

Please send any cleithra removed from Tennessee musky to:

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The following 2 pages of information concerning how to remove the cleithra were  
obtained from [www.hoosiermuskie.com](http://www.hoosiermuskie.com).

# You Can Help With Muskellunge Research

In the late 1970's, a concern arose amongst fisheries biologists that valuable biological information was being lost as large, trophy muskellunge (*Esox masquinongy*) were "fished up". This information is important for managers of muskellunge fisheries in assessing the status of populations and subsequently regulating them. However, fisheries workers using conventional sampling techniques rarely see muskellunge and the relatively small population sizes do not allow for intensive sampling. As a group, anglers and taxidermists handle more muskellunge than fisheries professionals.

Thus, in 1979, the Ontario Ministry of Natural Resources, through Dr. John Casselman, and the Royal Ontario Museum, through Dr. Ed Crossman, initiated the Cleithrum Project as a joint study to collect, archive, and disseminate biological data on trophy muskellunge. A guiding principle of the project is fish should not be killed for the data, but every fish killed should be used to provide the data. To collect the data, the Cleithrum Project relies on the most common handlers of muskellunge: anglers and taxidermists. In return for supplying biological data and the cleithral bone, participants are given information on the age and growth rate of the submitted fish. The Cleithrum Project is designed to be independent of geographical and political boundaries; many muskellunge populations are fished by both Canadian and American anglers, and fish are commonly mounted far from where they were caught. The project resides at the Royal Ontario Museum in Toronto, Ontario.

The Cleithrum Project is based on the cleithral bone, part of the pectoral girdle of fish. The cleithrum is the only valid method for assessing the age of old, slow-growing trophy members of the pike family, especially muskellunge (see figure below). Scales commonly fail after sexual maturity is reached.

Anyone can participate in the project by submitting the cleithrum bone either

in a special envelope or in a ziploc bag with a copy of the envelope's form. If a fish is to be killed for eating, the angler can participate directly; if it's to be mounted, then the angler can request the taxidermist to participate. If the taxidermist requires further information or envelopes, we can provide it. It is possible to make a quality mount from a fish with a cleithrum removed. Samples can be sent individually or in batches; please send in a rigid container to prevent breakage during shipping. The samples should be sent to either address on the form.

