

GREAT LAKES FISH HEALTH COMMITTEE

2016 Winter Meeting
East Lansing, MI

February 2-3, 2016

Minutes

Submitted By:

Coja Yamashita
Pennsylvania Fish and Boat Commission

The data, results, and discussion herein are considered provisional;
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GREAT LAKES FISHERY COMMISSION
2100 Commonwealth Blvd, Suite 100
Ann Arbor, Michigan 48105
Great Lakes Fish Health Committee

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List of Attendees:

Bridget Baker	Wisconsin Department Natural Resources
John Coll	US Fish and Wildlife Service (Region 5)
John Dettmers	Great lakes Fisheries Commission
Megan Finley (WIDNR)	Wisconsin Department Natural Resources
Carrie Hobden (OMNRF)	Ontario Ministry of Natural resources and Forestry
Andy Jarrett (OHDNR)	Ohio Department Natural Resources
Kevin Kayle (OHDNR)	Ohio Department Natural Resources
Sunita Khatkar (DFO)	Fisheries and Oceans Canada
Kevin Loftus (OMNRF)	Ontario Ministry of Natural resources and Forestry
Andy Noyes (NYDEC)	New York Department of Environmental Conservation
Dave Meuninck (INDNR)	Indiana Department Natural Resources
Paula Phelps (MNDNR)	Minnesota Department Natural Resources
Ken Phillips (USFWS)	US Fish and Wildlife Service (Region 3)
Ling Shen (MNDNR)	Minnesota Department Natural Resources
Gary Whelan (MIDNR)	Michigan Department Natural Resources
Coja Yamashita (PFBC)	Pennsylvania Fish and Boat Commission

Other Attendees Included:

Jeni Bailey (USFWS),	US Fish and Wildlife Service (Region 3)
Christina Baugher	Michigan Department Natural Resources
Mohamed Faisal (MSU),	Michigan State University
Lori Gustafson (USDA)	US Department of Agriculture
Theresa Lewis (USFWS),	US Fish and Wildlife Service (Region 3)
Tom Loch (MSU)	Michigan State University
Sean Sisler (MNDNR)	Minnesota Department Natural Resources

Great Lakes Fish Health Committee Meeting

Kellogg Hotel and Conference Center

219 S Harrison Rd, East Lansing, MI 48824

February 2-3, 2016

Tuesday, February 2nd 2016

8:30 am – 8:40 am	Welcome & Introductions (C. Yamashita)
8:40 am – 9:00 am	CLC update/Pathogen description updates (J. Dettmers)
9:00 am – 10:00 am	Agency Updates (All)
10:00 am – 10:15 am	Break
10:15 am-11:00 am	Agency Updates (All)
11:00 am – 11:30 am	APHIS Updates and introduction to CAHPS (L. Gustafson)
11:30 am – 12:00 pm	USFWS Use of flow cytometry to determine ploidy of wild-caught Asian carp (Bailey)
12:00 pm – 1:15 pm	Lunch
1:15 pm – 2:00 pm	MSU Presentations (Part I)
2:00 pm – 2:15 pm	Break/travel to University Research Containment Facility (URFC)
2:15 pm – 3:00 pm	Tour of URFC
3:00 pm – 3:15 pm	Travel to Food Safety & Toxicology Building
3:15 pm – 4:15 pm	MSU Presentations/Tour of MSU Labs (Part II)
4:15 pm – 5:30 pm	MSU Presentations/Tour MSU Labs (Part III)

Wednesday, July 29th 2015

8:30 am – 8:40 am	Next Meeting/Tech Advisors (C. Yamashita)
8:40 am -9:00 am	Review of GLFC Pre-Proposals (J. Dettmers)
9:00 am – 10:00 am	Weird and Unusual Cases (All)

