

GREAT LAKES FISH HEALTH COMMITTEE

2020 Summer Meeting
Virtually
August 13, 2020

Minutes

Submitted By:

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Great Lakes Fishery Commission

The data, results, and discussion herein are considered provisional;
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GREAT LAKES FISHERY COMMISSION
2200 Commonwealth Blvd, Suite 100
Ann Arbor, Michigan 48105
Great Lakes Fish Health Committee

List of Attendees

Kerry Hobden	Ontario Ministry of Natural Resources and Forestry
Danielle Godard	Wisconsin Department of Natural Resources
Nicole Nietlisbach	Wisconsin Department of Natural Resources
Gary Whelan	Michigan Department of Natural Resources
Kevin Loftus	Ontario Ministry of Natural Resources and Forestry
Andrew Noyes	New York State Department of Environmental Conservation
Sunita Khatkar	Fisheries and Oceans Canada
Dave Meuninck	Indiana Department of Natural Resources
Mitch Marcus	Indiana Department of Natural Resources
Kevin Kayle	Ohio Department of Natural Resources
Thomas Loch	Michigan State University
Coja Yamashita	Pennsylvania Fish and Boat Commission
Brian Newinski	Pennsylvania Fish and Boat Commission
Ling Shen	Minnesota Department of Natural Resources
Paula Phelps	Minnesota Department of Natural Resources
Ken Phillips	U.S. Fish and Wildlife Service
John Coll	U.S. Fish and Wildlife Service
Kevin Irons	Illinois Department of Natural Resources
 <i>Guest Attendees:</i>	
Don Tillitt	U.S. Geological Survey
Matthew Braille	Ontario Ministry of Natural Resources and Forestry
Sohail Suddiqui	Ontario Ministry of Natural Resources and Forestry

Great Lakes Fish Health Committee Meeting

Webinar

Thursday, August 13, 2020

**9am-12pm Eastern
2pm-5pm Eastern**

9:00-9:15	Welcome and introductions (Chair)
9:15-9:30	Zoom etiquette and user instructions, Commission update (Dettmers)
9:30-10:30	Lake Trout thiamine levels in Lakes Michigan and Huron (USGS)
10:30-11:00	Blue Book revision update and discussion (Loch)
11:00-11:30	In-hatchery enrichment strategies on post-stocking survival of Atlantic salmon smolt (Loftus)
11:30-12:00	Mass Marking Efforts During COVID19 (USFWS)
12:00-2:00pm	Afternoon Break
2:00-2:15	MNRF Dorion Fish Culture Station – Facility presentation/virtual tour (Sohail Siddiqui, Manager)
2:15-3:30	Agency Updates & Lessons Learned During COVID19 (All)
3:30-4:30	Interesting Cases (All)
4:30-4:45	PFAS Task Force update and discussion (Meuninck)
4:45-5:00	Winter 2021 meeting update, Summer 2021 meeting (Chair)
5:00pm	Adjourn

Summary of Decisions and Action Items

ACTION ITEM: Coja will send out a new paper published by USGS on Melanosis.
Completed and sent via email on August 13, 2020

ACTION ITEM: John Dettmers will share Tammy Newcomb's PFAS presentation to Meuninck and the committee.

ACTION ITEM: Andy Noyes will provide any results from New York's PFAS testing that might have resulted in non-consumption advisories to Meuninck.

ACTION ITEM: Kerry Hobden will also look into OMNRF's PFAS testing history and get back to Meuninck.

ACTION ITEM: The committee should send comments on this virtual meeting experience to Kerry and Danielle (copy John Dettmers and Erin Bertram) to accommodate concerns or questions for next possible virtual meeting.

1. Thiamine status of lake trout eggs from Lakes Huron and Michigan (Don Tillitt – USGS)

Thiamine Deficiency Complex (TDC) is also known as early mortality syndrome (EMS). It is caused by low thiamine in tissues or eggs. Thiamine is an essential nutrient that all vertebrates require. Thiamine is critical for glycolysis (PDH) and energy metabolism, used for creating DNA and RNA etc. EMS is linked to diets that are high in alewife, which produce thiaminase that breaks down thiamine. The lake trout life cycle requires thiamine throughout all stages but low thiamine levels during fry development through to swim up can cause a survival bottleneck. In an adult that has low thiamine, the gametes have low thiamine and mortality occurs at the swim-up stage. Historically, EMS was predicted by low thiamine levels in adults and eggs. EMS signs include loss of equilibrium, erratic swimming, lethargy, hyper-excitability, brain histopathology, hemorrhaging and death at swim-up.

