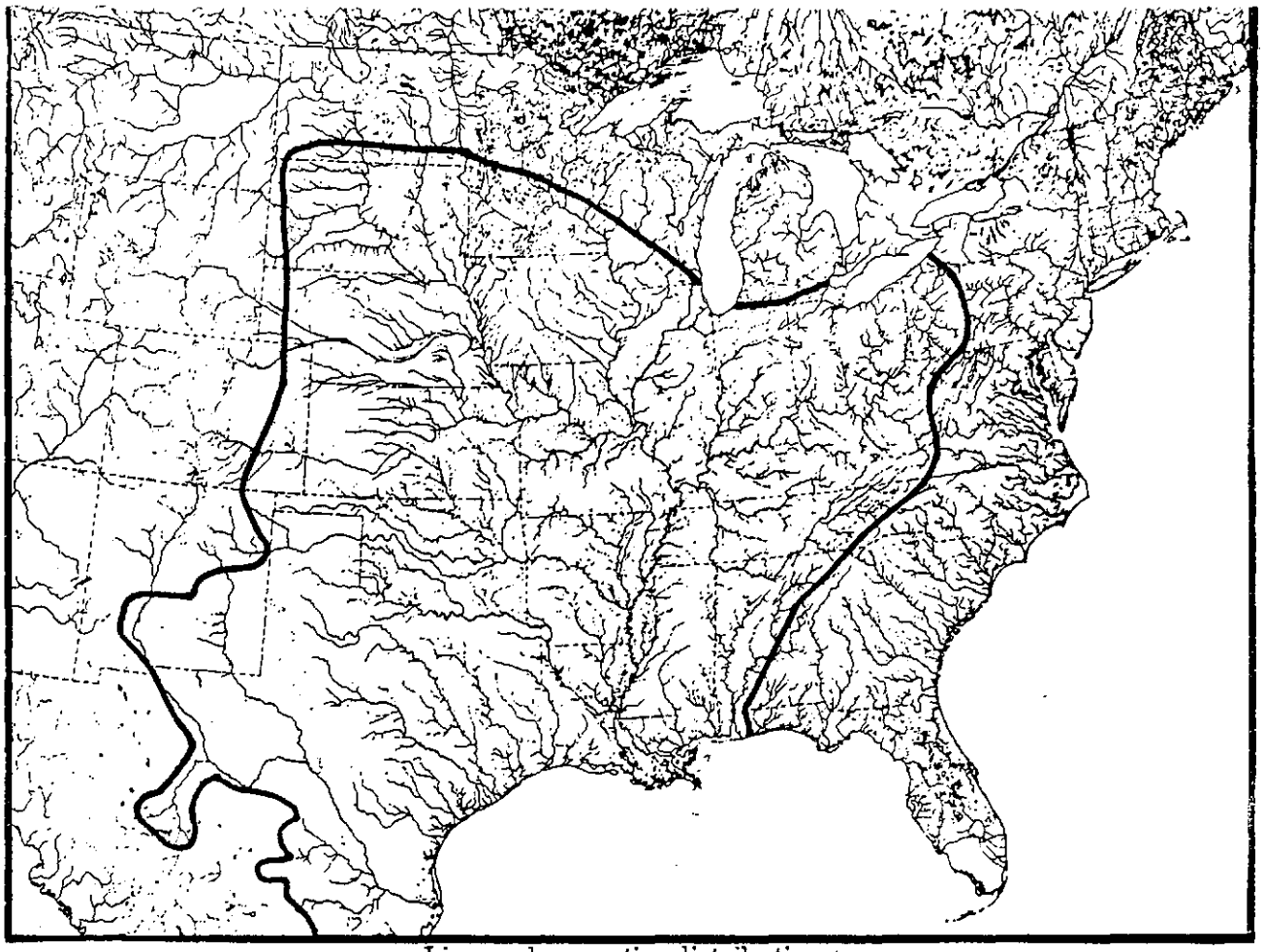

Figure 2. North American distribution of the Flathead Catfish, *Pylodictis olivaris*, from Glodek (1980).

