



**THREE LAKES**  
ASSOCIATION

**Fish Shelter Project Handbook**

Leah Varga

TLA Research Associate

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### **Mission**

The Mission of the Three Lakes Association is to provide leadership to preserve, protect, and improve the environmental quality of the Elk River Chain of Lakes, especially Torch Lake, Clam Lake, and Lake Bellaire, for all generations.

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## Fish Shelter Project

The fish shelter project is a five-year program to deploy fish shelters in five lakes of the Elk River Chain of Lakes. These five lakes are Torch Lake, Clam Lake, Lake Bellaire, Intermediate Lake, and Elk Lake.

The project will introduce shelters at each of the 80 sites throughout these five lakes in about 15 to 20 feet of water. There are three shelter types, and each of the 80 sites will be comprised of the three designs. Written permission of the riparian property owners is required for the lakefront property in order for the shelters to be deployed at that site. There was also a Michigan DEQ permit submitted in early March of 2012, and was accepted and issued June 1, 2012.



\*Note: Map picturing the first 5 deployments, as of early August 2012

## Objectives & Goals

The main goal of this project is to improve the fishing in the five targeted lakes for all anglers. However the shelters do not only impact the game fish species. The shelters will provide habitat and protection for a great variety of species as well as life stages.

It has been well documented that organisms prefer habitat complexity, and these three shelter types provide increased complexity for the species in the lakes. The shelters, although not necessarily a nursery habitat, will still provide protection for the fish-food organisms and macro-invertebrates as well. Juvenile and adult fishes will find refuge in and around the three shelters, and the fishing will be improved in the lakes.

A more scientific objective of this project is to determine any conclusive trends from the collected data. The trends may or may not be influenced by several factors: the weather of the season, the shoreline of the particular site, the distance between the three shelters at the site, the type of lake, and the anthropogenic presence at or around the site.

The weather may impact the success of the shelters, whether day to day or between seasons. The shoreline will influence the shelters and the fishes inhabiting the shelters, in that a site near a more natural shoreline may have a greater success attracting and keeping fish. It is important to note the distance between the shelters at one site because as the shelters get closer to each other, the more they become one larger structure instead of three distinct structures. Concerning the type of lake, these five lakes are different in terms of the level of nutrients and therefore the abundance of life. Clam Lake is an example of a eutrophic lake, meaning there is a higher level of biological productivity. Torch Lake is a great example of an oligotrophic lake, meaning there is a low level of biological productivity. In the middle falls Lake Bellaire, termed a mesotrophic lake. Finally, looking at the trend of human activities at or around the shelters may also affect the data observed at the site. These include but are not limited to fishing, boating, and other recreational water activities.



Torch Lake (oligotrophic)



Clam Lake (eutrophic)

## Construction

Materials, as well as many willing and able volunteers:

Crate:

- About 30 boards (4 ft long, 4 to 6 in wide),  $\frac{3}{4}$  in thick rough-sawn boards
- 8 similar sized boards for the corners of each crate (total 38 boards per crate)
- Ample tree branches, brush, etc. to fill the crate
- Nails (2  $\frac{1}{2}$  in twisted)
- 200 to 225 lbs of field stones. Crates made with green lumber can weigh 150 to 160 lbs, and the volume of boards in each crate can displace about 290 lbs of water, which means that with 150 lbs of field stones the crate will be buoyant and not sink. Therefore, place 200 to 225 lbs of field stones in burlap bags in each crate
- Two burlap bags, used for importing coffee beans



Slab tree:

- Wooden pole about 2  $\frac{1}{2}$  in diameter, 5 ft in height, set in a poured concrete disk (inverted Weber grill cover), about 120 lbs concrete
- 8 to 10 slabs 5 ft long about 2 in thick with a 2  $\frac{1}{2}$  in hole in the center of the slab board
- Five dowels,  $\frac{1}{2}$  in diameter by 6 in long; inserting horizontally into holes in the vertical pole to space the slabs.



### Tree Stump:

- Tree diameters ranging from 8 in to 18 in
- Approximately 60 to 80 lbs of field stone in coffee-bean bags attached to each tree stump

\*Note: concerning all of the lumber required for these structures, it is preferred that the wood be as green as possible, meaning that it is fresh and not dried. This requires less weight in field stones since green lumber weighs more than dried lumber.



## Deployment

Necessary for a successful deployment required the three completed structures, a pontoon barge with a sizeable front deck for the structures, and a willing and able crew. For each deployment, the three structures were loaded onto the barge with the crew.

Before leaving the boat launch or dock, the crate was loaded with at least two bags of rocks, adding approximately 200 to 225 pounds. To insert the bags, two wood slats were removed and then replaced once the crate was properly weighted. The slab tree was next assembled on the barge, each slab being dropped on the trunk with the light colored side of the wood facing upwards. Finally, a bag of rocks, weighing approximately 60 to 80 pounds was tied to the stump.