When thiamine levels in lake trout eggs are ≤ 1.4 nmol/g, substantial mortality occurs. At concentrations of < 4.0 nmol/g sub-lethal effects such as reduced growth, prey capture and predator avoidance are apparent. More recently, these data were incorporated into individual based models and published in the Journal of Great Lakes Research. Results indicated that the threshold for sublethal effects is even higher at $< 7.4-10$ nmol/g. When including interstitial and pelagic predation, the impact of sub-lethal effects shifted the EC50 to 7-10 nmol/g. Don Tillitt has been working with the thiamine deficiency of lake trout eggs, from 2014 to present with the Great Lakes Science Center. Many other agencies and individuals have produced data and been involved in these analyses over the years

Data from 2019 Box and Whisker Plot:

Tillitt did not receive a full set of egg collections from cooperating agencies but got samples from three locations in Lake Huron. Rogers City was a new addition this year. Lake Michigan thiamine averages are lower than those seen in Lake Huron. When looking at the data, averages can be deceptive as a population average is not what is concerning, it is the amount of thiamine in the eggs from an individual lake trout. When looking at individual data points, one can see the spread of the data. With the threshold down at 4nmol/g, a number of individuals fall underneath that threshold for causing TDC. Lake Huron lake trout egg thiamine trends between 2001-2020 show the continuity that has occurred over the years at these same sampling locations. Lake Michigan lake trout egg thiamine trends between 1996-2020 show where sampling has been repeated over the years. Mean egg thiamine concentrations (nmol/g) for Lake Michigan were below the 4nmol/g threshold for years, but in the mid-2000s thiamine concentrations started to increase. The threshold is reference. The same trend is seen in Traverse Bay, with increasing thiamine. Southern Lake Michigan does have a few sites above the threshold but there are no increasing trends in southern locations. Mean egg thiamine concentrations for Lake Huron were below the threshold during 2000 - 2008. Almost all Lake Huron locations saw increases in thiamine. When applying these data in a regression, there is an increasing trend for Lakes Huron and Michigan. However, the rate of increase in Lake Michigan is not as great as in Lake Huron.

What proportion of these individuals are above or below the threshold of < 4 nmol/g? For Lake Michigan, in early days of monitoring there were high proportions of fish that had thiamine concentrations below the threshold. Clay Banks eventually had zero fish that were below the threshold. For other sites in southern Lake Michigan, there was no significant trend but scattered data points. In Lake Huron, there is a steady decrease in the proportion of fish below the thiamine threshold. This decline occurred more quickly in Lake Huron due to the

alewife crash there. The overall trend for both lakes is a decreasing trend in thiamine. Between the two lakes, the percent of females with eggs below the threshold in 2013 has increased in Lake Huron. From 2014 to 2016, there were no individuals in the Lake Huron locations that have been sampled that were below the threshold. In southern Lake Michigan, there is a higher percentage of individuals that are below the threshold. For 2019, no fish in Lake Huron were below the thiamine threshold. A few different sampling locations were included in 2019 for Lake Michigan (e.g. Northern LM Refuge). For 2019, using the threshold at $<10\text{nmol/g}$, there is a much larger proportion of the population with overt mortality at the fry stage. All locations sampled in Lake Huron during 2019 have lake trout populations that produce eggs with ample thiamine ($>4\text{nmol/g}$). Lake trout from northern Lake Michigan have some individuals (0-14%) with low thiamine but most populations produce eggs with ample thiamine. Southern Lake Michigan populations of lake trout tended to have more individuals with very low egg thiamine. Significant amounts of TDC would be expected from this part of the lake.

DISCUSSION

Is there a standard protocol to sample and for collection that all stations are using?

Yes, there is a standard protocol and Don would be happy to share it with this group. We typically request at least 10g of eggs and have photos to show how much that looks like. How we freeze and label etc.

How do Lake Michigan and Lake Huron lake trout egg thiamine concentrations compare to Lake Superior lake trout?

We do not have as much solid data for Lake Superior but the concentrations in Lake Huron are now approaching the amounts that you see in Lake Superior. We do not have long-term historical data for Lake Superior.

Is there any reason to believe that thiamine levels won't increase in the future if and when alewife populations recover?

The relationship of thiamine in eggs and the diet of adult females is an inverse relationship. Female fish with diets that are almost strictly alewife are the ones where the concentrations of thiamine in the eggs end up being the least. Alewife have the enzyme thiaminase that degrades thiamine in the gut of the lake trout as it is being digested. If you have recovery of alewife populations and the diet of female fish is predominately alewife, I would expect to see more TDC in that particular lake. If alewife recover, thiamine deficiency related issues will return and it is unlikely that thiamine levels will increase.

Are the data points representative of individual eggs from females? Or are they representing individual parents?

Each data point is from individual females. Some of the plots are showing the mean by location across many females. However, those means are deceptive because individual females contribute to the level of thiamine in the eggs.

What do the data mean in context in the pattern of lake trout natural reproduction that we see in Lake Michigan? Natural reproduction of lake trout in southern Lake Michigan is increasing, but this trend is not totally consistent with the observed data showing less thiamine in the eggs.

Based on the southern refuge location in Lake Michigan, it seems surprising that there would be a lot of recruitment from those populations based on the thiamine concentrations.

Gary Whelan explained that it is possible that lake trout are spawning in some areas that are not sampled for when doing thiamine analyses.

