

## CHARLEVOIX FISHERIES RESEARCH STATION 2013 FIELD SEASON NEWSLETTER

Produced by Nathan Skop and Patrick O'Neill

The Charlevoix Fisheries Research Station (CFRS) staff and research vessels are employed to provide information, models and advice to make possible science-based management of Michigan's fishery resources. CFRS is responsible for MDNR Fisheries Division research needs for the Lake Michigan basin. This annual newsletter is designed to summarize the field and lab activities completed during the past year by the CFRS staff. *[Note: Sample processing and data analysis are incomplete for some 2013 sampling activities. In those cases, complete results for 2012 surveys are presented.]*

### **FEATURED STORY: The trials and tribulation of a Water Cannon to suppress invasive species.**

Should every experiment end with a positive outcome? Is every outcome predictable? If yes, why go through the effort to run the experiment; just say its common sense. But wait, common sense is rarely seen as an accepted answer for scientists. Wikipedia defines the word "experiment" as "an orderly procedure carried out with the goal of verifying, refuting or establishing the validity of a hypothesis", and indicates that "...scientist[s] generally base scientific hypothesis on previous observations that

cannot satisfactorily be explained with the available theories." How does this all relate to CFRS activities you ask? It just so happens we are one of the places that run experiments and test hypothesis.



*SV Steelhead leaving St. James Harbor, Beaver Island with the CMU Biological Station in the back ground.*

For the last two years the staff of CFRS and The Nature Conservancy (TNC), Smith Root, and staff and students from Central Michigan University (CMU) joined together with the ultimate goal of answering the following question: Can we affect native fish egg survival by suppressing the egg predators on known Lake Michigan spawning reefs?



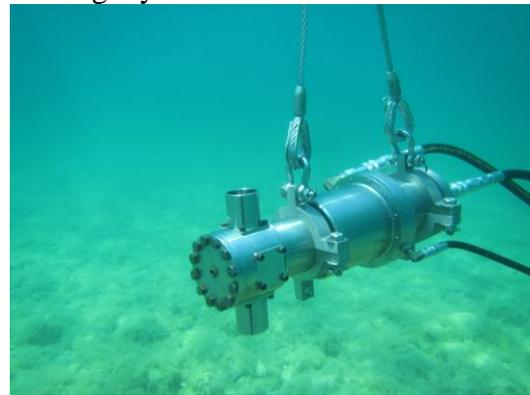
*R/V Pimephales and support staff prepare to run an experiment to determine the effects of the water cannon on Round Gobies and Rusty Crayfish.*

It all started with a piece of equipment used to sound for oil reserves in the ocean that was later looked at for the effects it had on fish. The technology morphed from an air-supplied unit to what we now know as a hydraulic-driven seismic water cannon. This water cannon has a large piston that is compressed to 2000 psi before being released. When released, the piston creates so much pressure exiting the chamber that it changes the water to vapor. It is this force that creates a sound wave that affects most fish. Prior experiments proved the seismic cannon effect was so strong that it would inflict organ damage to almost every fish within 15 meters. These past experiments proved that this technology would rupture the swim bladder or

induce internal bleeding in fish within the target range and that the fish would die within 7 to 10 days.

Fast-forward to 2012, when an eager bunch of scientists felt confident (due to the past experiences) that the seismic cannon could completely change the playing field with respect to the invasion of the exotic round goby. Scientists felt that if this technology could prove to have a detrimental effect on these pesky exotics, native fish (such as the lake trout, lake whitefish, and lake herring) could finally have the upper hand needed reproduce successfully and increase survival. If fall abundance of round gobies is relatively low, the native fish eggs have a much greater chance at survival.

That moves us to 2013; we were the first to test the seismic cannon's effects on a fish (the round goby) that has literally changed the Great Lakes fish biomass over the last 10 years. One more very important detail...the exotic round goby lacks a swim bladder!



*Hydraulic seismic water cannon suspended in the water column.*

The overall results of the experiments proved, at least to this point, that we could not extinguish the round goby under any circumstances using the seismic water cannon. In fact, a larger

cannon was built over the summer and its effects were tested in the fall, once again to no avail. However, even though gobies resumed feeding shortly after treatment stopped, it did appear there was enough pressure created to cause some internal damage to gobies. At this point, it isn't certain how this will affect their long-term survival.



