



CHARLEVOIX FISHERIES RESEARCH STATION 2012 FIELD SEASON NEWSLETTER

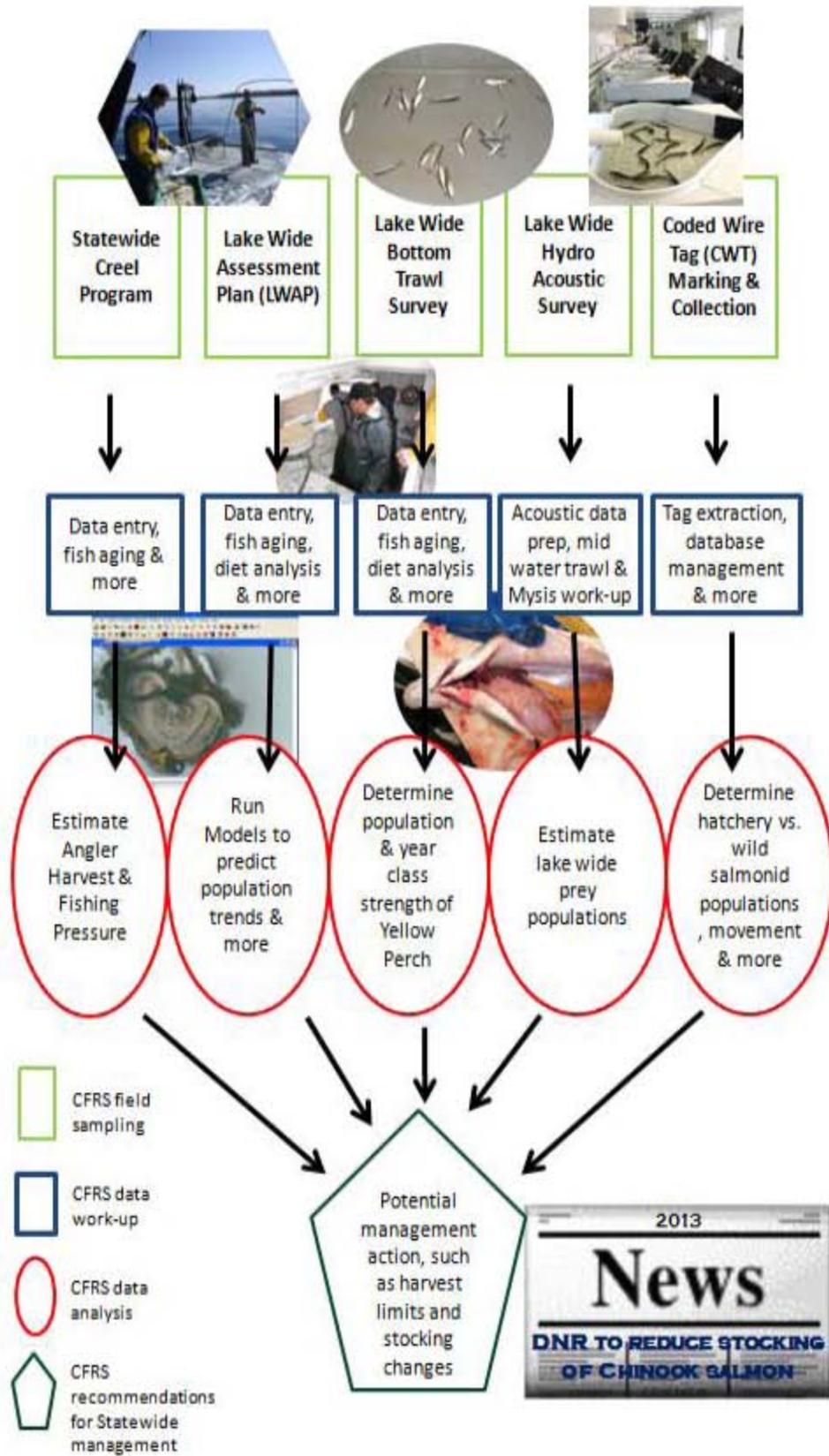
Produced by Nathan Skop and Patrick O’Neill