Is there evaluation of otoliths to look at micronutrients and evaluate where those fish may have come from that are naturally reproducing?

When fish spawn in the open lake the ability to discriminate tends to go way down. It is worth the exploration but could be difficult to do.

Dave Meuninck is looking at thiamine levels in Indiana's steelhead broodstock. Indiana has had issues with survival of the adults after being handled and in captivity despite getting antibiotic and thiamine injections. The theory was that they were feeding on alewife and suffering TDC as well as low immune system response and defense mechanisms. It took a lot longer for these fish to reap the benefits of the thiamine injections they would get. Is it a good theory that these fish are suffering TDC resulting in infection and/or low immunity?

Yes, low thiamine can affect immune function in salmonids. It is not certain if it is innate or an adaptive immune response, but yes there is good evidence that it is one of the consequences of loss of fish.

What is the forage base for other species in northern Lake Michigan? Could that be a reason why lake trout are pushing their movement more south?

Probably a more variable prey/forage base. More smelt are in northern Lake Michigan than the southern portions and plenty of gobies are in the diet as well as alewife in northern Lake Michigan. There is evidence to show that smelt and gobies can also have thiaminase activity. It is unknown if goby are producing the thiaminase themselves or getting it from the environment.

Getting back to the discussion on the paradox of natural recruitment of lake trout despite low thiamine levels: you mention the 10nmol/g threshold is causing sub-lethal effects and some of these sub-lethal effects might not always cause mortality. What is the gradient of effects from 4-10nmol/g?

In the early 2000s we took lake trout from different spawning events and looked at growth. Growth was inhibited as thiamine levels fell. We also looked at predator avoidance, and did studies with prey capture ability. If you think about those behavioral studies results are highly dependent on the species you're using and the prey species you are using. Because of that, in the environment, there are a variety of predators and we don't have the data to represent that or what the efficiency of those different predators may be. We also know that there is a variety of species as predator or prey that can impact the gradient of the threshold and the sub-lethal effects. The shift from 4 to 7-10 nmol/g incorporates the effects of predation. There is a lot of grey area where we can enhance our knowledge to make more accurate representation of what we might think a true threshold might be and thus the gradient of sub-lethal effects.

2. Blue Book revision update and discussion (Tom Loch- MSU)

AFS-FHS EXCOM formed an *ad hoc* committee to dig into possible revisions of the Blue Book. In the meantime, a Multistate Conservation grant to update the Blue Book was sought and awarded. The *ad hoc* committee report was completed, sent to FHS members for comment, approved by EXCOM, and will be used to help guide activities of a project manager who will craft suggested revisions. The goal is to have the project manager in place by Jan 2021 (was delayed due to COVID-19), a Steering Committee comprised of state, federal, tribal, and private stakeholders is expected to be formed, and working groups comprised of subject matter experts to work with project manager and steering committee to

update the Blue Book. Update on Blue Book revisions that have/are occurring through “typical” process (i.e., via AFS-FHS Technical Standards Committee and/or via Handbook Revision and Oversight Committee):

- Diagnostic Section (i.e., BB Section 1)
 - *Streptococcosis* in Fish, chapter 1.3.3
 - *Perkinsus* spp. Infections of Marine Molluscs, chapter 5.2.1
 - VHSV chapter, 2.2.7
 - *Microsporidium* chapter (Dx section)- Pending
 - Bacterial Kidney Disease, chapter 1.3.1
- Inspection Section (i.e., BB Section 2)
 - Standard Operating Procedure (SOP) for Jonstrup et al. qRT-PCR assay for VHSV- Pending (will be within Chapter 4)
 - *R. salmoninarum*, Chapter 3.5

DISCUSSION

You mention that qPCR for VHS could be used as a primary test. When do you think that can happen? In MN we have already adopted that. What about other states using PCR as primary testing?

Concurrent with all of this, there are other efforts to get federal consistency as part of the revision process. At this point, if you follow the Blue Book, there is a flow chart where qPCR can be used but you need to use an additional test to confirm. It is recommended to sequence and genotype the amplicon but the qPCR test would still be considered as confirmation.

Could also use PCR to rule out all of the negative testing. If you use PCR and it is positive then makes sense to follow up to confirm it, but what about all the negative samples?

The testing discussed in the flow chart is in the diagnostic section, but not considered for the health inspection portion. According to the diagnostic section if you get a qPCR negative test, it is enough for confirmation for diagnostics but not sure about health inspections. The way it is revised in the diagnostic section, yes qPCR is considered a confirmatory test.

When using qPCR for bacteria, are you talking about confirmation testing on just the tissue and cells?

It can be used in sequence as a confirmatory test as written on any of the samples.

Even though chapters are posted and available is there some sort of review that still needs to happen? How long will this process take?

Since they are posted, they are considered final. They have gone through approval and review channels and are finalized.

USDA is revamping the NAAP. Is that something we want to have them come talk to us about during that process and get feedback on?