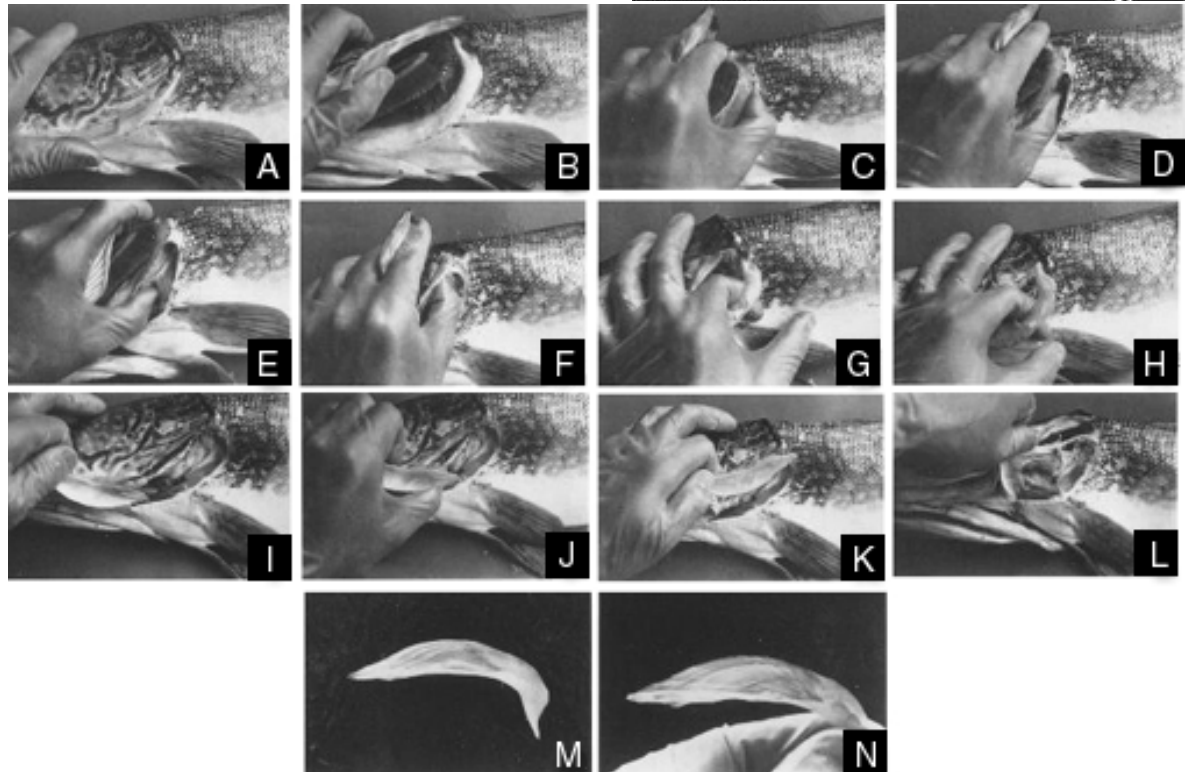
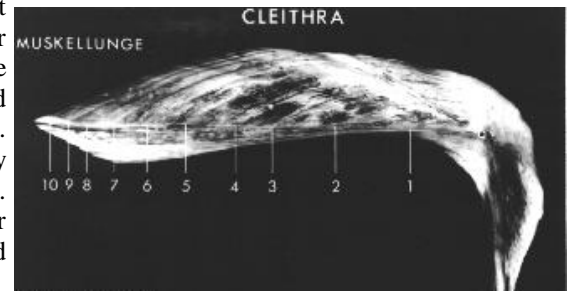
If age and growth information of the fish is desired, please print or type a name and complete address on the envelope/form where indicated with "send age"; alternatively, in the Age of the Internet, we can send the information to an email address (please still include a name).

## Instructions for Removing Cleithral Bones

Text and photos from Casselman, 1979 **Cleithra** (singular - cleithrum) are paired, crescent shaped, flat bones that are the main supports of the shoulder girdle. They are just visible under the skin, on either side of the head immediately behind the gill covers. They are near the surface of the body and can be easily removed by hand. The step-by-step procedure for removing the cleithrum is detailed and

illustrated below. The basic points for removing the left cleithrum by hand are as follows:

- A. Hold the fish with the head facing left, and grasp the fish behind the pectoral fins with the right hand. Hold the fingers of the left hand over the top of the head.
- B. Use the thumb of the left hand to lift the opercular flap (gill cover), exposing the cleithrum just posterior (behind) to the gills.
- C. Push the thumb between the posterior edge of the cleithrum and the connective tissue and muscle.
- D. &
- E. Move the thumb towards the top, and then towards the bottom, to separate most of the inner surface of the bone from the underlying soft tissue.
- F. Push the thumb or index finger of the left hand through the soft connective tissue in the middle anterior of the cleithrum.



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- G. Hook the index finger from the outside through this hole and firmly pull the cleithrum away from its dorsal connection, exposing the dorsal spine
- H. &
- I. When the dorsal tip has been released (in very large fish some of the heavy connective tissue may have to be cut away to ease the separation) grasp it between thumb and index finger.
- J. &
- K. Pull the cleithrum out from the body and towards the anterior (front of the fish). This will expose the anterior tip. It is important during this process to pull the cleithrum strongly away from the body to avoid breaking or tearing the extreme anterior tip and growing edge.
- L. &
- M. Push the cleithrum over the thumb of the same hand or the index finger of the other hand to hold back the adhering soft tissue. This peels away the muscle and connective tissue from the outer surface of the cleithrum
- N. A clean cleithrum showing annuli (curved lines) indicating age.

With this method of removal the cleithrum comes away virtually free of soft tissue. If age is to be determined immediately it is sometimes necessary to scrape away any remaining soft tissue with a knife. Otherwise the bone is kept damp until boiling water is available with which to thoroughly remove the soft tissue. Bones must be thoroughly cleaned of muscle and skin before being sent through the mail to prevent putrefaction in transit.