10:00 am – 10:10 am	Break
10:10 am - 10:40 am	Steelhead condition in Lake MI (All)
10:40 am - 11:00 am	Approved drug use within WI DNR and other Agencies (All)
11:00 am – 11:30 Am	Restricted and Emergency Pathogen control in hatchery effluents (All).
11:30 am – 1:00 pm	Lunch
1:00 pm – 3:00pm	Histology Slides (M. Faisal, all)

1. Welcome and Introductions (C. Yamashita)

Members and Guest were welcomed to the meeting. The process for submitting written annual reports was reviewed: the vice-chair solicits for and receives the agency updates; compiles them into a single document; and sends them to the committee prior to the winter meeting for review

2. CLC updates (J. Dettmers)

The CLC is planning a coregonid workshop to be held in 2016 and will likely need GLFHC representation.

3. Agency updates (All)

Pennsylvania

- Very few new Issues.
- IPN and Furunculosis observed at several hatcheries resulting in mortality in brook trout. IPNV and Furunculosis positive lots of fish were not stocked into the Great Lakes basin.
- The agency continues to import disease-free fish/eggs from other states and federal agencies to start new brood programs.
- UV filtration was purchased using GLIRI funding for the influent and effluent treatment at the Fairview State Fish Hatchery.

Michigan

- Overall very few issues, and there were no unusual mortalities this year
- IPN was found at Oden, but the outbreak was not as severe as it has been.
- EDDv is still absent from Marquette. Overall,.
- The current “big” issue is private companies want to bring cage culture to Michigan’s Great Lakes water. DNR staff are attending hearings to debate whether or not it should be legal. The MI DNR has not yet taken an official position, but will hopefully have one shortly. Look for updates in the future about this.
- Watersmead (a private aquaculture facility) has some health issues with Brown Trout they have received from Wisconsin, but the owner refuses to change the source because the fish “look healthy”. The fish are not allowed to be stocked in the Great Lakes, so they end up in private waters.

Ontario

- Carrie Hobden is the new fish health specialist in Ontario and will be a member of the committee.
- The agency is developing hatchery practices for bloater. This is the 2nd year for spawning broodstock, and they collected nearly 800k eggs, a 10x increase over last year. Hormone induction is ongoing and will hopefully help the sexes become synchronized.

- Ontario is consulting with the Iowa DNR and Wisconsin to develop practices for Walleye, and began refreshing their Seneca Lake broodstock last fall with the help of New York State and USFWS.
- Chinooks had low eye-up, which may be correlated with temperature or something happening in the lake.
- The Atlantic Salmon restoration program had low returns but should hopefully turn around after implementing recommendations from a workshop last year.
- Private aquaculture is having policy conversations about ongoing regulations for cage culture in Lake Huron. Proposals are being reviewed for new species in aquaculture (e.g., Barramundi). Concerns are minimal if they follow protocols.
- In hatcheries, some *Renibacterium*, *Aeromonas salmonicida*, and *Yersinia ruckerii* were found at the end of the year, but no major mortalities.

Wisconsin

- Hatcheries are quiet right now.
- Fathead minnow nidovirus was found in fatheads and muskies at the Wild Rose State Fish Hatchery.
- There was an outbreak of *argulis* last summer from bait fish. BKD was detected in coho broodstock and EEDv was found in lake trout broodstock, but neither has been found in the hatcheries.
- A private pond with rainbow trout from a private hatchery contained a California species of gill lice. The gill lice have been found elsewhere in the Great Lakes, but this hatchery was in the Mississippi River basin, so it's likely state-wide now.
- There was one die-off in a lake which affected largemouth bass, likely from a novel iriovirus.
- Seeforellen brown trout broodstock had a novel virus found in ovarian fluids.
- Cutthroat virus is still detected but it's not affecting production.
- Salmonid broodstock from Lake Michigan were smaller than usual this year.
- Columnaris has been found in sturgeon in net pens and a streamside rearing facility, so parameters have been tightened.
- The agency has been receiving reports of black crappie sarcoma in several locations throughout the state.