Kathleen needs to have a fully drafted NAAP by early September. There is a lot of potential for collaboration on this. She also happens to be the chair of the technical standards committee. Funds procured for the project manager are for one year. There is no way the whole Blue Book could be revised in a year. Tom just started his term as Fish Health Section President. He is looking at a means of pulling a lot of entities together (NOAA, USGS,

USFWS, and this group) to get the Blue Book updated sustainably as it will not happen in the year as a way to maintain relevance.

Gary was recently on an AFWA call and the due date for the draft NAAP is by Labor Day for internal agencies. The old NAAP will disappear quietly. They are looking for input from resource agencies to get input during September. Gary indicated on the call that he would be involved and assist AFWA. Other states like CA, CO, WI will also be involved. The plan will move forward quickly. Gary would like GLFHC members to provide him comments to be put through to AFWA or submit comments directly to AFWA. There is a certification process in the proposed NAAP for small labs that seems quite unobtainable for most labs the committee works with. AFWA is a possible home as it involves all of North America.

What is expected completion date for revised blue book?

The grant will not be able to allow the blue book to be fully updated in the next year. Completion date is not exact but is a primary goal for a lot of folks involved.

Regarding lab certification, Minnesota is trying to look into this, but the more they did the more they feel that certification for a small lab like theirs may become a very difficult task for them. If all labs that conduct fish health inspection have to be certified, what is the discussion now? Is that going to be required in the future?

It is supposed to be a stepping stone to help in the certification processes.

The link to the Blue Book and its finalized chapters can be found at:

<https://units.fisheries.org/fhs/fish-health-section-blue-book-2020/>

3. In-hatchery enrichment strategies on post-stocking survival of Atlantic salmon smolts (Kevin Loftus-OMNRF)

Kevin Loftus provided key findings and updates about this effort since the last GLFHC meeting, the expansion of that work by section staff, and the current thinking about enrichment strategies. Enhancing fitness investigations are ongoing, including stocking Atlantic salmon as spring smolts. When using PIT tags to monitor the fish, more than twice as many fish that were enriched survived to the time of downstream migration than conventionally reared fish. A large portion of that difference occurred in the first 10 days after stocking. What happens to them after they migrate into the lake is unknown. There was no detectable difference in response to predator scent. The next steps will be to enhance effectiveness of enrichment strategies at Normandale and to simplify implementation. OMNRF staff are also considering exploratory work with other species such as lake trout, bloater, or intensively reared walleye. When walleye are intensively reared, they are not exposed to live feed or exposed to predators. While many walleye can be reared this way, there are legitimate concerns that the fish are much less fit. For the bloater program, they have been taking gametes from the in-house broodstock of bloaters for the last three or four winters. Gamete quality has been low for several years. The diet was altered but there were no benefits in 2019. For winter 2020, there was some improvement in eye-up rates. University of Guelph confirmed differences in egg compositions for bloaters. They have secured funding for this summer for testing different diet formulas for bloaters.

DISCUSSION

Wisconsin asks if sperm extenders have been used for bloaters? Is poor gamete performance after fertilization or not? Have you attempted using any sperm extender or using any other spawning conditions in-hatchery? Northern Pike do well when using sperm extenders in Wisconsin.

A few years ago, they did use sperm extenders but it was not effective. Bloaters are relatively small fish to start with and the amount of milt they produce is quite small. Egg lipid composition is varying and probably the main part of the problem. Micro nutrient deficiencies have also been investigated as an issue for gamete quality.

What is the average size at stocking for Atlantic salmon fall fingerlings and spring smolts? How far upstream are they being released?

It may vary depending on the site but they are fairly far upstream about 15-30 km upstream. The fall fingerlings are typically 25 g to 50 g.

4. MNRF Dorion Fish Culture Station – Facility presentation/virtual tour (Sohail Siddiqui-MNRF)

Sohail Siddiqui is the manager of the Dorion Fish Culture Station and provided an overview and virtual tour of the facility. Dorion is one of nine fish culture stations in the province of Ontario, located in the north western part of Ontario on the north shore of Lake Superior. The facility holds 13 different species of fish. They stock up to 8 million fish annually. Approximately 2,000 waters are stocked from this facility. The main station began operating in 1933 and was renovated in 2008. A sub-station was created in 1975 and will require renovations soon. The larger area of land it is stationed on has been classified as an area of concern where activities like forest management are controlled. Some adjacent lands have been identified as watershed reserves and are withdrawn from stocking. The main station is a broodstock and production facility. The water source is from a spring-fed pond with gravity flow. It is 4-9 degrees C year-around on average, 17,000 L/min inflow, and has an aeration and degassing building that balances gases; reduces radon, nitrogen; and increases dissolved oxygen. The sub-station water supply is from one main water line that is from a spring-fed pond. It is 5-8 degrees C year-round and is 5,000 L/min from the spring and is also gravity flow. It is only a broodstock facility. Approximately 870,000 fish are stocked annually per production cycle. Most are stocked as yearlings. Fish are stocked among lakes surrounding the facility along the north shore of Lake Superior. For some lakes, fish are stocked using helicopters, trucks, and quads. Red Lake has a biodiversity conservation program in place from spawning issues in wild stock. The restoration program was established in 2005. In 2012, a single line of brood stock was created. In 2019, over 130K fish were stocked. Early rearing incubation and egg receiving includes biosecurity measures for fish health. There is an advanced rearing area for brood stock. It has 75 raceways for yearling and brood rearing. Each tank holds 15,000 liters of water. It is a pneumatic feeding system with controlled lighting. Isolation rearing includes five rooms and biosecurity measures for staff as well. Advanced rearing and brood stock pneumatic feeding system is computerized. This enables control of pellet size, feeding frequency, and duration of feeding. Waste management involves source water into fish culture system, waste water to clarifier and sludge is captured, and then clean and effluent water is released back into the environment.

