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RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING



WILLIAM E. MORITZ
DIRECTOR

February 6, 2017

TO: Great Lakes Fishery Commission - Great Lakes Fish Health Committee

FROM: Michigan Department of Natural Resources, Fisheries Division (MDNR)

SUBJECT: 2016 Michigan DNR- Fisheries Division Fish Health Report

In 2016, Michigan Department of Natural Resources – Fisheries Division (MDNR) continued the partnership with the Michigan State University Aquatic Animal Health Laboratory at the Colleges of Veterinary Medicine and Agriculture and Natural Resources. All fish lots to be stocked by MDNR in Michigan public waters were examined and tested for emergency and restricted fish pathogens as outlined in the 2014 Great Lakes Fish Health Commission – Great Lakes Fish Health Committee (GLFHC) Model Program for Fish Health Management. Laboratory analyses of these samples were guided by the protocols of the American Fishery Society – Fish Health Section (AFS-FHS) Blue Book and the World Organization for Animal Health (OIE). Fish stocks in selected public waters were also evaluated for emergency and restricted fish pathogens.

A. Spring 2016 Inspections

Pre-Stocking Fingerlings

Fish from twenty-one different lots (60 fish per lot) of eight salmonid species from six State of Michigan hatcheries that included Marquette State Fish Hatchery (MSFH), Thompson State Fish Hatchery (TSFH), Oden State Fish Hatchery (OSFH), Platte River State Fish Hatchery (PRSFH), Harrietta State Fish Hatchery (HSFH), and Wolf Lake State Fish Hatchery (WLSFH) and the Lake Superior State University Aquatic Research Laboratory (LSSU-ARL) were tested for emergency and restricted fish pathogens prior to stocking in spring 2016. This included five lots of Brown Trout (*Salmo trutta*, Wild Rose, Gilchrist, and Sturgeon River strains), four lots of Rainbow Trout (*Oncorhynchus mykiss*; steelhead and Eagle Lake strains), four lots of Chinook Salmon (*O. tshawytscha*; Swan River and Little Manistee River strains), two lots of Atlantic Salmon (*Salmo salar*; St. Mary's River strain), one lot of Coho salmon (*O. kisutch*), two lots of Lake Trout (*Salvelinus namaycush*; Lake Superior and Seneca strains), two lots of Brook Trout (*Salvelinus fontinalis*; Assinica strain), and one lot of splake (*Salvelinus namaycush* X *Salvelinus fontinalis*).

Renibacterium salmoninarum, the causative agent of bacterial kidney disease (BKD), was detected using a quantitative enzyme linked immunosorbent assay (Q-ELISA) in: one lot of Rainbow Trout from TSFH (steelhead strain at 2% prevalence with low antigen levels); one lot of Brown Trout from OSFH (Gilchrist strain at 2% prevalence with low antigen levels); and three lots of Brown Trout from HSFH (Gilchrist strain at 3% prevalence with low antigen levels; Sturgeon River strain at 5% prevalence with low and medium antigen levels; and Wild Rose strain at 7% prevalence with low and medium antigen levels).

An *Aeromonas salmonicida* vaccine (AquaTactics, Kirkland, WA, USA) was administered to

fingerlings to prevent infections caused by *A. salmonicida* subsp. *salmonicida* (etiological agent of furunculosis). Neither *A. salmonicida* subsp. *salmonicida* nor *Yersinia ruckeri* (causative agent of enteric redmouth disease agent) were isolated during spring production inspections in 2016. Non-reportable bacteria that were isolated during these inspections included members of the Flavobacteriaceae and Enterobacteriaceae families, as well as *Carnobacterium*, motile and non-motile *Aeromonas*, and *Shewanella* species. In addition, seven representative lots from these hatcheries were examined and found to be negative for *Myxobolus cerebralis*, the causative agent of whirling disease. Skin and gill preparations for external parasites revealed the presence of monogeneans and motile/sessile ciliates in a subset of the examined fish, including from splake and Assinica strain Brook Trout (MSFH), and monogeneans only from steelhead (TSFH) and Gilchrist strain Brown Trout (OSFH). No viruses were detected in fish sampled from these lots and included negative results for: viral hemorrhagic septicemia virus (VHSV); infectious pancreatic necrosis virus (IPNV); and infectious hematopoietic necrosis virus (IHNV). Epizootic epitheliotropic disease virus (EEDV) was not detected at MSFH in either of the Lake Trout lots.