Minnesota

- The Crystal Springs hatchery had several outbreaks of Furunculosis. Appears to be a reoccurring issue, outbreaks also occurred in 2014.
 - Pathogen was detected and outbreaks occurred in several species and in different areas of the hatchery
 - Multiple antibiotic treatments administered with some positive results.
 - Hatchery was depopulated.
 - Hatchery disinfection process still ongoing but is difficult because there currently no way to bypass water around the hatchery.

- Effluent pipes/system most likely need to be reconfigured before hatchery is repopulated.
- Staff is looking for Disease free Brook Trout brood source.
- The MNDNR private aquaculture program has a new hire – Sean Sisler.
- The agency is revising protocols for fish kills and chemical spills to ensure staff know what to do.
- The state is receiving requests to bring in new species (e.g., Pacific white shrimp, Arctic char) and has an aquaculture screening committee to analyze the species, potential diseases, and biosecurity options.
- Besides Furunculosis outbreak at Crystal springs and a few Bacterial Kidney Disease detections it has been very quiet.

Ohio

- Things have been calm.
- There are no signs of VHS (last detection was in 2009).
- 13 different species of fingerlings were tested for various pathogens and none were detected. Cool- and warm water feral broodstock in Great Lakes basin waterbodies also tested clean.
- In one Ohio River waterbody, LMBv was found for the second year.
- GLRI money is being used at the Grand Lake St. Mary's hatchery, which is physically split along the Ohio River and Lake Erie drainage divide. It's important to maintain the water basin divide.
 - New treatment and screening processes are in the engineering phase along with hatchery infrastructure improvements.
 - An outdoor raceway was leaking water and fish, so a new building is being built and should be completed soon.
- New legislature will allow bait dealers at the Lake Erie shoreline to import baitfish from other states without VHS testing, as long as the fish came from the Lake Erie watershed and follow other states' regulations.
- Ohio is also dealing with requests to allow Class B species to be imported (e.g., Pacific white shrimp and Barramundi from Australia and Texas, respectively).

U.S. Fish and Wildlife Service (Region 5)

- The Allegheny hatchery is functional again after an IPN outbreak in Lake Trout in 2005 required major renovations. The hatchery receives fish/eggs from New England.
 - Hatchery had poor egg eye-ups (8%) same fish had 90% eye ups at brood hatchery.
 - Suspect that warmer than normal temperatures may be resulting in poor eye ups.
- Wild Fish Health Survey

- Burbot from Lake Erie had some gonad issues and *Yersinia ruckerii* was isolated from the gonads of one fish. Work is being done, but this seems to be a new sequence of the pathogen.
- No detections for VHS or Nucleospora,
- Whereas EEDv and salmonid herpesvirus V were found in Lake Erie and Seneca Lake.
- A vertical transmission study is being done on EEDv by Vermont.

New York

- Overall, fish health issues are minimal
- The NY Wild Fish Health survey analyzed 30 locations around the state (new sites are added each year),
 - Herpesvirus in Lake Trout,
 - EEDv in Lake Trout in Seneca Lake
 - LMBv in smallmouth bass, Susquehanna River
 - VHS in round gobies in the St Lawrence River.
- Continue to see low level pulse of VHS in NY waters.
- Thiamine deficiency in steelhead still exists but isn't bad.
- At the Rome hatchery, brown trout and brook trout were resistant to furunculosis, but furunculosis was isolated in a few broodstock again this year. Staff are trying to rejuvenate the genetic diversity to minimize inbreeding depression in the future.
- Flavobacterium dominates the landscape. As for hatchery detections, *Yersinia ruckerii* was not found this year.
- Returning Chinook and Coho salmon have a lower prevalence of *Aeromonas salmonicida*.
- There is a downward trend for Chinook eye-up, so staff are considering waiting until the temperature is 55°.