DISCUSSION

What type of lighting are you using? LED's have a temperature rating

There is no issue with temperature using the LED lighting. The water temperature does not have a wide range though out the year.

Is there a challenge in maintaining that many strains in one facility?

There are technology coordinators that keep track of all the broods and their fecundity and line crossing cycle and they work closely with aquatic research scientists. It takes extra work to maintain that many separate strains but it is manageable.

5. Agency Updates & Lessons Learned During COVID19

Michigan DNR

There were reports of wild fish mortalities due to weather patterns this year. The eyes in the field system has been very busy this spring with reports such as dissolved oxygen issues and temperature swings. Walleye or musky egg takes did not occur this year due to COVID19. There was not a major VHS outbreak this year.

NYDEC

Due to COVID19, many agency activities are on pause, including fish health activities. With the detection of zebra mussels at the Rome Hatchery, hatchery production has been cut 25% and stocking plans altered. Rome strain Brown and Brook Trout are currently being challenged with *Aeromonas salmonicida* as a routine part of maintaining disease resistance in those trout strains. Flavobacterial diseases comprise 90% of hatchery casework. A Smallmouth Bass kill on the St Lawrence River was attributed to excessive heat and complicated by heavy tournament activity since most of the dead fish were found close to the fish release site.

Wisconsin DNR

As of March 2020, there was a stay at home order for Wisconsin. All field activities ceased. Veterinarians were deemed essential in hatcheries given safety measures such as using separate vehicles, staying six feet apart and wearing masks. Later in the year field staff returned to work and fish health is now involved in more wild fish surveillance. There were sampling events for fish health inspections, forage fish surveillance, and grow-out surveillance. There were no significant findings except for unusual morbidities and mortalities that are still under investigation/to be discussed. Wisconsin DNR did not spawn lake sturgeon, musky, or northern pike, but walleye and steelhead were spawned. Discussing with other managers in Wisconsin what their egg needs may be; we can assist to the best of our ability.

Ohio DNR

Early egg takes for walleye, fish health testing in the hatchery and on the Ohio River was done before the stay at home order in March. Fish health was then deemed essential early on. Walleye and saugeye production were successfully completed. Egg collection efforts were stopped after Mosquito Lake due to increases in safety from COVID19. No positive COVID19 cases in the hatchery staff. We got what we needed out of Mosquito Lake. We did not do our own musky egg take. PFBC provided musky eggs. We did get fish health samples out of all of our hatcheries. Approximately 43.6 M fish were requested to be stocked in 2020 and we were able to surpass that. Work plans are in place for hatchery staff and being

adapted as we move from production season to maintenance. Walleye population in Lake Erie is at an all-time high. Numerous reports have shown up this spring with tapeworms identified as *Diphyllobothrium*. The last three or four weeks that frequency has since decreased.

Minnesota DNR

VHS zonation has been adopted for the state. To maintain the zonation, we have to do surveillance work. We tried to do this in the spring since there is evidence VHSv will not be detected at higher temperatures. However, with the stay at home order for the state, it took a while to get the surveys approved but it was eventually deemed essential work. Surveillance samples were taken for the lakes zoned for and all tests are now done. The zones can be maintained until next year. There was a minor episode of *Aeromonis* infections at the Peterson Hatchery, with first year brook trout line that we tried to establish the wild strain into the hatchery setting. The mortality was a dripping pattern. *Aeromonis hydrophilla* was discovered and treated with terramycin and fish recovered fairly well after treatment. It could be a combination of factors such as adapting to a new environment and stress and more susceptible to infections. There was no walleye egg take this year due to COVID19 restrictions. The lab is still deemed essential but the work load has decreased from limited sample taking. The disease outbreak at Peterson Hatchery might also be due to construction issues. During demolition two years ago in the spring, they found contaminated soil and it took time to determine how to deal with it. The building was not completed on time last fall. They had to construct a temporary nursery and egg incubation area and build a temporary plastic building. The limited capacity caused higher densities of fish at Peterson which might also have contributed to the disease outbreak. There are still construction issues and the new building will not be done in time again this fall. It will be necessary to do the same thing as last year using the temporary building. A roof collapsed at a different hatchery this past winter. There will be shifting between all four hatcheries to meet production quotas and may see more density related issues. There will not be any steelhead stocking this year for Lake Superior. There was no approval for egg takes this coming year either, but Paula Phelps is working on this to get it pushed through. There will be some walleye for stocking, as MN DNR purchased some from private industry under contract and can use some carry-over fish. DNR purchased carry-over tiger muskies from private industry and those have been stocked. A sports group donated a large amount of musky for the agency. Fish are stocked around 12 inches and they survive five times better if stocked at 15 inches instead. We put these donated fish at rearing ponds first and then we are growing them out over the summer. We will harvest them this fall and stock out into their final homes at 15 inches.