*The bigger seismic cannon used in the fall required a much larger hydraulic pump (1500 lbs.) that had to be loaded in the R/V Pimephales using the S/V Steelhead's boom.*

Alongside conducting extensive testing on the round goby, we also tested seismic cannon effects on the rusty crayfish (which had never been done before), native rock bass, and a Go-Pro camera! Results were not what we had hoped; we could not kill or deter the exotics, but did have success controlling the rock bass (and our expensive gear!).



*The pressure was just too much for this Go-Pro camera.*

In the fall, the project continued despite windy and rough sampling conditions. We had graduate students working at six spawning reef sampling sites, trying to get egg-predator abundance estimates using multiple sampling gears and conducting a crayfish movement study, along with determining recolonization rates on reefs from which crayfish had been removed. Future directions for this work include continuing to monitor changes to invasive species populations on fish spawning reefs and transitioning from direct control to indirect mitigation for impacts; e.g., by restoring critical reef habitat to better protect native fish eggs.



*R/V Pimephales operating in rough and windy conditions.*

### **LARGE VESSEL ACTIVITIES**



*S/V Steelhead leaving Frankfort.*

Lake-wide Assessment Plan (LWAP): Each spring the CFRS vessel S/V Steelhead conducts a survey of the Lake Michigan fish community. The main goal is to determine relative abundance

of lake trout, lake whitefish, burbot, and yellow perch. Fish are collected from 7 locations: South Haven, Saugatuck, Grand Haven, Arcadia, Leland, Elk Rapids, and Charlevoix. Sampling gear used for this spring survey consists of 112,000 feet of 6 foot-high graded 1.5" to 6" mesh bottom gill nets.



36 inch Lake Trout caught near Arcadia.

In 2013 the *S/V Steelhead* set sail from Charlevoix on April 8<sup>th</sup> heading to the port of South Haven to begin the spring surveys. During the LWAP survey, we collected a total of 1,123 lake trout with the majority of those caught out of Elk Rapids (291) followed by Leland (191) and Saugatuck (174). Lake whitefish catch totaled 393 fish with the majority being caught out of South Haven. We had a strong catch of 800 yellow perch, with 76% of our catch coming from Grand Haven (610 fish).

During the spring survey many other species are caught – including suckers, catfish, and freshwater drum – but the one that has been showing up more often in our nets is the lake sturgeon.



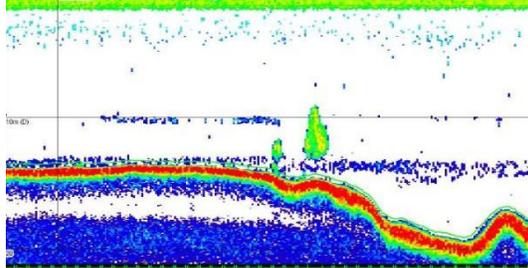
During 2012 the *Steelhead* crew tagged 19 lake sturgeon, and in 2013 nine sturgeon were tagged and released. The majority of the sturgeon encountered came from the Saugatuck and Grand Haven areas.



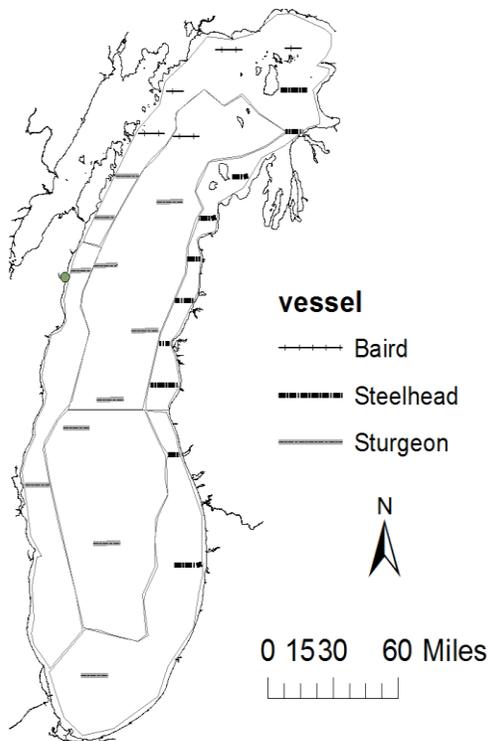
Juvenile lake sturgeon caught during the LWAP.