Fisheries and Oceans Canada

- DFO does not oversee any hatcheries, so the lab tests samples from survey programs, one of which is for VHS in the Great Lakes
- The agency does not have regulatory oversight of the surveying (CFIA does), so DFO staff perform the diagnostic testing and research and provide advice.
 - The main focus is PCR testing
- Staff is developing a new assay for SPDv. (Salmon Pancreas Disease virus or Salmon Alpha Virus).
- One koi herpesvirus was detected in Ontario.
- The GLFHC may want to invite CFIA to future meetings, which is having ongoing discussion about permitting and animal transfers.

U.S. Fish and Wildlife Service (Region 3)

- Theresa Lewis is the new Midwest Fisheries Center Complex Director

- Ken is the new project leader at the Midwest Fish Health Center he has taken over Terry Ott's position at the Midwest Fisheries Center after his retirement.
- Jordan River had a case of *Chryseobacterium* (Chapinense). It didn't cause much mortality, mostly just lesions in juveniles about one month after being moved. Terramycin worked to control it. EEDv testing was negative.
- Genoa is adding a third quarantine facility for captive coregonid broodstock, which should be completed this fall. It has Lake Herring right now but likely will expand to other coregonids. The target is to stock the fish in Lake Huron.
- Jordan River is doing construction to cover the raceways and rebuild the early-life stage building. Part of the building will be for coregonid culture with a recirculation system, and it should be online in 2016. The hatchery did some experimental egg take in Fall 2015.

Indiana

- Quiet Year
- Mixsawbah Hatchery had one positive fish for *Aeromonas salmonicida*, no clinical signs of disease, so fish were stocked on schedule.
- The Terre Haute prison facility did well raising fish the first year, but is having problems this year due to a change in the filters being used.
 - Channel catfish have started to die and water samples showed high ammonia. The water is aerated by stones, so that might be changed.
- There were three wild surveys done for VHS and LMBv:
 - Webster lake MUS were positive for LMBv
 - Dogwood lake which is the water source for the East Fork Hatchery, had Bluegill and Largemouth bass test positive for LMBv.
 - Hatchery tested negative, and has consistently tested negative despite LMBv detections in the lake.
- There were issues gathering enough summer-run *Skamania* steelhead broodstock.. They hope to get enough for Indiana's needs, and any extras will be sent to Illinois.
- All broodstock steelhead are injected with thiamine. Eye-up on first two egg takes has been high, possibly because of fewer fish and therefore less stress.
- Bodine got eyed Chinook eggs from Rook River.
- Muskies (with PIT tags) are being stocked in Webster Lake because of a decline in fish number/size. Hopefully the population will recover.
- White River has Asian carp, a hatchery pond at East Fork Hatchery drains to the river, and they found 6 Asian Carp in the pond.
 - Staff is going to rotenone that area.

4) APHIS update and introduction to Commercial Aquaculture Health Program Standards (CAHPS) (L. Gustafson) See Appendix 1 for the presentation.

Representatives from the NAA and the VS Aquaculture Program Team have been developing draft program standards to establish a voluntary, non-regulatory framework for the improvement and verification of the health of farmed aquatic animals produced in U.S. commercial aquaculture industry sectors. The goal of CAHPS is to support various business objectives,

including improved health management, protection and expansion of aquaculture business opportunities, and promotion and facilitation of trade, as well as improved resource protection and environmental sustainability. Program would use common resources and may provide for a harmonization of current regulations, which could potentially result in large cost savings to the sportfish and Baitfish industries. This would be an expansion of the NAAHP.