PFBC

Fish health work was deemed essential early on during the pandemic. Hatchery staff continued with some restrictions as well as with the fish health unit. We could not use volunteers for stocking. We used accelerated stocking, putting fish out seven days a week of as many as could be stocked using all agency staff including engineers, biologists, accounting i.e. all hands-on deck going all over the state. We only had one person per vehicle. We did not get to sample all warm water broods. All warm water fish were spawned. Inspections are difficult with one person per vehicle. A study is looking at gill lice effects on our wild trout but had to postpone due to COVID19. During steelhead spawns in Lake Erie we detected IPN positive fish. During one of our spawns, every group we took samples from were positive for IPN, so we had to cull all those eggs. In another group, all males were positive and then it deceased with each spawn over time. We lost quite a few eggs and struggled to maintain production goals. Probably got positive fish in the weirs and it got into the hatchery and stress increased IPN detectability. We are getting positive results by cell

culture but when we ran confirmatory tests with PCR we were not getting any hits. There were tapeworms found from walleye in Lake Erie. Inspections were still completed this year alongside John Coll and his crew. It was a hot and dry year so a lot of *Columnaris* was detected in the wild and in nurseries, as they are open water sources and streams are warming up.

Indiana DNR

No walleye or musky take was completed this year. VHS surveillance is typically done in those water bodies so that was not completed either due to the pandemic. Steelhead broodstock spawning this January and February will be done with COVID19 restrictions. Coded wire tagging of steelhead was not able to happen this July. There is hope to still do it if there is approval soon. A few ponds are reaching maximum densities. If tagging doesn't happen soon, the ponds will have to be split. Should that happen, no tagging can occur. Hatcheries have not seen anything out of the ordinary in terms of disease or fish health. Each hatchery takes samples and ships them to Purdue for processing. For wild fish kills, there have been spawning stress mortalities with bluegill and catfish. This spring was drawn out and then it got hot quickly. No koi herpes virus with carp was seen. No diagnostic cases so far this year. Many of the hatcheries do not have walleye or musky in their tanks and they usually are the ones to get an outbreak of something like *Columnaris*. Two water bodies that are supplies to our hatcheries were negative for VHSv Dogwood Lake that feeds a hatchery was positive for LMBv. Bluegill and largemouth bass samples were submitted but can't tell what species is positive due to a sample labeling mishap. Due to a drawn-out spring, there was no musky collection for sampling and water temperatures were outside of what is required for VHS. Some changes that have been made this year for summer-run steelhead broodstock collection and include: OTC injection switched to a brand that is now available in 100 ml bottles and using the maximum dose of 50mg/kg of fish. Using soluble terramycin was stopped 10 years ago, but we have gone back to using it to transport the adults. Extra label prescription of 10.65 g per 100 gallons of transport water is used, along with routine salt treatments for 350 gal per minute using 15, 40-pound bags of salt. All or some of these changes seemed to be positive for decreased handling mortalities. The only thing that didn't change is the thiamine injections.

USFWS LaCrosse

In mid-March the USFWS completely shut down. The fish health center was deemed essential but only doing minimum work. Fortunately, all inspections were completed before the stay at home order. Warm and cool water inspections in Genoa and Neosho were not completed which affected stocking, so there were no lake sturgeon egg takes. Lake trout were stocked out using a different strategy using shore stocking instead of out on reefs in the lake. No overnight travel was allowed. Staff are starting to travel now and do inspections including Genoa. To do any field work, a risk assessment document must be completed and submitted to the regional office for approval. Some lake trout hatcheries will be visited for inspections. The one person per vehicle restriction is still in effect and makes eight-hour day trips difficult. Iron River National Fish Hatchery did not have any *V. salmoninarum* because all broodstock were depopulated last spring. There is another lactic acid bacteria and pseudokidney disease in production fish, though. Two year-classes of brook trout brood stock are there and each facility is losing about 10 a week. They are sending us TSA slants. Carnobacterium has been isolated from almost all of them. The first-year class was quarantined in Genoa and then they were moved to Iron River NFH over a year ago and during an early September inspection, disease symptoms were seen. Carnobacterium was detected and got worse after they had spawned. It is known to be in the water supply to Iron River NFH as it keeps re-infecting the fish. The plan is to create an isolation room for brook

trout broodstock with disinfected water coming in. The concern is putting lake trout back there and possibly seeing the same thing with them. Treatment for *Carnobacterium* has been approved. Injections are being done on a small portion of them to see how effective it is. Once the small isolation room is created it will be used to treat the rest of the fish there.