Given the previous detection of IPNV in MSFH Brook Trout and OSFH Brown Trout in 2014, an additional 60 fish per rearing unit were tested from Assinica strain Brook Trout of 2014 year-class fish from all six rearing units at MSFH. All 360 additional fish were found to be negative for IPNV by cell culture.

Feral Broodstock

Thirty pairs of steelhead returning to the Little Manistee River Weir (LMRW) were examined. No *A. salmonicida* subsp. *salmonicida*, *R. salmoninarum* or *Y. ruckeri* were detected. Non-reportable bacteria that were isolated included: motile *Aeromonas* sp.; *Escherichia* sp.; *Flavobacterium* spp.; and members of the family Enterobacteriaceae. Of note, 10/60 (16.7%) fish (5/30 females and 5/30 males) were infected with *F. psychrophilum*. No viruses or *M. cerebralis* were detected.

B. Fall 2016 Inspections

Pre-Stocking Fingerlings (salmonids and muskellunge)

Seven lots of production fish (60 fish per lot) from MDNR hatcheries were inspected prior to stocking in summer/fall 2016 including: steelhead trout and Muskellunge from WLSFH; Assinica strain Brook Trout from MSFH; steelhead trout from TSFH; Eagle Lake strain Rainbow Trout and Wild Rose strain Brown Trout from OSFH; and Atlantic Salmon from PRSFH. *R. salmoninarum* was detected in 5% of PRSFH Atlantic Salmon at low titers; in 7% of Assinica strain Brook Trout from MSFH at low titers; in 8% of Eagle Lake strain Rainbow Trout from OSFH at medium and low titers; and in 22% of Wild Rose strain Brown Trout from OSFH at high, medium, and low titers. The Wild Rose strain Brown Trout were sampled during a BKD outbreak and were not stocked (no surplus fall fingerlings to stock). The BKD infected Wild Rose strain Brown Trout lot at OSFH was treated with erythromycin following investigational new animal drug (INAD) protocols, with good success. No other reportable pathogens or viruses were detected. Non-reportable bacteria that were isolated included *Enterobacter*, *Carnobacterium*, *Pseudomonas* and *Shewanella* species.

Production Lake Sturgeon (*Acipenser fulvescens*) from the Black Lake Streamside Facility were inspected in summer 2016. No reportable bacteria or viruses were detected, including White Sturgeon Iridovirus (according to histopathological examination for characteristic cytoplasmic inclusions); however, non-reportable motile *Aeromonas* spp. were isolated from these sturgeon.

Captive Broodstock

Inspections. An *Aeromonas salmonicida* vaccine was administered to captive broodstock to prevent infections caused by *A. salmonicida salmonicida*.

Eleven lots of captive broodstock were inspected in fall 2016. From MSFH, two lots of Assinica strain Brook Trout and three lots of Lake Superior strain lean Lake Trout were inspected. From OSFH, two lots of Gilchrist strain Brown Trout, one lot of Sturgeon River strain Brown Trout, one lot of Wild Rose strain Brown Trout, and two lots of Eagle Lake strain Rainbow Trout were inspected.

R. salmoninarum was detected in all six lots of fish from OSFH at 10-30% prevalence (high and low titers in Gilchrist strain Brown Trout; medium and low titers in Eagle Lake strain Rainbow Trout; and low titers in Sturgeon River and Wild Rose strains of Brown Trout). EEDV was not detected at MSFH in any of the Lake Trout lots. No other reportable pathogens were detected. Detected non-reportable bacteria included *Carnobacterium* and motile *Aeromonas* spp. Monogeneans were detected in skin/gill preparations from one lot of Eagle Lake strain Rainbow Trout at OSFH, and ciliated protozoans were detected in the Wild Rose lot and one lot of Gilchrist strain Brown Trout from OSFH.

Preventative measures to minimize the vertical transmission of R. salmoninarum. To minimize vertical transmission and incidence of *R. salmoninarum* in hatchery stocks, milt and ovarian fluid were collected in the fall of 2016 from 360 Gilchrist strain Brown Trout broodstock at OSFH and 480 Assinica strain Brook Trout broodstock at MSFH and tested for *R. salmoninarum* using Q-ELISA while fertilized eggs were held in isolation pending the 24-hour laboratory results. In the event that *R. salmoninarum* was detected, the corresponding eggs were discarded. Testing is also planned for gametes from spawned OSFH Eagle Lake strain Rainbow Trout. From OSFH, *R. salmoninarum* was detected in two lots of Gilchrist strain Brown Trout at 5.5% prevalence with high, medium and low titer levels. At MSFH, *R. salmoninarum* was also detected at 2.2% prevalence in medium and low titer levels in gametes from two lots of Assinica strain Brook Trout.