Program first relies on defining the population and objective, then employees five key principles;

1. **Aquatic Animal Health Team-** Individuals who are engaged on site who assist in the site specific health plan and decision support.
 - Fish Health managers
 - Veterinarians
 - AFS Certified Professionals
 - Extension agents and /or subject matter experts
2. **Risk Evaluation**
 - Evaluating Pathogen Risk
 - Identify pathogens of concern for propagated species
 - Identifying pathways for pathogen introduction
 - Identify impacts of pathogen introduction
 - Compose Risk Management Strategies
 - Early Disease Detection System (EDDS) which includes Training and Management, and setting Site Specific Thresholds
 - Mitigating Risk, includes Biosecurity, Outreach and Regulations
3. **Surveillance**
 - Observational
 - Random Sampling
 - Risk based Sampling
4. **Investigation and Reporting**
 - Disease investigation-triggered when specific thresholds are met and involves site visits and diagnostic testing
 - Reporting – Appropriate organizations (APHIS, OIE, ..) and officials.
5. **Response**
 - Contingency Planning,
 - Pathogen impact-Treat, Vaccinate, Depopulate, Zone and / or regulate
 - Debrief

Group discussion and presentation also addressed the applicability of CAHPS to wild fish health; VHSV was used as an example. Program would be dependent on being able to define specific zones which would need to be based on natural boundaries. Several state agencies are already creating zones using HUC's and data gathered from surveillance and risk assessments. If applied to wild fish populations CAHPS could assist in defining wild fish populations, monitoring populations and evaluate the risk involved in transporting fish between defined populations.

5) USFWS Use of flow cytometry as a tool in Fisheries management. (Jennifer Bailey)

See Appendix 2 for presentation.

Technology measures size, shape, biochemical signature, and numbers of cells using lasers and light. Allows for data collection from large numbers of cells in real time. The process is currently being used to determine ploidy of wild caught Asian carp process currently uses cells from the eye; however blood can be used but requires special reagents.

- **Other Fish Health Applications include:**
 - Determining ploidy of Rainbow trout.
 - Algae cell counts- Determine composition of diets for mussel culture
 - Aid in tissue cell culture and cytotoxicity testing
 - Determine the ploidy of Lake Sturgeon
- **Future Explorations/applications**
 - Virus detection in cells
 - Bacteria detection in blood samples.

Group discussion included the \$40,000 dollar cost of the equipment, the possibility of using it to check for ploidy in cage cultured Rainbow trout, the current workload, different types of equipment that could be used and why the eyeball is used.

6) Michigan State University Updates

Advances in the detection and prevention of VHSV-IVb. (Isaac Standish)

See Appendix 2 for the presentation.

Development and optimization of an indirect ELISA

Process used for the direct detection of immunoglobulin. Major advantages are a cheaper process that has few steps reducing variability in results. The process requires a species specific MAb. This research resulted in a thoroughly optimized assay that allows for the direct quantification of anti-VHSV antibodies in Muskellunge. The Assay has been used to show that Wild Detroit River muskellunge have significantly decreasing anti-VHSV antibodies since 2012. Also used to determine the timing and duration of the humoral response of muskellunge exposed to a DNA vaccine.

Production of Recombinant VHSV Glycoprotein

Process attempts to introduce VHSV glycoprotein gene into cells to produce and purify recombinant protein. Research has showed recombinant production can be produced in insect larvae. Ongoing research has shown that antibodies can recognize recombinant protein produced in insect larvae and, data from the initial trial indicates that the protein stimulates a protective immune response in muskellunge.

Can Vaccinated Hatchery Fish be used to Prevent Disease Spread? A Case Study VHS IVb. (Travis Brendon) See Appendix 3 for the presentation.

Goal of the project is to develop a spatially –explicit individual-based model (IBM) to determine if a herd immunity response can be elicited in lake Michigan fishes to VHSV using hatchery vaccinated fish. IBMs have been used to look at vaccination in small populations of terrestrial animals. There are many difficulties designing the model including a lack of information needed for designing a model for species that are highly susceptible to VHSV. As a result there is a 2 part plan.

1. Develop a model using a species with lots of information to determine
 - a. Impacts of a generic disease on Chinook salmon in the Great Lakes.
 - b. The feasibility of using hatchery fishes to elicit a herd immunity response to a VHS like disease.
2. Adapt model 1 and refine for specifics for VHS and musky in the future.