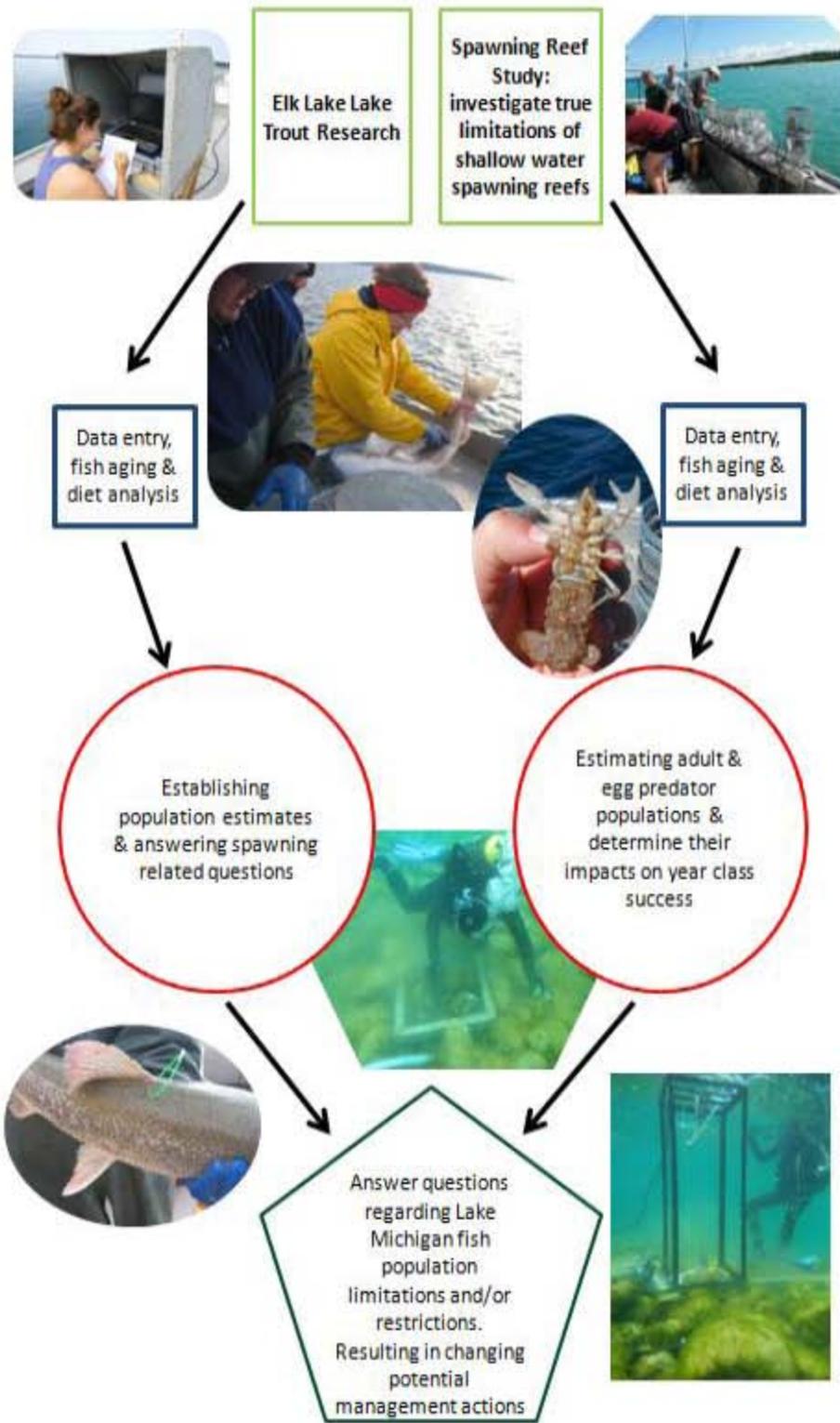
The Charlevoix Fisheries Research Station (CFRS) staff and research vessels are employed to provide information, models and advice to make possible science-based management of Michigan's fishery resources. CFRS is responsible for MDNR Fisheries Division research needs for the Lake Michigan basin. This 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 2012 sampling activities. In those cases, complete results for 2011 surveys are presented.]*

FEATURED STORY: Tracking the flow of data.

It is often the case in fisheries research and management for people to not understand the various steps that are involved in managing Michigan’s aquatic resources and also creating regulations to protect those resources. In this feature story “Tracking the flow of data” we will show a few examples of how a study at the CFRS “flows” starting with the development of project objectives and then conducting monitoring plans, field sampling, data processing, and ultimately influencing potential management choices. Most people are aware of the changes that MDNR Fish Division makes regarding stocking or fishing regulations, but the underlying science behind those decisions are often conducted behind the scenes and not as apparent to the general public.