Illinois DNR

Musky broodstock are not out of the water so there are few in the hatchery now. Walleye and sauger eggs came in just prior to closing mid-March. All fish screening happening at brood lakes and hatcheries and will wrap up soon. For hatchery staff, only two people per vehicle are allowed for long trips. We continue to look at hiring an agency pathologist. There were large fish kills similar to Michigan's reasoning due to water temperature swings and other common reasons. There was one large crappie kill this spring. They were analyzed but could not nail down the reason.

USFWS LaMar

USFWS is collaborating with other states and agencies to stay on top of production and inspections through COVID19 restrictions. The Atlantic salmon program and sea run fish collection involves fish collected by state partners that was suspended in the peak of the run and wasn't until later that they collected fish for the hatchery. The target population size was 450 fish for the geneticist and it ended up being much lower than that. They get PIT tagged and they draw blood to screen them as they come in. Only 272 was the total count. The run is halted now because the water is too low and very warm right now. Overall, there are decreased densities in hatcheries and reduced flows. Coregonine work is still occurring. The offspring are doing well in the hatchery. They are now out of double isolation after screening. There was an issue with calcein being unavailable during COVID19. Tunison Lab marked their fish with terramycin. They have been unable to see a mark on those fish.

OMNRF

Hatchery workers and staff were deemed essential. There is minimal staff at the station and some are working from home. From a financial standpoint, all staff continued working. The lab used to do routine monitoring of samples were sent home to work. Their staff still continued to get samples processed and got the work done while working from home. Sample processing is done throughout the year and went through site by site to prioritize and are now all caught up. Not many detections in the samples. There is a yearly detection of *Yersinia ruckeri* in early rearing in the fry in the North Bay. We typically do not treat and assess how they do. It was picked up in splake and brook trout. Mortality was seen before the samples were analyzed. Aquaflor will be pursued to use for those after talking with our veterinarian. It could be a commercial vaccine that could be used. If anyone has experience with that, your input is appreciated. There were reports of die offs for our wild fish. Districts were limited to who and when they could respond to die off reports. There was little success in processing archived material, so we advised everyone to freeze what they could. Trying to get Title 50 in place to get fish across the border.

Michigan State University

Tom Loch's lab was only 2/3 through inspections before COVID19 hit. A significant portion of the lab is made up of undergrad and graduate students. Undergraduate laboratory technicians were not approved to be in labs; however, graduate students and staff could be for approved "essential research." Loch was not allowed to mandate graduate students to come in but thankfully, all are exceptionally dedicated and came in each day to get the work done. All diagnostic and inspection submissions were completed as needed and despite challenging conditions.

6. Interesting Cases

Wisconsin DNR

Interesting cases were comprised of various reports, including a catfish from Lake Winnebago with bacterial exterior infection and/or lesions, a smallmouth bass with external multifocal black spots, and bluegill die-offs from multiple lakes (generally associated with *aeromonas* infection). Most of the fish were submitted in a state of decay and not able to be fully investigated. A black crappie from Swanson Lake was reported with a large dorsal tumor and possible sarcoma but samples were not able to be taken this spring. A white sucker from Big Green Lake was reported with a suspected *Saprolegnia* infection, and a walleye from Eau Claire Lake was further reported with an unknown cutaneous infection. Further assorted health issues reported to fish health staff included a northern pike with generalized lacerations, female and male walleye with unexplained cloacal prolapses from Beaver and Fox Lakes, and discolored (bright yellow) bluegill fillets from fish caught in northeast Wisconsin. There are no definitive answers to this change in fillet coloration, but diet is suspected. Musky from Dells Ponds were reported with external hemorrhagic lesions, while northern pike from Long Lake, salmon from Lake Michigan, and channel catfish from Eau Claire River were reported with varying types of exterior lesions or infections. Other health issues included a northern pike from an unknown location with an exterior tumor and large open wound/infection near the caudal peduncle, and a catfish with a large mass on the head; no biopsy was done. The suspicion in this case was a tumor of unknown etiology or an inflammatory response. Finally, within multiple Winnebago system lakes, lesioned catfish were reported to be washing up dead. Fresh samples were collected via fish trawler in order to collect skin scrapes, bacteriology, and histology. Initial results showed a mixed bacterial infection that included *Flavobacterium columnare*. Wisconsin DNR's presentation provided photos for each case

ACTION ITEM: Coja will send out a new paper published by USGS on Melanosis. Completed and sent via email on August 13, 2020

Michigan State University

West Londo Lake (200610-1-6) had hundreds of dead fish at various stages of decay this June. Less than two weeks before the event, hybrid bluegill and perch were stocked into the lake. When MI DNR collected the fish and submitted to the MSU-AAHL for clinical and diagnostic testing, the fish had gross signs of a systemic disease, and high loads of *Flavobacterium columnare* were detected. Driskel Lake (200721-1-2) also had a die off that occurred in late July. There are reports of bluegill or centrarchid specific mortality events from early in the spring. Then bluegill were being caught in July with evidence of hemorrhaging from an area that has water quality issues. MI DNR grabbed the bluegill that were moribund but still being caught hook and line. Some lethargic largemouth bass in the lake were collected. Varying degrees of ulceration in both bass and bluegill were observed, but not so pronounced and unusual as reported. Scrapes were done and high loads of rods were consistent of *Flavobacterium columnare*. The lab also recovered LMBV from both bluegill and bass. All bass analyzed had LMBV from various tissues.

