# The invasion of the central mudminnow (*Umbra limi*) into the Otsego Lake Watershed

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## ABSTRACT

This study was conducted to determine how the central mudminnow became established in the watershed of Otsego Lake, which serves as the headwaters of the upper Susquehanna River. An electrofishing survey was conducted in the northern Otsego lake watershed and the adjacent Canadarago Lake watershed to determine the distribution and abundance of the central mudminnow. The central mudminnow was located only in Weaver and Young's Lakes and their tributaries and was not found in the adjacent watersheds of Canadarago Lake. This study indicates that the central mudminnow was probably introduced into Weaver or Young's lake by fisherman and are expanding their range into adjacent streams and lakes.

## INTRODUCTION

In eastern North American there are two species of mudminnow: the eastern mudminnow (*Umbra pygmaea*) and the central mudminnow (*Umbra limi*). The eastern mudminnow has a natural distribution in the Atlantic coast drainage, east of the Appalachians, while the natural distribution of the central mudminnow was confined to the Mississippi and Great Lakes drainage.

Through the past five decades, the central mudminnow has expanded its range eastward along the Erie Canal into the Atlantic coast drainage of the Mohawk–Hudson watershed (Smith 1985). More recently, the central mudminnow has spread from the Mohawk watershed into the Susquehanna watershed via the Old Chenango Canal. In 1979 the central mudminnow was first captured in the Susquehanna watershed, three miles east of Morrisville in a stream connected to the Old Chenango Canal (O'Connor 1996). In 1996 the second capture of the central mudminnow in the Susquehanna watershed occurred in Cripple Creek, in the northern watershed of Otsego Lake (O'Connor 1996).

While the northern watershed of Otsego Lake is adjacent to the Mohawk River watershed, there is no connection between the two. The purpose of this study is to survey the northern Otsego Lake watershed and the adjacent Susquehanna watershed of Canadarago Lake to determine the invasion route of the central mudminnow.

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## MATERIALS & METHODS

Sample sites were located in the northern watershed of Otsego Lake and Canadarago Lake (Figure 1). Surveys focused on typical mudminnow habitats of sluggish water with dense vegetation and debris (Hasse 1992). Sampling occurred in November 2003 (sites A, C and D) and in April 2004. A Smith- Root Backpack electroshocker was used to sample for 500 seconds at each location. Fish were captured in scap nets, placed in five gallon buckets, identified, and counted before being returned to the sample site. Sampling was started down-stream and proceeded upstream.

## RESULTS

Besides the original Cripple Creek location (O'Connor 1996), we found central mudminnows in four new locations (Table 1 and Figure 1). All four of the new locations (upper and lower Route 131, Little Lake Road, and State Route 20) were connected to Weaver Lake in the town of Warren. No other streams sampled held mudminnows, although the stream habitat of where mudminnows were found and where they were absent was very similar.