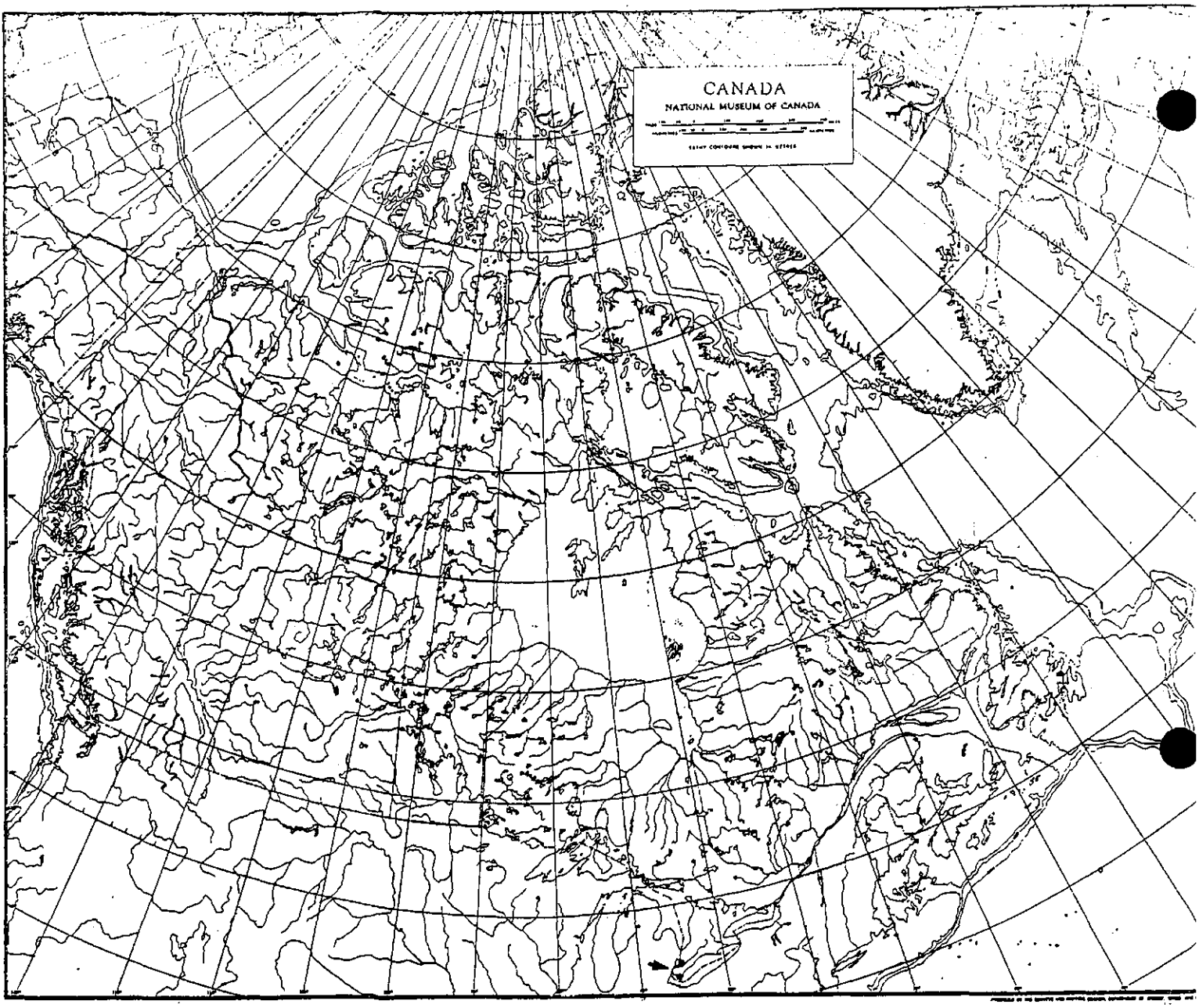

Figure 3. Canadian distribution of the Flathead Catfish, *Pylodictis olivaris*.