Gametes were collected throughout spawning from two lots of Sturgeon River (255 fish) and one lot of Wild Rose (120 fish) strains of Brown Trout at OSFH, and three lots of Lake Superior strain lean Lake Trout (137 fish) at MSFH and submitted for testing. From OSFH, *R. salmoninarum* was detected in both lots of Sturgeon River strain Brown Trout at 2.4% prevalence with low titer levels, and in Wild Rose strain Brown Trout at 15.8% prevalence with low titer levels. *R. salmoninarum* was not detected in gametes from the Lake Trout. All gametes were also tested for VHSV, IPNV, and IHNV, all of which were negative.

It is noteworthy that the injectable form of erythromycin, which had been administered to MDNR captive broodstock under INAD protocols in the past as an additional means to reduce the vertical transmission of *R. salmoninarum*, was not available in 2015 or 2016. However, this treatment is now available and will be used in upcoming spawning, as these injections, in conjunction with other BKD control measures, have proved successful in the past.

Feral Broodstock

Chinook and Coho Salmon. Thirty pairs of Chinook Salmon from each of the Little Manistee River (LMRW) and Swan River Weirs (SRW) and thirty pairs of Coho Salmon returning to the Upper Platte River Weir (PRW) were examined. Prevalence for *A. salmonicida* subsp. *salmonicida* was 6.7% in the LMRW, 1.7% in the PRW, and was not detected in the SRW Chinook Salmon. Prevalence for *Y. ruckeri* was 1.7% in the LMRW and was not detected in the PRW or SRW. Detected non-reportable bacteria included: *F. psychrophilum* (at a prevalence of 55% in LMRW Chinook salmon and 20% in SRW Chinook salmon; not detected in PRW Coho Salmon); *F. columnare*; other *Flavobacterium* spp.; and motile *Aeromonas*, *Shewanella*, *Carnobacterium*, presumptive *Serratia*, and *Enterobacter* species. *R. salmoninarum* was detected at low antigen levels in Chinook Salmon from LMRW and SRW (prevalence of 10% at each site), and was not detected in the PRW Coho Salmon. No viruses were detected. *M. cerebralis* was not detected via light microscopy.

Atlantic Salmon. Thirty pairs of Atlantic Salmon returning to the St. Mary's River, LSSU-ARL, were examined. Detected reportable bacteria were *A. salmonicida* subsp. *salmonicida* (prevalence of 6.7%) and *R. salmoninarum*. No other reportable bacterial or viral pathogens were detected. Fish were negative for *M. cerebralis* via light microscopy. Recovered non-reportable bacteria included *F. psychrophilum* (prevalence of 3%), as well as motile *Aeromonas*, *Carnobacterium*, *Pseudomonas*, and *Shewanella* species.

C. Coolwater Broodstock Inspections

Inspections were conducted on coolwater broodstock populations in the spring of 2016 (304 fish). These included full examinations on: Walleye (*Sander vitreus*) from the Tittabawassee River (n=60), Muskegon River (n=60), and Little Bay de Noc (LBDN; n=60); full examinations (n=10) and non-lethal sampling (n=15) of Muskellunge from the Detroit River; and non-lethal sampling of Lake Sturgeon from the Sturgeon River (n=28), Peshtigo River, WI (n=16), and Black River (n=55). No reportable pathogens or *Heterosporis* sp. (Walleye) were detected. Isolated non-reportable bacteria from walleye samples included *Flavobacterium*, motile and non-motile *Aeromonas*, and *Shewanella* species. No piscirickettsia-like organisms or *Francisella* species were detected in Muskellunge. Walleye skin and gill preparations revealed parasites that included sessile/motile ciliated protozoans and a few monogeneans. No viruses were detected in any of these collections.

D. Private Aquaculture Farms and Bait Fish

For private aquaculture facilities to stock private fish in public waters, fish must be certified free of IPNV, VHSV, IHNV and *M. cerebralis*. Twelve lots from two facilities were

examined. No reportable pathogens were detected. In addition, Rainbow Trout from the Grayling Fish Hatchery were submitted due to elevated mortalities and toxicological analyses requested. No toxic compounds of concern were detected.