7. PFAS Task Force update and discussion (Dave Meuninck- IN DNR)

Dave Meuninck has recently taken a position on the PFAS task force in Indiana and is asking if any agencies have concerns or new testing protocols for PFAS

DISCUSSION

Ohio: As part of normal fish contaminant analysis, we are now including PFAS sampling and looking at contaminant levels across the fish consumption advisory list. We just started this last fall and we are doing it again on the fish we have sampled this year. We are working with Ohio Department of Health with standards they have set.

Minnesota: We are doing a lot of testing with PFAS and contaminants. Last year we ramped up collecting samples for PFAS testing. PFAS is widespread throughout Minnesota. We have a task force for the DNR and Department of Health to do more testing for several years to come. COVID19 slowed down some of this sampling. We are not collecting any fish contaminant or PFAS samples currently because of it.

Has any of your testing produced samples with 70 parts per trillion?

They have lowered the level of PFAS and has created changes of concern in Minnesota. There is an unpredictable accumulation pattern in fish and does not follow typical bioaccumulation. There are similar levels in panfish and predator fish. It appears to be pervasive across Minnesota. 95% of waters tested in 2018 had at least one fish with PFOS.

Michigan DNR: In Michigan we have been the forefront of PFAS. It has been detected in many locations in the state, often close to airbases. Wolverine Boot Company outside of Grand Rapids contaminated around 100 wells. There are pending lawsuits surrounding this. Since the 1980s, we have found that the Oscoda airbase has been leaking PFAS into the environment and has been found in deer populations. There is a no consumption advisory that was issued for deer and grouse in that area. PFAS does not concentrate in standard locations such as the muscles.

New York: New York's Bureau of Habitat has a PFAS research unit testing for it in fish and other wildlife for many years now.

Any advisories because of it?

Not sure off hand but Andy can provide that.

ACTION ITEM: Andy Noyes will provide any results from New York's PFAS testing that might have resulted in non-consumption advisories to Dave.

Tammy Newcomb gave a presentation on PFAS to the lake committees as well as Beth Murphy from EPA at the Council of Lake Committee meetings.

ACTION ITEM: John Dettmers will share Tammy Newcomb's PFAS presentation to Dave and the committee.

Ontario is not aware of any PFAS screening.

ACTION ITEM: Kerry Hobden will look into this and get back to Dave.

We are wondering about the effect on fish. There are many consumption issues. What about reproduction or growth issues in our fish populations?

It is a known endocrine disrupter, and produces gender reversals. It may be difficult to find broodstock that are acceptable to be used to reproduce given increased in PFAS concentrations in fish stocks.

Tom Loch: MSU has a new PFAS testing center. There is a proposal to the Great Lakes Fishery Trust to look at lake whitefish and lake trout. The idea is that it could have effects on fish immunocompetence and so they want to assess whether exposure to these fish exacerbates this.

8. Winter 2021 meeting update, Summer 2021 meeting

The winter 2021 meeting will be held on **February 2-3, 2021** either in person in Windsor, ON or virtually.

The summer 2021 meeting will be held on **August 3-4, 2021** either in person in Charlevoix, MI or virtually.

ACTION ITEM: Send comments on this virtual meeting experience to Kerry and Danielle (copy John Dettmers and Erin Bertram) to accommodate concerns or questions for next possible virtual meeting.

GREAT LAKES FISH HEALTH COMMITTEE
TECHNICAL ADVISORS

August 2020

Bacteriology

Diane Elliot (U.S. Geological Survey)
Hui-Min Hsu (Wisconsin Veterinary Diagnostic Laboratory)
Thomas Loch (Michigan State University)

Virology

James Winton (U.S. Geological Survey)
Tom Waltzek (University of Florida)

Molecular

Nick Phelps (University of Minnesota)
Sharon Clouthier (Fisheries and Oceans Canada)

Nutrition

Wendy Sealey (U.S. Fish and Wildlife Service)
Ann Gannam (U.S. Fish and Wildlife Service)

Quantitative Fish Health Data Analysis

Dominic Travis (University of Minnesota)
Travis Brenden (Michigan State University)

Epidemiology

Lori Gustafson (U.S. Department of Agriculture)

Parasitology

David J. Marcogliese (Environment Canada)

Thiamine Deficiency

Jacques Rinchar (SUNY Brockport)
Don Tillitt (USGS)