#### **Instructions for Cleaning Cleithral Bones:**

After one or both of the cleithral bones are removed from the fish the bones should be kept damp until they can be cleaned. If this is to be more than a day, they should be kept frozen. Be sure that the appropriate information remains associated with each cleithrum during this intermediate step.

1. Pour boiling water into a pyrex or other heat-resistant container.
2. Holding the bone with a pair of tongs or forceps, dip the bone into the boiling or near boiling water, and hold it there for approximately 15 seconds. Remove the bone and dip in cool, clear water. Rub off the muscle and other soft tissues with a cloth, paper towel, or tooth brush. If some soft tissue still remains firmly attached, repeat this process until all the soft tissue is removed. Twice is

usually adequate except for very large bones, or those on which a lot of connective tissue has been left attached.

3. Then rinse the bone with clean water and wipe dry with a cloth or paper towel.
4. These bones can then be placed directly in the envelopes or ziploc bags. For each fish complete the information on the envelope/form, include the bone and scales, seal, and return to the Royal Ontario Museum

**CAUTION :** Do not leave the bones in boiling water for more than 5 minutes or the zones used to determine age will become completely obscured. If processing several fish at one time, be careful to make sure that the bones, scales, and information from one fish are not mixed with those of another fish. *If there is any possibility a mix-up has occurred discard both samples.*

#### **Instructions for Taking Scale Samples:**

1. If the fish is to be mounted remove scales from the side of the fish to be slit.
2. Approximately 10-12 scales from a scale sample area located about half way down the side of the fish.
3. Remove scales by lifting the exposed edge and pulling firmly on each scale. Do not remove scales by scraping backwards as in scaling a fish. Scraping breaks the surface of the scales and makes determination of age very difficult.
4. If fewer than 8 scales are removed examine them by eye in front of a light to be sure that at least some of them have complete concentric rings to the very centre. Scales that have been replaced have no rings in the centre area and are useless for age determination.
5. No cleaning is necessary. Place the scales directly into the envelope for that fish or wrap them in a small piece of paper and then place them into the ziploc bag for that fish.

The basic data contained in the Cleithrum Project will continue to be archived and disseminated to interested parties. In addition, several exciting new developments in analyzing age and growth information will be applied to project data.

- Setting age and growth standards.
- Estimating population mortality rates from maximum age.
- Examining factors affecting year-class strength and growth.
- Building long-term growth chronologies.

- Determining a general rule for sex-specific growth rates in muskellunge, allowing for the determination of sex for unknown samples based on growth rate.

Eventually these advances may allow for waterbody-specific management plans and regulations, which have are dependent on adequate data from individual waterbodies such as the Cleithrum Project contains. A Masters degree on muskellunge age, growth, and year-class strength, using the Cleithrum Project, is being undertaken by Chris Robinson, which will incorporate the above analyses. However, there is some concern over the future of the Cleithrum Project. With the increasing popularity of catch and release fishing, fewer muskellunge are harvested each year, thus reducing the number of samples and amount of biological data available to the project. In addition, the rate of submission of harvested muskellunge fluctuates and is currently at a low. Reasons for this include a general belief that only a fixed number of cleithra were required, some taxidermists claiming quality mounts could not be made if a cleithrum is removed, and discouragement over the long interval between submission and the return of an age. The latter situation is the result of a lack of a full time technician to maintain the collection; however, a major effort is currently being undertaken to revitalize the project and bring both the return of results and the archive itself up to date. Included in this is an attempt to recruit new contributors to the project.

\* All of the information obtained for this article were obtained from the Ontario Ministry of Natural Resources web site. You can see even more information about this project by visiting the site at <http://www.mnr.gov.on.ca/MNR/fishing/p1078.html>

People need to get involved in this project. We are not in any way promoting that fish should be killed for this project, but in the case that one is killed or you happen to find a dead muskie in one of our fisheries, we hope that you would take the time to remove the cleithral bones from the fish. The forms for submitting the cleithral bones will be added to our web site for people to download and submit. Very few samples from each fishery are needed to produce a large amount of knowledge about the potential of our fisheries, so please take the time to participate in this project!