E. Response to 2016 Fish Kill Reports

Bluegill (*Lepomis macrochirus*) and Pumpkinseed (*Lepomis gibbosus*) from Lake Lancer were submitted for testing in 2016 due to a wild fish-kill that predominantly involved Bluegill. Findings indicated that the fish suffered from heavy parasitism of the visceral organs compounded with bacterial infections and complicated by secondary fungal growth on external lesions. No viruses were detected at 15°C or 25°C, including Largemouth Bass virus (LMBV), VHSV, IHNV or IPNV. No reportable bacteria were isolated. Recovered non-reportable bacteria included *Pseudomonas*, motile *Aeromonas*, *Shewanella*, and *Flavobacterium* species.

Emerald Shiner (*Notropis atherinoides*) were collected from Lexington Harbor and submitted for testing following reports of extensive external hemorrhaging on fish. No viruses or any bacteria of clinical relevance were detected.

F. VHSV Surveillance

The Michigan DNR VHSV surveillance was initiated in 2006. During 2016, 20 cases of 778 Muskellunge fry and 420 Walleye fingerlings were submitted for VHSV testing. VHSV was not detected in any of these samples.

G. Diagnosis of Clinical Cases

Fish were submitted by MDNR hatcheries for seventeen clinical cases from production lots and one clinical case from a pond of Muskellunge for laboratory diagnoses following episodes of elevated mortality and/or morbidity. *Flavobacterium* spp. was again the group of pathogens most commonly associated with these disease events. *R. salmoninarum* was detected in four of the lots from LSSU (Atlantic Salmon), HSFH (Brown Trout), and OSFH (Brown Trout), for which oral erythromycin was administered under INAD. Antibiotic sensitivity testing was performed for clinical cases as appropriate, and INAD or other approved FDA treatments were recommended, and fish treated following INAD or label requirements.

H. Wild Inspections

Twenty-one cases (957 fish) collected in 2016 were submitted to screen fish stocks that reside in waters that supply PRSFH, HSFH and MSFH, as well as the waters receiving HSFH outflow, for pathogens. The fish species tested included Brown Trout, Brook Trout, Rainbow Trout, Coho Salmon, and Mottled Sculpin (*Cottus bairdii*). All submitted fish were tested for the presence of IPNV, VHSV and IHNV. Additionally, salmonids were tested for the presence of *R. salmoninarum* and *M. cerebralis*; and Mottled Sculpins from Cherry Creek (MSFH water supply) were tested for the presence of EEDV. *R.*

salmoninarum was detected in medium and low titers in Brown (18% prevalence) and Brook (10% prevalence) Trout from the Cherry Creek. EEDV was not detected in Mottled Sculpin from Cherry Creek in 2016. Other results are pending.

Bluegill from Indian Lake (n=120), Lake Hudson (n=145), and Thornapple Lake (n=120) were tested for viruses (e.g., IPNV, VHSV, IHNV, and LMBV) and for *Heterosporis* sp. No viruses were detected at 15°C or 25°C. *Heterosporis* sp. was not detected.



HATCHERY CLASSIFICATION REPORT

Report Period: 01-01-15 to 12-31-16 **Report Date:** 01-12-17

HATCHERY NAME	Location	Pathogen Acronym
Harrietta SFH	Harrietta	B-BK
Marquette SFH	Marquette	B-BK
Oden SFH	Oden	B-BK
Platte River SFH	Beulah	B-BK, BF
Thompson SFH	Thompson (Manistique)	B-BK
Wolf Lake SFH	Mattawan	B-BK
LSSU-ARL	Sault Ste. Marie	B-BK

Report Prepared by: Martha Wolgamood
 Title: Hatchery Manager
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EMERGENCY FISH DISEASES

<u>Disease</u>	Disease Pathogen	Disease Acronym	Pathogen Acronym
viral hemorrhagic septicemia	virus	VHS	VE
infectious hematopoietic necrosis	virus	IHN	VH
ceratomyxosis	<i>Ceratomyxa shasta</i> protozoan	CS	SC*
proliferative kidney disease	sporozoan	PKD	SP*

RESTRICTED FISH DISEASES

<u>Disease</u>	Disease Pathogen	Disease Acronym	Pathogen Acronym
whirling disease	<i>Myxobolus cerebralis</i> protozoan	WD	SW
infectious pancreatic necrosis	virus	IPN	VP
bacterial kidney disease	<i>Renibacterium salmoninarum</i> bacterium	BKD	BK
furunculosis	<i>Aeromonas salmonicida</i> bacterium	BF	BF
enteric redmouth	<i>Yersinia ruckeri</i> bacterium	ERM	BR
epizootic epitheliotropic disease	virus	EED	VL**

* Inspectors within the Great Lakes basin do not need to include these pathogens unless importations of fish from enzootic areas are known to have been made.