*Acoustic Survey:* A lake-wide prey fish survey is conducted in the late summer each year to estimate prey fish distribution, abundance, and biomass. Our research vessel is charged with collecting data in the Michigan waters of Lake Michigan. Sophisticated sonar equipment is deployed, in conjunction with a mid-water trawl that is fished at the depth where fish layers are observed on the sonar unit to verify the size and species of fish. The number of fish enumerated on the transect is combined with data from other transects conducted by the United States Fish and Wildlife Service (USFWS) and United States

Geological Survey (USGS), and then extrapolated to get a lake-wide estimate of the number and weight of prey fish by species in Lake Michigan.



Example of sonar display.



Map shows each vessels transects for 2013

During the 2013 acoustic survey, crew aboard the *Steelhead* conducted 10 transects totaling 86 miles at 7 offshore locations ranging from Beaver Island to Saugatuck. From data compiled by the USGS it was observed that alewife densities remain low in Lake Michigan. The biggest difference in 2013 over previous years was the very low

densities of age-0 alewife. Rainbow smelt density in 2013 was the second lowest in the period 1992-2013. Bloaters were also present in very low densities. The results of the 2013 Lake Michigan acoustic survey indicate continued variability in alewife biomass, persistently low biomass of rainbow smelt and bloater, and continued low abundance of native species (Warner, Farha, O'Brien, Ogilvie, Claramunt, and Hanson. 2014. *Status of pelagic prey fishes in Lake Michigan, 2013*. Report to the Lake Michigan Committee annual meeting, Windsor, Ontario).



2013 mid-water trawl sample

The overall goal of the acoustics survey is to predict forage fish abundance and to make recommendations to reduce a potential food chain imbalance which in turn could cause a fisheries collapse.

Large vessel bottom trawling: In September the *S/V Steelhead* headed back south to conduct Lake Michigan bottom trawling, primarily to assess yellow perch populations. In 2013, we sampled South Haven, Grand Haven, and Pentwater. Trawls were conducted both north and south of each port at depths of 30, 40, 60, 80 and 100 feet. During the trawl sampling a total of 1,100 yellow perch were caught and used for year-class strength determination. During trawling, only one

trawl was lost due to hanging up on the bottom. The most interesting catch in 2013 was a 30 foot white pine that was caught in the trawl and brought on board.



*Log being pulled out of the throat of the trawl.*

*Large vessel public assistance:*

During a trip out of Charlevoix to conduct night acoustics work, the *Steelhead* crew came across a boat dead in the water in heavy seas roughly 3 miles out from the pier heads. Upon closer examination the boat's anchor had fallen off the bow and the anchor line was tangled in the propeller. The *Steelhead* crew was able to get a tow line to the boat and towed them into calmer waters where research station staff assisted in removing the tangled line from the propeller. The two individuals onboard were a little shaken from the experience and the woman (who was expecting!) was suffering from sea sickness.

**CODED-WIRE TAGGING**

The mass-marking initiative continues to be at the forefront of the Coded-Wire Tagging (CWT) Program. U.S. Fish and Wildlife Service (USFWS) operate two tagging trailers at various state hatchery facilities. Hatchery and CWT staff supplies the trailers with as many as 60,000 fish per day for fin clipping and tagging.

With the increase in number of fish being marked with CWT's, the USFWS provided seasonal workers to assist CFRS staff in the recovery of CWT heads in the summer of 2013. This allowed for more fishing tournaments to be covered compared to previous years, which resulted in more heads collected in 2013. Attending fishing tournaments is one of the most efficient methods of sampling due to the large number of fish observed in a short period of time.

In 2013, fifteen CWT lake trout over 20 years of age were collected. Five came from Lake Huron, two of which were 27 years old with total lengths of 32 and 36 inches. Lake Michigan produced the other ten fish; two of these were 28 years old. One CWT lake trout of particular interest was a 29 year old, 36 inch, 12.8 pounder that was from the very first tagging event in Lake Michigan (stocked in 1985).