Preliminary results showed that herd immunity may be possible if enough vaccinated fish are stocked. The number stocked to elicit the response still needs to be calculated as well as how it is affected by factors such as degree of contact and absorption of virus particles by immunized fish. Future steps include a finalized model setup for Chinook salmon and complete disease runs as well as obtaining information for analysis specific to VHS genotype IVb and muskellunge. Group discussion revolved around the possibility of using information from a well-known disease such as Bacterial Kidney Disease, if it can be applied to vaccinated fish that become more susceptible over time. The model will be very adaptable to other pathogens and species.

7. Tour of the MSU facilities (All)

Attendees were given a tour of Michigan State University's University Research Containment Facility and the Food Safety & Toxicology Building. In addition to the tour there were various presentations by Dr. Kim Scribner and several MSU students.

8. Next meeting / Technical advisors (C. Yamashita)

Future Meetings

- Summer meeting: Bayfield, WI, August 3-4, 2016.
- Winter meeting 2016: Will be in April and coincide with the AFS – Fish Health section, being held in Lansing, MI

Technical Advisors

The committee needs a new fish nutritionist. Dale Honeyfield recently retired and is still willing to participate, but he now lives in New Mexico and would need to travel. Dominique (at Guelph) does not want to be an advisor.

Ann Ganam and Wendy Sealey were suggested as possible technical advisors specializing in fish nutrition. Both are excellent but neither are in the Great Lakes. Andy Noyes has volunteered to contact them and see if there's any interest.

The committee will bring this up to the CLC in April, who in turn could go to USGS and USFWS and ask for some expertise to come into the basin, especially with the upcoming coregonid issues. John Dettmers will get in touch with Coja and Andy to draft a statement. Gary can mention this to MSU when he speaks to them about PERM issues.

9. Review of GLFC pre-proposals (All)

The committee reviewed two GLFC proposals and provided recommendations.

10. Unusual cases

Allegheny NFH – rainbow, brook, brown, and lake trout. John Coll, USFWS

Due to the detection of IPN in 2005 the hatchery was shut down for disinfection and production moved to New England. USFWS Staff decided to cover the raceways and add biosecurity measures. The facility was disinfected again after the construction. Brook trout were brought in as sentinel fish and did not have any disease occurrences for a few years; the only issue was temperature affecting eye-ups. On October 30, 2015, fish began dying. No viruses were found through PCR - only 1 culture of *F. psychrophilum*. Although it was suspected to be bacterial gill disease, that was not found to be the cause. Blood cells looked odd, but bacterial staining did not show any bacterial presence. Genetic sequencing showed four herpes-virus-like sequences, which may have been incorporated into the host genes. This is being researched. Mortalities were significant – lost about 200k out of 400k production fish. Staff had to work 24 shifts to skim dead fish from the screens. Even the “unaffected” fish had histology showing signs of what the dead fish look like.

Potential causes:

1. Galvanized covers. It's often misting within the raceway itself. The water was tested for heavy metals and they were low. Fish were anemic.
2. Feed. Vitamin B5 was low but adequate.

Fish are still in the hatchery. Mortalities spike then come back down, and it's cyclical. Electron microscopy is slated to be done shortly and will hopefully help narrow down potential causes.

The committee felt the galvanized covers were involved with heavy metal poisoning. Tests should be done on the water when it's misting in the raceway. Maybe lay down a bucket where it's falling and see if anything precipitates. Sometimes cadmium is added to galvanized material.

John will hopefully be able to report what it was at the next meeting.