** Field diagnostic test not available.

SALMONID IMPORTATION REPORT

Agency State of Michigan

Reporting Period 01/01/16– 12/31/16

I. A. Known importations since last report.

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>	<u>Imported to:</u>
1.	Sullivan NFH Brimley, MI	Lake Trout Seneca/ 317,376	11,630	A	10/18/2016	Corey Puzach	Lake Superior	MSFH
2.								
3.								

B. Proposed importations:

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>	<u>Imported to:</u>
1.	Sullivan NFH Brimley, MI	Lake Trout Seneca 300,000		A			Lake Superior	MSFH

II. Lab Findings

III. Other



**2016
Indiana Fish Health Report
To The
Great Lakes Fish Health Committee**

Dave Meuninck, Manager, Bodine State Fish Hatchery
Andy Richards, Assistant Manager, Cikana State Fish Hatchery

Two Model Program (M/P) pathogens were detected in production fish in 2016 among Indiana's cold-water production facilities. These pathogens were *Aeromonas salmonicida* and *Renibacterium salmoninarum*. Bacteria testing of cool and warm water species are only done during sick fish submissions. Channel catfish mortalities occurred at two hatcheries and one rearing unit. Bacterial infections could not be confirmed. One hatchery treated with medicated feed with good results. Walleye were stricken with mortalities at a rearing unit. Water quality was poor and clubbed gills led to a presumptive diagnosis of a gill bacterial infection. Chloramine-T was administered. Ich was then discovered. A single Formalin treatment killed all but 100 fish. No viral infections were detected in any of Indiana's hatcheries. Surveillance of three water bodies for viruses detected no VHSV or LMBV. No fish kills were reported throughout the State.

Cold-Water Facilities

Aeromonas salmonicida was detected in two lots at Mixsawbah and one lot at Bodine State Fish Hatcheries during routine inspections. Prevalence was 50% in Chinook and 13.33% in summer-run (Skamania) steelhead at Mixsawbah, and 6.67% in winter-run (Little Manistee) steelhead at Bodine. No clinical sign of disease was noted at either location. Given the high prevalence in Chinook at Mixsawbah, retesting was ordered. Results were the same, 50%. It later learned Purdue's ADDL does not take the identification of *Asal* to the subspecies. Given the absence of sickly fish or elevated mortality, it's presumed the bacteria is not *A. salmonicida salmonicida*. These lots were stocked on schedule with no handling mortality observed.

Five month old winter-run steelhead at Mixsawbah had a presumptive positive for *R. salmoninarum* by FAT. It was one fish and, unfortunately, there was insufficient tissue for PCR confirmation. In previous cases when there were FAT positives, PCR reversed the findings.

There were eight virus screening submittals for trout and salmon species. No viral agents were found. These were conducted within a few weeks of first feeding. The intent is to rule out viral infections early in the rearing cycle. This in turn will allow stream discards of surplus fish after first inventory.

Cool and warm water species are tested prior to stocking or transfer to another facility. Some lots will be tested multiple times when a transfer or change in rearing conditions has occurred. For the cold water species, each lot is tested at least twice for virus. The first time is a virus screening submission a few weeks after first feeding. The second time is during a routine fish health inspection for M/P pathogens. A third routine inspection is done for any lot that will be more than a year old at stocking. Whirling disease testing is done on six month old summer-run steelhead.

Cikana State Fish Hatchery manages walleye and channel catfish production at a prison. A few weeks after two month old channel catfish were transferred to the prison rearing facility, the lot went off feed and became moribund. Fish and water was submitted for analysis. Diagnosis was bronchitis most likely due to high ammonia levels. There was also a secondary infection of two *Aeromonas* species. Pool filters are used filled with biofilter media, for ammonia removal. There may be a problem with this strategy especially if the detention time in each filter is too short. There may also be a problem with carbon dioxide and nitrate build-up. No means of mechanical aeration is used anywhere in the system. Oxygen is added to the tanks by pumping air through Point Four diffusers on the bottom of each tank, each with a water depth of 30 inches.