The following is an example of a general process that researchers and managers work through to answer important fisheries issues. A study originates when a question or issue arises and needs to be researched. Study objectives to address the question need to be clearly defined and researcher’s hypothesis (expected results) should be stated. A sampling design is formulated to answer the objectives of the study, in which field sampling or data collection is executed using various methods, such as gill netting or trawling. Commonly field collected samples need to be further analyzed in a laboratory and all data needs to be summarized. Data are then processed and analyzed to provide results that are used to implement any necessary management actions to protect and sustain a fishery for future generations. The following diagrams show how data collected by CFRS staff contributes to the fisheries divisions’ goal of providing world class fresh water fishing opportunities.





LARGE VESSEL ACTIVITIES



S/V Steelhead in motion on Lake Michigan

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 6 locations: South Haven, Saugatuck, Grand Haven, Arcadia, Leland and Charlevoix. Sampling gear used for this spring survey consists of 112,400 feet of 6 feet high bottom gill nets. In other words, a total of 21 miles of gill net set throughout the two months of spring sampling. The gill nets used range in size from 1.5 inch mesh size to 6 inch mesh size. These variations in mesh size give us the ability to sample the entire fish community, from juvenile to adult.



Setting LWAP gill nets in the 2012 survey

In 2012 the *S/V Steelhead* set sail from Charlevoix on April 9th heading to the port of South Haven to begin the spring

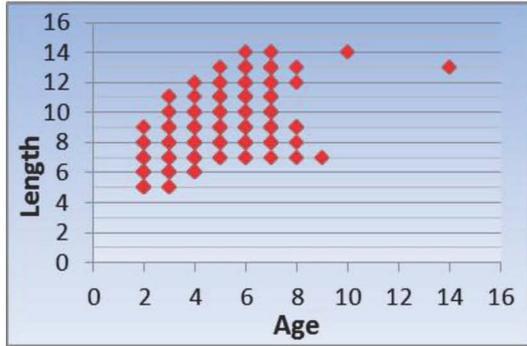
surveys. Surveys begin in Southern Lake Michigan and end in the north; this year three additional sites were added in Northern Lake Michigan: Ile Aux Galets, Irishman's Reef, and The Middle Grounds.

During the LWAP survey, we collected a total of 762 lake trout with the majority of those caught out of Saugatuck (195) followed by Leland (131) and South Haven (129). Lake Whitefish catch totaled 333 fish and 45% of those were caught out of South Haven; this is the second year in a row that South Haven has produced the highest whitefish catch. We had a good catch of 346 yellow perch compared to 285 in 2011; this slight increase is mainly due to surveying a few weeks later than in years past. Most of the perch were caught out of Grand Haven (147) and South Haven (135).



A jumbo yellow perch collected during the survey.

From our age classification analyses, we found that there was an even distribution of 2 to 7 year old fish out of our total catch of 346. The oldest perch from our analysis was 14 years old and was 13 inches long. The graph (next page) is an example of the information from our survey and it demonstrates the length and age relationship for yellow perch.



Information on yellow perch age-length

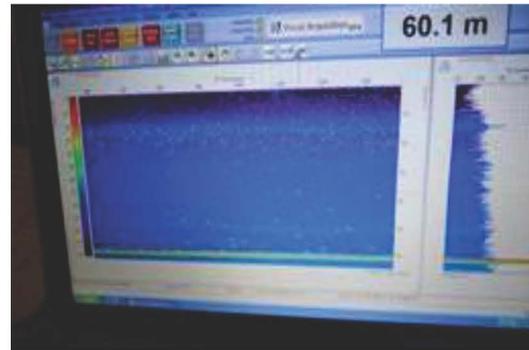
VHS Sampling: Viral hemorrhagic septicemia (VHS) is a serious viral disease, which has a lethal effect on fish, and has been present in the Great Lakes region for a number of years. Coinciding with our spring LWAP survey, the *SV Steelhead* conducts Lake Michigan VHS surveillance sampling. Surveillance sites for 2012 included Saugatuck, Ludington, and Ile Aux Galet. To collect the needed 60 samples per species per site a total of 8,300 feet of 2.0 inch to 4.5 inch gill net was used to target lake trout, lake whitefish, yellow perch, round goby, and alewife. In 2012 we collected kidney and spleen tissue samples from 120 lake whitefish, 56 lake trout; whereas, alewives and yellow perch are saved whole. After we collect the tissue or whole fish samples they are sent to Michigan State University for further analysis to detect the presence of VHS. To date samples sent to MSU have tested negative for VHS.