Apostle Island Lake Trout. Bridget Baker, WI DNR

Wild Lake Trout were found with round or stalk-like plaques in the liver, spleen, and other organs. Sometimes there would be one long stalk, sometimes there were up to 5 plaques scattered in different locations and in different sizes. Both male and female fish were affected. The plaques are yellowish-brown, firm (can snap in half), and looked like cholesterol clefts. Nothing came up when stained. Four veterinarians looked at samples and did not have any advice or conclusions. The initial hypothesis was an encapsulated parasite, but none were found.

The plaques are probably not causing harm to the fish, but this is an academic curiosity. About ½ the fish had this. It was completely celomic.

The committee hadn't seen anything like this before. Mohamed recommended it might be carnal bacteria– which is associated with calcium deposition. That starts in the kidney, but could be slough off because they are calcified “pseudo-kidney disease”.

KMSH Steelhead fry. Megan Finley, WI DNR

Steelhead fry had higher mortalities than usual but without any clinical signs or change in behavior. The water quality and flows were good. Necropsies showed distended intestines with clear liquid. Some *Pseudomonas* and flavobacterium were found, but in low numbers. Two-day Epsom salt treatments did not work on the first try, but mortalities decreased after a second attempt.

Mohamed mentioned this is common in salmonids and often has a fungus associated with it. The Epsom likely didn't impact the dying fish, but may have helped the healthy fish.

Brown Bullheads. Dave Meuninck, IN DNR

Three lakes in northeast Indiana have had cases of melanomas since 2011. In 2015, it was hypothesized the cases may be a result of excessive exposure to the sun or environmental contaminants. Fish either had smooth or raised black splotches on the skin which looked like tar.

Is this the progression of getting a melanoma: initially smooth to the skin, eventually raises, and when stressed, rupture and cover the fish? Is this possible? The area biologists get complaints from anglers about fish with black spots.

The committee suggested Dave contact Vicki Blazer, who does a lot with brown bullheads and may have more information about this.

11. Steelhead condition in Lake Michigan (All)

This discussion was a continuation of conversation at last summer's meeting.

There were reduced insects last year, so there was less scum on the water, which may be a reason for reduced fish size. Wisconsin examined fish last year, and many did not have any GI contents. Michigan saw small fish last spring but the population rebounded and looked alright by fall. Because of decreased alewives, there may have been a lack in prey supply which eventually corrected itself. Weight is still a little low but the fish look good overall.

12. Approved drug use within Wisconsin DNR and other agencies (All)

There has been improper use of drugs within the Wisconsin DNR (e.g., MS-222), so an effort is underway to educate staff through workshops. Many agencies now use Aqui-S, which biologists like more, so the DNR will soon train field biologists. At the same time, the workshops will teach staff to use proper dosing methods for other chemicals as well.

Is there an alternative for using oxytetracycline to mark eggs? It seems wasteful to use a good drug for non-therapeutic uses, may enhance or lead to antibiotic resistance. Calcine could be used but it's expensive and doesn't mark well.

Another issue is that a lot of medications now need prescriptions and can be difficult to get, making it hard when something happens and you can't react properly right away. Chloramine-T should always be on hand because it sometimes has a two month wait.

13. Restricted and Emergency pathogen control in hatchery effluents (All)

The Minnesota DNR had a furunculosis outbreak that brought about questions for controlling the effluent to the public waters. The Model Program does not address this.

Options are either UV or ozone, but UV at a Minnesota hatchery won't work because they would need to dig a new effluent pond. Ozone is more difficult and cumbersome, and therefore you need to be a lot more careful about it.

Discussion: UV disinfection units in Indiana were expensive, about \$130k with bills around \$1200/month. The self-cleaning option was an additional \$30k. Overall, UV systems depend on the flow of the effluent, and final cost can range from \$50-225k.

The Michigan DNR added a UV to the in-flow at Marquette and that has made a significant difference in the health of the broodstock. BKD is no longer the huge issue it once was.

Adding effluent disinfection to the MP could be difficult, but the committee could offer guidance.

14. Histology slides at Michigan State University Vet School (All)

Attendees who were available attend a histology session at MSU.