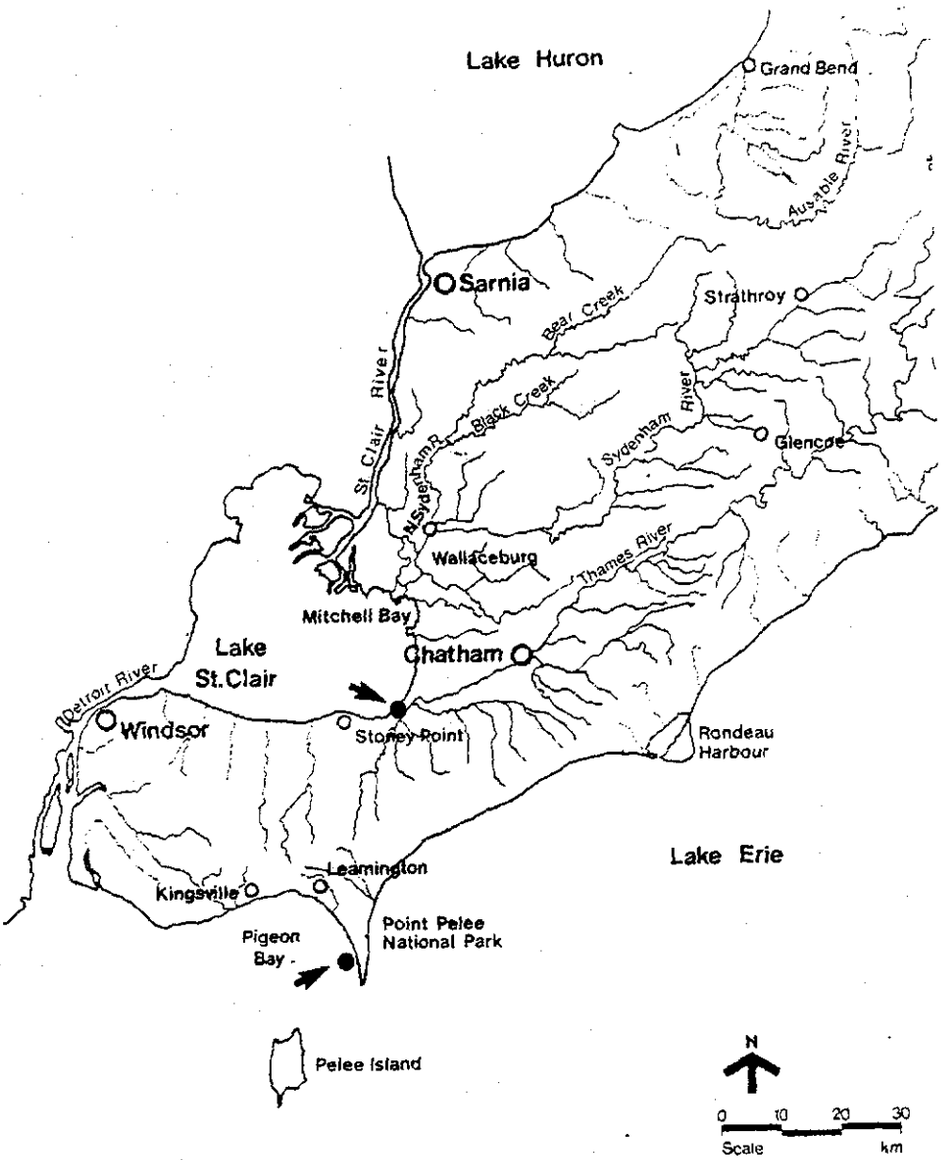

Figure 4. Location of capture of Flathead Catfish, *Pylodictis olivaris* in southwestern Ontario, Canada.