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 used to collect fish abundance data along predetermined transects.



Bringing the mid-water trawl aboard

In conjunction with the acoustics, a mid-water trawl is deployed to 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 the other transects including sampling by the United States Geological Survey (USGS) and then extrapolated out to get a lake-wide estimate of the number and weight of prey fish by species in Lake Michigan.



Example of 2012 Acoustics data

The image above shows what an acoustics sounding looks like: the clusters of light blue marks near the top are young-of-the-year (YOY) alewife and the larger marks near the bottom are bloater chubs.

During the 2012 acoustic survey we conducted 10 transects totaling roughly

120 miles in length at 7 offshore locations ranging from South Haven to Charlevoix. From our data we observed that the 2012 alewife year-class appears to be average or slightly above average based on the observed widespread distribution and abundance of YOY alewives. YOY alewives were found throughout Lake Michigan, including the northern offshore region which in the past has experienced low abundance and limited distribution. One other observation was the widespread presence of both adult and YOY bloater chubs. Smelt were observed, but only in low numbers.



2012 mid-water trawl sample

The overall goal of the acoustics survey is to predict and reduce a potential food chain imbalance, especially in the open-water offshore zone, similar to what occurred in Lake Huron.

Large vessel bottom trawling: In September the *SV Steelhead* headed back south to conduct Lake Michigan bottom trawling, primarily to assess yellow perch populations. In 2012, we sampled South Haven, Grand Haven, Pentwater, and Little Traverse Bay. Trawls were conducted at depths of 30, 40, 60, 80 and 100 feet. During the trawl sampling a total of 1,336 yellow perch were caught, ranging in size from 2 to 13

inches. Some examples of by-catch that were also captured include round goby, smelt, lake whitefish, round whitefish, common white sucker, bloater chub, gizzard shad, fresh water drum, white bass, shiners, and alewife.



Little Traverse bottom trawl sample

EPA fish monitoring and surveillance:

Every other year the crew aboard the *SV Steelhead* collects lake trout for the Environmental Protection Agency's Great Lakes Fish Monitoring and Surveillance Program. In 2012, we were given the task of collecting 50 lake trout between 600 and 700mm out of the port of Saugatuck. Two net nights were needed to achieve the quota this last year. Fish are processed by taking lengths, weights, sex, and fin clip wrapping them in aluminum foil, double bagging them and freezing the fish whole. Samples were then sent to a lab in Virginia for preparation and analysis. The EPA analyzes these samples for contaminants that bio accumulate to assess trends in the open waters of the lakes.



Lake Michigan view with whitecaps and rainbow

CODED WIRE TAGGING

In 2012, all of the stocked Chinook salmon (approximately 1,831,000, down 38% from last year due to Lake Huron stocking reductions) and 288,000 lake trout released into Lake Michigan, Lake Huron and Lake Superior had an adipose fin clip and were marked with a CWT. This mass-marking initiative is a collaborative endeavor led by the U.S. Fish & Wildlife Service (USFWS) via mass marking trailers. In addition, almost 160,000 Steelhead from Thompson Hatchery were marked by CFRS personnel with a CWT, along with 8,130 lake sturgeon, up 51% from last year.



Images taken from one of the mass marking trailers that was located at four of the States rearing facilities in 2012.

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 heads in

the summer of 2012. This allowed for more tournaments to be covered compared to previous years, which resulted in more heads collected. Attending these tournaments is one of the most efficient methods of sampling because of the large number of fish observed in a short period of time.

In regards to CWT head sampling and processing, 2011 samples were collected from the following sources: DNR/Tribal assessment samples (2%), sport fisheries (48%), and harvest weirs (50%). The total number of fish processed in 2011 (2,258) was lower than the average for the period 1990–2010. All CWT fish heads were checked for tags and when present, tags were removed, read, and recorded in a database. Data was then 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)

CHARTER BOAT SURVEY



Lake Michigan angler on a charter fishing trip

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. In 2011, a total of 57,432 charter anglers participated in 14,144 excursions on the Michigan waters of Lakes Michigan, Huron, Erie, Superior, and the St. Clair system (including the major tributaries), and spent 327,853 angler hours fishing; up slightly from the previous season. Charter operators reported 146,360 fish harvested from the Michigan waters of the Great Lakes. Harvest numbers for 2011: chinook salmon (55,904), lake trout (27,101), yellow perch (22,073), walleye (18,685), rainbow trout (9,853), coho salmon (8,496), and brown trout (507). 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). Detailed 2012 results will be available mid-year 2013.