During the VHSv screening of Lake Webster early April, several brown bullhead were observed to have multiple irregularly shaped black blotches on their skin. One of these fish was submitted for testing. The black hyper-pigmented spots were found to be melanomas. Interestingly enough, a report came in about a brown bullhead caught by an angler having a tar-like substance all over its body. The black material was wiped off with a rag and the fish released. The rag was sent to Purdue so the dried material could be analyzed. Melanoma cells were identified. In 2011, a picture of a brown bullhead with a raised black area on its head was e-mailed for an opinion. At the time, going by just a picture, no plausible explanation could be rendered. Putting these three cases together, is it possible melanoma in brown bullhead starts as a smooth black blotch that with time becomes raised? Later, could the elevated melanoma reach some critical mass and rupture?

Cool- and Warm-Water Facilities

Indiana's cool-/warm-water hatcheries experienced some fish health issues in 2016 that warranted further inspection from Purdue's Animal Disease Diagnostic Laboratory. A case by case summary follows.

Cikana State Fish Hatchery observed partial losses in nearly all of its channel catfish rearing ponds in late summer and early fall of 2016. Estimated mortality was 10% in YOY ponds and 20% in advanced fingerling (17 mo.) ponds. Impacts on statewide stockings were minimal. Only three sites, totaling 5000 fish, were left un-stocked.

Disease signs in the advanced fingerlings pointed to acute bacterial infections brought on by poor water quality, high temperatures, and high feeding rates. Ponds containing advanced fingerlings (age 1) were the first to show mortality starting on August 9. Six live fish were sent to ADDL for necropsy, bacteriology, histopathology and virology. Although a bacterial infection was suspected upon inspection (lymphocytic bronchitis, superficial necrosis), no pathogenic bacteria was seen microscopically or culturally. The pond was partially drained and refilled and a ten day treatment of TM 200 (3 grams/100lbs of fish) was started on August 10th. Mortality slowed by day 5 and ceased by day 10. Three other advanced ponds showed similar symptoms between 8/10 and 9/1 and the same treatment regime was used successfully.

Losses in the YOY ponds began on 9/15 and continued through 10/15. Ponds were flushed and refilled but no other treatments were used. As weather cooled and water quality improved, mortality stopped.

Driftwood State fish Hatchery experienced a mortality event in one lined pond of 17 month old channel catfish on October 12th. A one-time 20% loss occurred after two days of not feeding. No biological pathogens were identified by ADDL, however gill damage was observed. Inadequate

water quality was suspected. The pond was recharged and no medicated feed was used. Driftwood's water is supplied by a small reservoir and the fish health problems coincided with the lake turnover.

The Federal Prison Facility in Terra Haute has partnered with the Indiana DNR to rear channel catfish in their recirculating system for Indiana's Urban Fishing Program. They have also been challenged with feed training and grow out of advanced fall walleye. In 2016, after the walleye feed habituation period, a respectable 60 % remained. At week six of the production cycle, the walleye were inventoried and split in to two tanks. Problems surfaced about one week after the split on August 10th. A few fish were sent to ADDL and a mutual, preliminary diagnosis pointed to columnaris. Chloramine -T treatments were tried first (20 ppm for four days) with no improvement and increasing mortality. About 20% of the original lot remained and were still feeding. On day 7 of the outbreak, a ten day Medicated feed (OTC) was started (4 grams/100 lbs. of fish). Mortality ceased by day 5 of the treatment. Coincidentally, on this same day 8/21, the final report from ADDL was received with a diagnosis of ICH. This was surprising and led to formalin treatments. Twenty-four hours after the first treatment only 100 fish remained.

Surveillance

Three water bodies were screened for VHSV. They were Brookville Reservoir, Starve Hallow and Dogwood Lake. Brookville Reservoir is the State's walleye brood source. Milt from 60 males was tested in five-fish pools. They tested negative. Starve Hallow is an impoundment and water supply for Driftwood State Fish Hatchery. Bluegill, redear and largemouth bass were tested. No VHSV or LMBV was isolated. Dogwood Lake is an impoundment and water supply for the East Fork State Fish Hatchery. A total of 60 bluegill were submitted for viral testing. Results were negative.

Normally, VHSV susceptible species are sampled from Webster Lake, the State's Muskie brood source. Unfortunately, insufficient staff was available to perform this function.

Fish Kills

There were no reported fish kills.

Unusual Cases

Nothing significant to share this year.