Angler information gathered from the collection process was provided to other researchers and managers (both within and outside the MDNR) for additional analysis and modeling applications, as requested. Data is also posted for public access on the MDNR internet site

[http://www.michigan.gov/dnr/0,4570,7-153-10364\\_52259\\_10949\\_11238\\_11359-171648--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_10949_11238_11359-171648--,00.html))

## CHARTER BOAT SURVEY



Charter dock "Chinook Pier" in Grand Haven

The objective of the state-wide Charter Boat Program is to obtain a continuous annual record of charter boat fishing effort, harvest, and harvest rate of the major sport fish in the Michigan waters of the Great Lakes. The new on-line reporting system for charter boat captains has proven to be a valuable tool for fisheries managers to keep tabs with "real time" harvest results. So if the delicate balance that is our Chinook salmon fishery is trending in a concerning direction, managers will notice almost immediately. Detailed charter fishing results from previous years are available on the MDNR internet site

([http://www.michigan.gov/dnr/0,1607,7-153-10364\\_52261\\_47568-91504--00.html](http://www.michigan.gov/dnr/0,1607,7-153-10364_52261_47568-91504--00.html)).

## SMALL VESSEL ACTIVITIES



R/V Pimephales

*Small Boat Bottom Trawl:* The bottom trawl survey is used to collect important near shore fish community information, with a primary focus on yellow perch recruitment. The small boat plays a vital role in sampling the shallow waters that the large vessel can't sample. The large vessel S/V *Steelhead* bottom trawls in depths of 30-100 feet about the same time that the small boat is sampling depths 30 feet and in. This gives us a good snap shot of the near-shore area of the Michigan waters of Lake Michigan and cool water species such as yellow perch.

The CFRS staff, with assistance from area DNR fisheries personnel, conducts annual yellow perch assessments according to established multi-agency lake-wide assessment protocols. Preliminary analysis of 2013 age-0 bottom trawl data indicates a low yellow perch year class; however the big 2010 year class continues to grow and move into the sport fishery.



*So you say you'd like to trawl the inner troughs of Lake Michigan? There is always a price to pay!*

On an annual basis, we attempt to sample for two nights at the following ports: South Haven, Grand Haven, Pentwater and Charlevoix/Petoskey. Each night of sampling requires 4 to 6 transects both at dusk and then repeated

after dark. Our shallowest transect of five to ten feet can get interesting some years, depending on how the sand bars and troughs are set up (hence the above picture)!

## OTHER ACTIVITIES

### *Hunt Creek Sampling:*



The Hunt Creek Fisheries Research Station located near Lewiston, Michigan was established in 1939 to conduct inland trout research. The research area encompasses nearly 3,000 acres and several miles of the Hunt Creek mainstream. Research at Hunt Creek is aimed at finding solutions to fisheries problems related to inland trout. Because the waters in the research area have been closed to fishing since 1965, and because land use activities are controlled, Hunt Creek is an ideal location for controlled studies.

Due to budget constraints, the Hunt Creek Research Station was closed in 2011 and all studies were put on hold. In 2013 managers and staff from both the Alpena and Charlevoix Research Stations made a very important decision to resume the long-term status and trends survey on Hunt Creek. In early September, Charlevoix staff using electro-fishing equipment conducted a mark-and-recapture survey within four sections of Hunt Creek. During the marking run every fish is marked with a fin clip, and during the recapture run fish are recorded as marked or unmarked.

This information is used by biologists to come up with population estimates as well as to look at competition dynamics over time between species. A total of 4.2 miles of Hunt Creek was sampled during both the mark and recapture run. Common species observed were sculpin, brown trout, and brook trout – with brown trout being the dominant species.



*Hunt Creek Tiger Trout – a cross between a Brown and Brook Trout.*



*CFRS staff holding Brown Trout collected during the marking run.*

**Weir Harvest:** Every year the CFRS staff assists in the harvest, bio-sampling, and evaluation of salmonid returns to weirs in Michigan's waters of the Great Lakes. The objective is to annually monitor and record returns of Chinook salmon, coho salmon, and steelhead trout to Michigan weir operation facilities. Weir harvests provide valuable data, such as annual estimates of size-at-age and fish movement.

In addition to the fall harvest, the Medusa weir in Charlevoix plays a vital role in the spring, when hundreds of thousands of Chinook salmon "smolts" are placed in the raceway to acclimate to Medusa Creek for about three weeks. This acclimation increases survival of Chinook salmon and results in higher salmon returns.