Also in 2012, CFRS personnel presented charter survey results at Michigan Sea Grant workshops, Michigan Charter Boat Association meetings, fisheries workshops, DNR Citizen's Advisory Meetings, and other public and agency meetings.

MICHIGAN STATEWIDE ANGLER PROGRAM

The objective of the Statewide Angler Survey Program (SASP) is to monitor trends in Michigan's sport-fishery through collecting continuous records of angler effort, harvest and catch rates. In 2012, sport-fishery information was collected by 27 field clerks located at major Great Lakes ports and various

tributaries and inland lakes throughout the state. The valuable information collected by the clerk is used by fisheries managers and researchers to monitor angling trends, identify potential management issues, supplement data on fish populations, and evaluate fishing regulations and stocking strategies. During the summer 2012 season, clerks sampled at 10 Lake Michigan ports from Bay de Noc to St. Joe, 11 Lake Huron ports from Detour to Lexington, and 4 Lake Superior ports from Ontonagon to Munising. Lake St. Clair and Erie each had one clerk working multiple ports. The 2013 winter creel is being conducted on 12 sites such as Saginaw Bay, Les Cheneaux Islands, AuSable River, Keweenaw Bay, and Lake Chicago, to name a few. Complete information from previous years up to the 2012 creel season can be found at the link below.

(<http://www.dnr.state.mi.us/chartercreel/>)

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.

Returns of chinook and coho salmon to Lake Michigan and Lake Huron harvest facilities vary yearly for a number of different reasons. In 2012, 23,198 chinook were harvested from five Lake Michigan weirs, compared to 30,328 in 2011. Lake Huron in 2012 also experienced a decline at the Swan River

weir, harvesting 2,815 chinook salmon compared to 5,433 in 2011. The return of coho salmon to Lake Michigan weirs in 2012 was up for the second consecutive year with 37,118 fish harvested compared to 25,607 in 2011. A majority of the coho salmon harvest came from the Upper Platte River weir with 21,010 fish. The lower chinook salmon numbers in 2012 can be attributed to stocking reductions to help alleviate predation on the forage base in Lake Michigan.

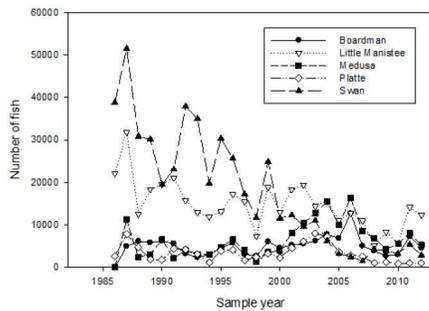


Figure 1. Total numbers of Chinook salmon harvested at weirs on the Boardman, Little Manistee, Medusa, Platte, and Swan Rivers, 1986-2012.



Fish harvest at the Medusa weir in Charlevoix.

The Medusa Creek weir, which is managed by CFRS staff, is primarily a harvest weir rather than an egg take operation. In 2012 5,302 chinook salmon weighing 56,569 pounds were collected and sold to American Canadian Fisheries. American Canadian Fisheries take these salmon which would die after spawning and turn them into useful products such as fillets for human consumption, eggs for bait shops, and

dog and cat food. Throughout the salmon harvest CFRS staff conduct bio-sampling which includes length and weight, collecting CWT heads, and OTC tail samples.

The Medusa Creek weir is also used as an educational platform to educate school groups about the life cycle of a salmon and to also spur interest in young people about the amazing fishing opportunities that our state has to offer.



School group lines the banks of Medusa Creek.