Thiamine Studies

Most adult summer-run steelhead in 2016 were given an injection of thiamine mononitrate at time of harvest. A total of 590 fish were collected between June 14 and August 23, 2016. The first 140 fish missed the injection due to a miscommunication with the veterinarian supplying the saline needed to make the serum. The serum was made from 1.83 grams of thiamine dissolved in 100 ml of sterile saline. Dose was 1.5 cc per 10 pounds body weight (visual estimate). A repeating syringe was used. Fish larger than 10 pounds received a half dose more while steelhead over 15 pounds were given a double dose. Spawning will begin the first full week of January 2017.

Production lots (5) spawned from injected parents have had very high and consistent survival rates of 95.5% to 98.1% during the first 21 days on feed. None of these lots received thiamine treatments

during or after green-egg stage. The only beneficial thiamine they acquired came from their parents.

Survival of thiamine injected captive adults also continues to be high. Considering the previous 16 brood lots, eight injected lots experienced an average 6.7% mortality while un-injected lots suffered an average 20.9% mortality period. For the 2016 brood lot, mortality through the end of the year was 6.3%. Not bad given 23.7% did not get a thiamine injection. Tracking period is harvest through December 31. Harvest period is first of June through end of September. Collection ceases when target number of fish has been collected (600 to 700) or harvest window closes.

Hatchery Classification Report Indiana Department of Natural Resources

Report Period: January – December, 2016 **Report Date:** 3/20/17

Hatchery Name	Location	Pathogen Acronym
Bodine SFH	Mishawaka, IN	B-AS(10/2016)
Curtis Creek TRS	Howe, IN	A
Fawn River SFH	Orland, IN	A
Mixsawbah SFH	Walkerton, IN	B-AS(7/2016), RS(9/2016)

Skamania Steelhead Broodstock (wild)	Mishawaka, IN	B-AS(1/2014)

Report Prepared By: Dave Meuninck

Title: Hatchery Manager/Fish Health Coordinator

Phone Number: 574-255-4199

EMERGENCY FISH DISEASES

Disease	Disease Pathogen	Disease Acronym	Pathogen Code
Viral hemorrhagic septicemia	Virus	VHS	VHSV
Infectious hematopoietic necrosis	Virus	IHN	IHNV
Ceratomyxosis	Ceratomyxa Shasta protozoan	CS	CS*
Proliferative kidney disease	sporozoan	PKD	PKS*

RESTRICTED FISH DISEASES

Whirling disease	<i>Myxobolus cerebralis</i> protozoan	WD	MC
Infectious pancreatic necrosis	Virus	IPN	IPNV
Bacterial kidney disease	<i>Renibacterium salmoninarum</i> bacterium	BKD	RS
Furunculosis	<i>Aeromonas salmonicida</i> bacterium	BF	AS
Enteric redmouth	<i>Yersinia ruckeri</i> bacterium	ERM	YR
Epizootic epitheliotropic disease	virus	EED	EEDV

* Inspectors within the Great Lakes basin do not need to include these pathogens unless importations of fish from enzootic areas are known to have been made.

SALMONID IMPORTATION REPORT

Agency Indiana Department of Natural Resources

Reporting Period January – December, 2016

I. A. Known importations since last report.

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>
1.	Troutlodge, WA	RBT/80,000 Eyed-Eggs	10,788/L	A			Erie/Michigan/ Ohio River
2.	Jake Wolf SFH, IL	BNT/30,000	3.12"	A	3/20/15	Ryan Katoma	Michigan
3.							
4.							
5.							

B. Proposed importations.

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>
1.	Troutlodge	RBT/90,000 Eyed-Eggs	7276/L	A	Oct '16	Sean Nepper	Erie/Michigan Ohio River
2.	Jake Wolf SFH, IL	BNT/30-50,000	3"	BK	Mar '17	pending	Michigan
3.							
4.							

II. Lab Findings

III. Other



United States Department of the Interior

FISH AND WILDLIFE SERVICE



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2016 Annual Report to the Great Lakes Fish Health Committee from Fish and Wildlife Service Northeast Region; Region 5

March 17, 2017

A fish health inspection was conducted at the Allegheny NFH in Warren, Pennsylvania on June 26, 2016, following the epitheliocystis and heavy metal exposure that was discussed at the GLFHC meeting. This inspection, including the testing of ovarian fluids at spawning (October 2015) marks the fifth consecutive annual fish health inspection without the isolation of a listed pathogen, thereby obtaining the hatchery classification of A-1.

Again, a large mortality event began in late 2016, with the similar clinical signs including gill damage, exophthalmia, and extreme anemia. Tests for all other known pathogens, including EEDv and Nucleospora have once again been negative. Once again metal in tissues (although no large scale sediment sludge occurred this time) are being investigated. Results of these latest investigations have not yet been received. Monthly monitoring of 2018 production (17 year class) has begun and no epitheliocystis has been detected in the tank room to date.