Once the barge was fully loaded and ready to go, the crew headed out to the site. The sites were in approximately 15 to 20 feet of water, directly in front of the property that the owner gave permission for placement of the shelters. In some cases of deployment, a dual-buoy device was used – one buoy was large and served as the site marker, while the other was smaller and could be pulled under by the anchor, marking 15 feet of depth once the anchor settled on the bottom. This served to be more reliable and stationary than using a depth finder on a boat.

Once at the proper depth, the shelters were pushed off of the barge, with about 20 feet of distance between them. Assuming each structure sank quickly and was weighted properly, the deployment was a success! If a shelter floated once dropped into the water, the crew determined the most effective and efficient way of sinking the structure using the available resources and extra weight on the barge. The GPS coordinates of each site were recorded with as much precision and accuracy as possible following the deployment.

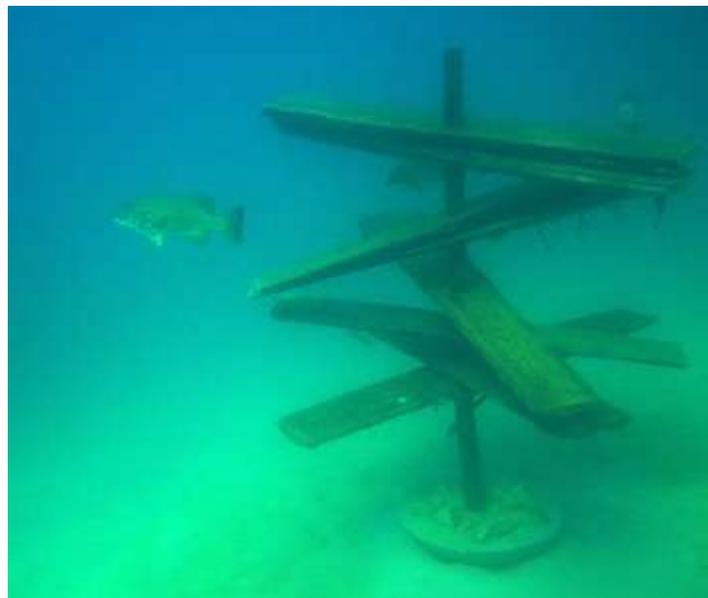


## Observations

As a certified diver, I was able to dive down at these sites in the various lakes and see the deployed shelters up close. Torch Lake was by far the easiest lake in which to make observations because of the increased visibility compared to the other lakes in this project. This is mainly due to Torch being an oligotrophic lake, as mentioned above.



The goal of each dive was to successfully locate each of the three shelters at the site, to make note of anything unexpected regarding either organisms or the shelters themselves, and to count and record the number and size of any fishes seen. The size ranges for the data compilation included: 0-6 inches, 6-12 inches, 12-18 inches, and 18+ inches. At the site, I would get in the water at least 20 feet from the shelters, approach the first of the line slowly, and circle each one counting fish and making notes of the site. I noted the distances between the shelters, the order of the shelters, and the quality of the shelters, specifically the stump that can be highly variable. All of these factors, although unknown at this time, may influence the success of the shelter attracting and sustaining fishes.



## Conclusions

The shelters are being colonized at a rapid rate. Within a week of being deployed there are several fish inhabiting all three of the structures. According to Pelletier's 1977 thesis with similar objectives, he observed colonization within three days. Our results are comparable to his. As the weeks progressed and the number of fish around the shelters increased, it became apparent that the smaller fish prefer to hide near the stump and in the brush of the crate, both of which provide greater protection for smaller organisms. The larger fish wander between the shelters, usually preferring the crate and the slab tree. When looking for hiding or protection, the larger fish prefer hovering underneath the slabs of the slab tree structure. Overall the range of observed length of the fishes around the shelters was 2 inches to 19 inches.



## Future Work

As this project progresses through the seasons, materials will be required in bulk for construction, and volunteers will be needed for deployment. The process will continue to become more stream-lined and efficient as more and more shelters are introduced throughout the five lakes. Besides a constant need of volunteers and materials, TLA will also be looking for a willing and able diver to continue the observation and data collection part of the project. And as always, a goal in the present and the future is to continue educating the community about the project and its objectives and findings.

## Citation

Pelletier, RB. 1977. The Colonization of Artificial Shelters by Fishes in an Oligotrophic and a Mesotrophic Lake.

## Contacts

Leah Varga, Research Associate, Summer 2012

Leslie Meyers, Executive Director

Dean Branson

Fred Sittel

Bob Bagley

Steve Young

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## Contributing Organizations