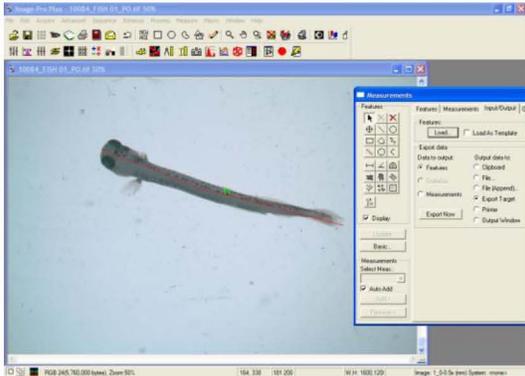
In addition to the fall harvest, the Medusa weir in Charlevoix plays a vital roll in the spring, when hundreds of thousands of chinook salmon “smolts” are placed in the runway to acclimate to Medusa Creek for about three weeks. This acclimation increases survival of chinook salmon and results in higher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

SMALL VESSEL ACTIVITIES



R/V Pimephales

Spring Larval Sampling: The schedule for the CFRS small boat *R/V Pimephales* starts shortly after ice out. Larval neuston netting occurred in Elk Rapids in the nearshore zone (3 to 6 feet) from the first of April until the first week of June. For the past few years this data has been collected in a follow-up to the fall adult spawning with emphasis on the rare cisco (herring).

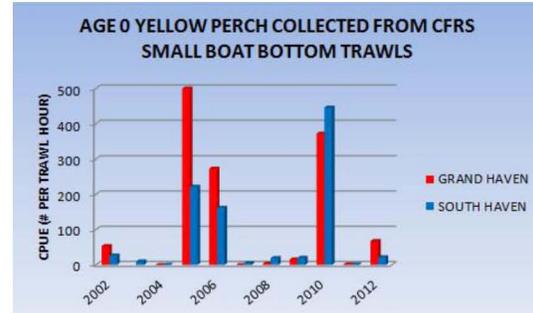


The contents of the neuston tows are picked and imaged to identify species and size using the Image Pro System back at the station.

Juvenile Whitefish & Cisco (Lake Herring) Sampling: Due to sampling conflicts and warmer lake temperature, we only had one day of spring seining for juvenile whitefishes. During this short time series, the juvenile fish are growing at a rapid rate and are a significant component of the near shore fish community. The objectives of this sampling are to determine lake whitefish and cisco population numbers, and to evaluate interactions with other nearshore Lake Michigan fish, including predators. Even with the limited sampling we were able to determine the presence and development stages of both the lake whitefish and cisco.

Small Boat Bottom Trawls: 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 2012 age-0 bottom trawl data indicates an above average yellow perch year class, however it is nothing close to the 2010 year class which is still abundant.



The following is the year class strength of young-of-the-year yellow perch captured from the DNR small boat.

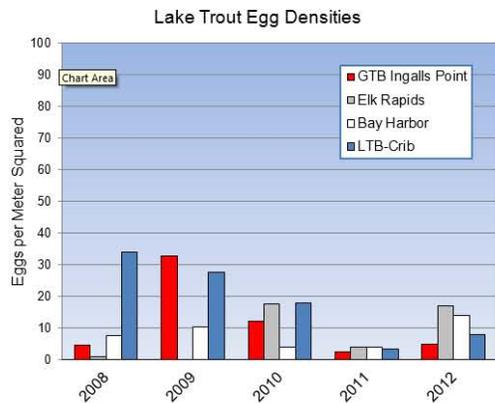
On an annual basis, we attempt to sample for two nights during dusk and dark at the following ports: South Haven, Grand Haven, Pentwater and Charlevoix/Petoskey.

Lake Trout Egg Abundance Project: The designated lake trout spawning reefs were again sampled to determine egg deposition, egg predator abundance, and substrate quality. These nearshore spawning reefs include Menonaqua (Crib) & Bay Harbor in Little Traverse Bay and Elk Rapids & Ingalls Point in Grand Traverse Bays. Prior to spawning, divers are deployed and bury egg nets into the substrate leaving little evidence of their presence. Predators are free to move in and out of the egg nets throughout the spawning event. After the spawn, divers go back down and recover the nets capturing the eggs and potential egg predators.



Egg nets are designed to be buried into the substrate and collect lake trout eggs.

Eggs and egg predators (i.e.-gobies and crayfish) are documented from each net. In the fall of 2012, we saw an increase in Lake Trout egg densities at all four index sites. However this was still below the three year average.