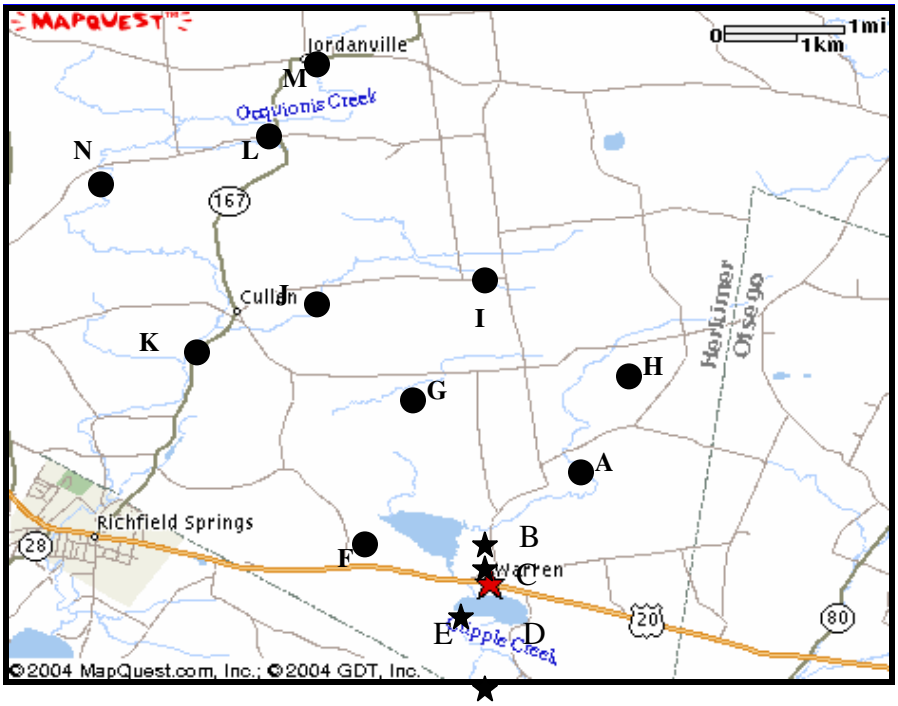


Figure 1. Sample sites showing the occurrence (stars) and absence (circles) of central mudminnows in the northern Otsego Lake and Canadargo Lake watershed.

Table 1. Sample locations and fish fauna in the northern Otsego Lake and Canadargo Lake watershed. Alphabetic designations provide a key to Figure 1.

| Sample Site | | Central Mudminnows | Banded Killifish | Brook Stickleback | Blacknose Dace | Creek Chub | Fathead Minnow | White Sucker | Yellow Perch | Bluegill | Pumpkin -seed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Springer Road | **A** | | | 13 | 3 | | | | | | |
| Upper Rt. 131 | **B** | 36 | | 6 | | | | 2 | | | |
| Lower Rt. 131 | **C** | 6 | | | | | | | | | |
| Little Lake Rd | **D** | 1 | | | | | | | | | |
| Rt. 20 | **E** | 2 | | | | | | | 24 | 7 | 1 |
| Millstone Rd | **F** | | | | | | 10 | | | | |
| West Chyle Rd | **G** | | | | | | | | | | |
| East Chyle Rd | **H** | | | 299 | | 2 | 6 | | | | |
| West Earle Rd | **I** | | | | | | | | | | |
| East Earle Rd | **J** | | | | 38 | 24 | 35 | 2 | | | |
| Lower Rt. 167 | **K** | | | | 5 | | 12 | | | | |
| Upper Rt. 167 | **L** | | | | 4 | | 2 | 1 | | | |
| Jordanville Rd | **M** | | 5 | | 12 | 4 | | | | | |
| Kingdom Rd | **N** | | 2 | | 2 | 2 | 6 | | | | |

## DISCUSSION

Over the last fifty years the central mudminnow has become abundant in sections of the old Erie Canal and has expanded its range along the Mohawk River watershed from Fort Hunter to the Hudson, and then as far south along the Hudson River as Monroe Island (Smith 1985). Expansion of the central mudminnow into the Mohawk-Hudson and Susquehanna watersheds was certainly due to the construction of man-made canals (Smith 1985). However, the answer to the question of how the central mudminnow got into the Otsego Lake watershed is not so apparent.

The central mudminnow has two traits that assist its expansion in New York state: (1) mudminnows can breathe atmospheric oxygen, and thereby survive in poorly oxygenated water that often form seasonal wetland connections between different watersheds (Litvek 1993); (2) mudminnows are often used as bait because they can withstand low oxygen conditions and can tolerate drastic temperature changes and rough handling (Smith 1985).

Mudminnows can survive extreme conditions and thus would be expected to persist in any new waters they invade (Hasse 1992). If the central mudminnow moved into the Otsego Lake watershed from the Canadarago or Mohawk watersheds than this should be apparent from their distribution in adjacent waters. However, instead, this survey shows that the central mudminnow is isolated in waters connected to Weaver Lake and Young's Lake. This distribution suggests that the occurrence of the central mudminnow in the Otsego Lake watershed was due to bait bucket introductions into Weaver Lake and/or Young's Lake.

## ACKNOWLEDGEMENTS

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