*Otolith Microchemistry:* Over the years fisheries managers have developed effective techniques to mark fish that come from hatcheries so that managers and anglers can identify the hatchery vs. wild origin of their catch. However, one thing managers have not been able to do is reliably determine where a wild fish came from. In terms of Great Lakes salmonid production, all we really know about an unmarked fish is that it did not get its start in a hatchery. What if most of the wild fish produced are only coming from one or two tributaries? Wouldn't managers like to know so they could do everything possible to protect the tributary?



*During this pilot study, CFRS had to determine the optimal time to collect yearling steelhead.*

There is a new test that can be run to match a particular wild fish back to its natal stream. This method has been used in the Great Lakes for walleye and now

CFRS and CMU are attempting to test the method on steelhead. To determine a fish's origin, researchers must first go out and collect young fish and water samples from various river systems. The microchemical signatures (elements and minerals) are then extracted from the fish's otolith (ear bone) using a high-powered laser.

Differences in microchemical signatures among different regions / rivers are to be determined at a variety of spatial scales. Time may also be important, and researchers are also looking at differences among years. After it is determined the microchemistry is not changing between years within the natal streams, researchers can then start to compare results from adults in the open lake. Alternatively, if differences are observed, year-specific identifiers can be used to determine origin. As for the juveniles, the otoliths will be extracted from the adults and the laser will then focus on the center. This is the area where the microchemistry signatures should have been absorbed while fish were in the natal stream. Then it's just a matter of matching up the adult signatures to the natal streams tested.

This study will be ongoing in 2014, and the results will hopefully allow managers to identify key systems and potentially even habitats that support successful steelhead reproduction.



*Spring yearling that will help researchers someday determine which river wild steelhead come from.*

**State-Wide Stocking Program:** Every year, staff from the CFRS assists in the stocking of trout and salmon from state hatchery facilities to designated lakes and rivers. In 2013 Pat O'Neill delivered adult rainbow and brown trout from the Oden Hatchery (near Petoskey) to the Huron River in Oakland County and Spring Mill Pond in Livingston County. Nathan Skop stocked fingerling brown trout from Oden Hatchery into West Grand Traverse Bay.



*Stocking Spring Mill Pond.*

**Beaver Island Smallmouth Bass Study:**

CFRS staff once again assisted CMU in conducting a smallmouth bass population and movement study in the waters around the Beaver Island Archipelago and Waugoshance Point.

**Net Repair:** During the winter months the vessel crew works endlessly to

maintain various nets as well as build new nets for upcoming projects. One project that will occur during the 2014 field season is a gear-comparison study to compare catch rates between nylon and monofilament gill nets. Vessel crew constructed 18,000 feet of monofilament gill net for the 2014 comparison.

**Fish aging:** One of the most time consuming and important activities occurring at the CFRS during winter months is age determination of fish sampled during our various lake surveys. Staff has the responsibility of aging thousands of fish from the LWAP survey, yellow perch assessment, commercial whitefish sampling, creel program, Elk Lake lake trout study, and EPA projects. Species aged include: lake trout, whitefish, burbot, yellow perch, lake herring, Chinook salmon, coho salmon, walleye, and muskellunge.

Charlevoix Staff

David Clapp, Research Station Manager  
Randy Claramunt, Research Biologist  
Dave Caroffino, Tribal Unit Biologist  
John Clevenger, CWT Program  
Patrick Hanchin, Tribal Unit Biologist  
Jory Jonas, Research Biologist  
Wayne Heinzman, Fisheries Assistant  
Patrick O'Neill, Fisheries Technician  
Rebecca Parker, Seasonal Worker  
Kendra Porath, Creel Clerk  
Jerry Ranville, Boat Captain  
Nathan Skop, Assistant Boat Captain  
[Vacant], Fisheries Technician  
Jeff Stevens, Trades Helper  
Cathy Sullivan, Station Administration  
Donna Wesander, Charter Boat Program

Charlevoix Fisheries Research Station  
96 Grant Street  
Charlevoix, MI 49720  
231-547-2914 (PHONE)  
231-547-6031 (FAX)  
[clappd@michigan.gov](mailto:clappd@michigan.gov) (EMAIL)

Web page:

[http://www.michigan.gov/dnr/0,1607,7-153-10364\\_52259\\_10951\\_11301---,00.html](http://www.michigan.gov/dnr/0,1607,7-153-10364_52259_10951_11301---,00.html)