Exotic egg predators continue to dominate the near shore spawning reefs. The round goby and the rusty crayfish still make up most of the predators found in the egg nets. Before they were

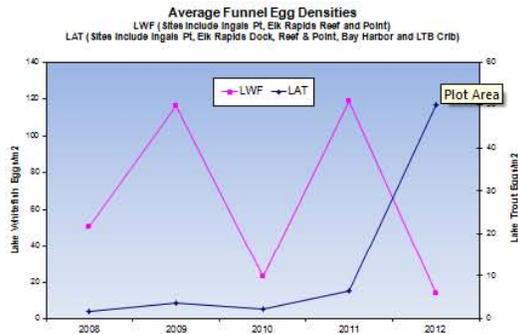
established in Lake Michigan, native crayfish like the *O. propincus* and *O. virilius* were abundant and the only native fish that consumed the fish eggs was the native sculpin. After the invasion of non-native crayfish and gobies, it's hard to find native crayfishes in decent numbers and the native sculpins are almost never observed.

Study on Invasive Predator Suppression on Critical Spawning Reefs: The CFRS staffs, along with other investigators (The Nature Conservancy, US Geological Survey & Central Michigan University) have received a federal EPA grant to study whether or not egg predator populations can be suppressed to a level that would allow an increase in egg deposition and increased recruitment. In 2012, CFRS staff and Central Michigan University (CMU) graduate students worked through the summer and fall to document invasive egg predator species densities on critical spawning habitat of coldwater fishes, such as lake trout, lake whitefish, lake herring and round whitefish. Researchers continuously worked to develop the best possible methods for removing these predators manually. In total, more than 6300 gobies, and nearly 1000 rusty crayfish (of which 520 were females) were removed from four treatment reefs. To collect quality data, there was very intense sampling had to occur which included 67 separate dives to collect 600 1-minute videos as well as deploying and retrieving egg nets to document round goby numbers. In addition, crews set over 5000 overnight minnow trap net sets to capture invasive crayfish and gobies.

The plan for removing round gobies, using a new fisheries management tool

called a seismic gun, was not tested and deployed in 2012 because of scheduling difficulties. The use of this gun has been postponed and is to occur in 2013.

In 2012, sampling to develop baseline data on adult fish species composition and abundance, egg density, and egg predator densities on the six study sites was completed.



In 2012 we noticed extreme shifts in the number of eggs deposited by both lake trout and lake whitefish.

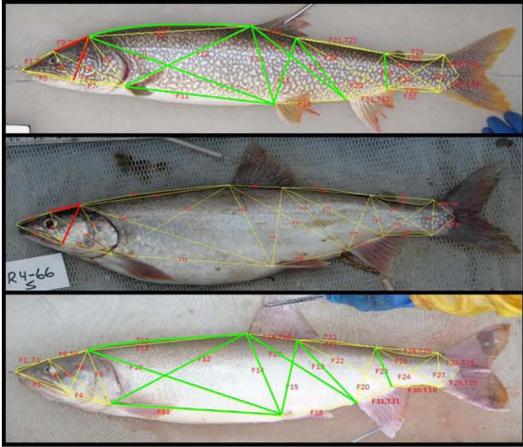
Elk Lake Lake Trout Project: The CFRS and collaborators from CMU continued sampling Elk Lake with the project objectives to obtain a population estimate and better understand the spawning characteristics of the lake trout in Elk Lake. After a successful fall 2011 tagging season on lake trout in Elk Lake, we followed up in 2012 with continued success. To date we have 250 fish tagged with a dorsal tag that includes an individual tag number and contact information for anglers to learn more about the lake trout they catch and the study to relate the remnant Elk Lake lake trout with rehabilitation efforts in Lake Michigan.

The next step of the project will be to document where and on what substrate these lake trout are spawning. The evidence leads us to believe these fish

are spawning in deep water (>100ft) on sand and clay bottom.

The last time lake trout could freely move from Lake Michigan to Elk Lake was in the late 1800's and early 1900's. Since then, the only stocking of lake trout occurred for a few years in the 1980's. Genetic testing suggests these fish are not related to the stocked fish. This is leading us to the conclusion that they could be from the remnant population of pre-lamprey introduction (circa 1920's). If this is so, they have evolved without the impact of sea lamprey and alewives and have maintained wild instincts for survival, which many hatchery reared lake trout may have lost.

A CMU graduate student has compared physical features between populations of current lake trout from Lake Michigan, Lake Superior and Elk Lake. This comparison is done by taking 31 measurements per fish from different landmarks, such as tip of snout to dorsal (top) fin or dorsal fin to caudal (tail) fin. With all these measurements required on a sample size of over 260 fish, you can imagine why graduate students get frustrated. Genetic results have concluded that the Elk Lake lake trout are significantly different from other populations. Leading researchers to believe these trout are like no other population of trout currently in the Great Lakes.



The following lake trout had 31 measurements taken per fish from three different populations with a sample size of 260 fish.

Fisherman’s Island Reef Complex Study:
 In 2012, CFRS finished up some larval sampling that was part of a Reef Complex Study. This particular area has been involved in numerous studies ranging from fish species composition, study of known spawning habitat types and documenting the spread of exotics like the round goby. The goal of this study was to encompass past data collected, fill in other missing information and come up with ecological picture at this very special Great Lake Ecosystem.



Fisherman’s Island shoreline

OTHER ACTIVITES

State Wide Stocking Program: Every year, staff from the CFRS assists in the stocking of trout and salmon from the state hatchery facilities to designated lakes and rivers. In 2012, CFRS staff once again 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.



Support MDNR fish stocking activities

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. Six weeks of trap netting and fish movement tracking was conducted in early June and late July. Smallmouth bass collected in the trap nets were measured, age structure samples were taken, and fish were given a jaw tag before being released. Any recaptured fish – fish that were tagged in previous years – were measured for individual growth comparisons. Tag numbers of all fish captured were recorded to allow calculation of population size.

Steelhead Egg Harvest: CFRS staff once again assisted in the Fisheries Division objective of collecting steelhead eggs from adults running the Little Manistee River. These eggs are then sent to two State Fish Hatcheries, Thompson and Wolf Lake, where they are raised for a year and a half before being released.



Steelhead egg take

Net Repair: Each winter the vessel crew works endlessly to maintain the various nets we use, and to build new nets for upcoming projects. This year CFRS staff built from scratch two 40 foot and three 15 foot bottom trawls to be used for yellow perch sampling. Gill net construction and repair included 20,500 feet (almost 3.9 miles) of the bottom gill nets used for many of our different studies including: spring LWAP, VHS surveillance, young-of-the-year yellow perch estimates and fall adult spawning.

Fish aging: One of the most time consuming and important activities occurring at the CFRS during winter months is determination of the age of fish sampled in our various lake surveys. Fish are aged to provide us with important information about a fish population, such as growth rates, age-at-maturity, age composition, mortality rates, or maybe even how many times certain fish spawn. This information can be used to make better management decisions for certain lakes or certain populations of fish. CFRS staff aged approximately 3,000 fish in 2012/2013 of which 91% required second and sometimes third reads.

Fish can be aged using almost any bony structure. Some of the most popular are

scales, spines, otoliths, and opercles. Scales and spines are advantageous because the fish doesn't have to be killed to collect the aging structure.



Otoliths and opercles may be taken as well when fish will be sacrificed for other research purposes (e.g., contaminant sampling).

Community involvement:

Outside of doing everyday fisheries work, we at CFRS strive to play a large role in our community such as the United Ways "Day of Caring", East Jordan Elementary Program "Tool School" and other events. Also we were very lucky to witness the "Nina" and the "Pinta" sail into Petoskey...at least the replicas.



Christopher Columbus's "Nina" was moored to the Petoskey Clock Dock in July for all to witness.

Public presentations: During 2012, CFRS staff made an effort to increase the number presentations given to public

groups concerning Station, Division, and Department activities. These included presentations to local Kiwanis and Rotary clubs, Michigan Sea Grant workshops, and various area school groups. We also hosted groups at the station, providing tours of our facilities and of the Medusa Creek salmon harvest facility. Groups and individuals who are interested in learning more about what we do are encouraged to contact the station for information, a presentation to your group, or to arrange a tour.

Charlevoix Staff Listing

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Randy Claramunt, Research Biologist
John Clevenger, CWT Program
Eric Crissman, Assistant Boat Captain
Patrick Hanchin, Tribal Unit Biologist
Jory Jonas, Research Biologist
Tracy Kolb, Creel Program Biologist
Bryce Kucharek, Fisheries Assistant
Patrick O'Neill, Fisheries Technician
Rebecca Parker, Seasonal Worker
Kendra Porath, Creel Clerk
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Nathan Skop, Fisheries Technician
Jeff Stevens, Trades Helper
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