Both Berkshire NFH (MA) and Dwight D Eisenhower NFH (VT) are inspected in compliance with the Great Lakes Fish Disease Control Policy and Model Program, as they have taken up supplemental roles of the USFWS Region 5 Lake Trout program. Having transferred the Seneca strain future brood to Allegheny NFH, Berkshire now rears Klondike strain Lake Trout brood and future brood. The fish health inspection of all lots at Berkshire (Brook Trout and Lake Trout) took place on March 16, 2016 and as indicated by the A-2 classification, all results were negative for listed pathogens.

The Dwight D. Eisenhower (formerly Pittsford) NFH also continues to contribute to the Great Lakes program and possesses a long history of disease free status. The annual fish health inspection, including the Lake Trout fingerlings and yearlings occurred on March 15, 2016 and all lots (LAT, BKT, and LAS) were also negative for listed pathogens, giving the station the A (Great Lakes A-1) classification.

The U.S. Fish and Wildlife Service continues to perform pathogen surveillance on free ranging fish as part of the National Wild Fish Health Survey. In 2016, the Lamar Fish Health Center has performed many investigations on free ranging fish throughout the Northeast for listed fish pathogens, including largemouth bass virus, spring viremia of carp virus, infectious salmon anemia virus, and most applicable to the Great Lakes Basin, viral hemorrhagic septicemia virus (VHS). Screening for Great Lakes emerging fish pathogens (i.e. *Nucleospora* and EEDv) is also conducted where applicable, under the Great Lakes Restoration Initiative (GLRI) and the USFWS National Wild Fish Health Survey.

The Great Lakes watershed proper for Region 5 consists of a small area in extreme northwest Pennsylvania and the northern border of New York. Since most of Pennsylvania's (and a great deal of New York's) waters do not flow into the basin, surveillance efforts have been directed to attempt to demonstrate VHS-free "zones", as well as track the movement of this pathogen in the Great Lakes.

In 2016, 36 sites were sampled. Over 1,950 fish, from over 30 species were tested via the National Wild Fish Health Survey in New York and Pennsylvania. The Lamar Fish Health Center did not isolate VHS virus from fish collected in the Lower Great Lakes Basin in 2016. Likewise, *Nucleospora salmonis* was not identified from any tests this past year. Lake Trout herpesvirus, (salmonid herpesvirus 3) also known as epizootic epitheliotropic disease virus or EEDv, was found by molecular techniques (PCR) from Lake Trout populations in Keuka Lake (NY). A newly identified and similar virus, salmonid herpesvirus 5, was found by molecular techniques in Lake Erie and Lake Ontario lake trout populations. It is unknown if this virus causes any disease. These findings indicate the need for further, continued surveillance, which is planned to continue in 2017. Five of 28 lake trout tested from Lake Ontario were shown to be positive for the epitheliocystis seen at Allegheny NFH.

Although coolwater fish have been added to the Model Program, no USFWS facility participating in the Great Lakes program in the Northeast, cultures these species. The Lamar Fish Health Center has been assisting the Pennsylvania Fish and Boat Commission with viral testing on wild warm and cool water broodstocks and their hatchery offspring. Additionally, cold, cool, and warm water fish continue to be tested in the National Wild Fish Health survey. Largemouth bass virus was isolated in largemouth bass in Butterfield Lake (NY) in 2016.

The Lamar Fish Health Center continues to participate in the US Fish and Wildlife Service Fish Health Center Ring Test Program, and in 2017 a coordinated virus proficiency test will be initiated for all Service Fish Health Centers.

2016 HATCHERY CLASSIFICATION REPORT

Report Period Jan. 1, 2016– Dec 31, 2016 Report Date: Mar 13, 2017

Hatchery Name	Location	Pathogen Acronym
<u>Allegheny NFH</u>	<u>Warren, PA</u>	<u>A-1 06/22/2016</u>
<u>D.D. Eisenhower NFH</u>	<u>Bethal, VT</u>	<u>A-1 03/15/2016 U-V treated</u>
<u>Berkshire NFH</u>	<u>Great Barrington, MA</u>	<u>A-2 03/16/2016</u>

Report Prepared by: John A. Coll

Title: Project Leader, Lamar Fish Health Center

Phone Number: 570-726-6611 x 221

EMERGENCY FISH DISEASES

Disease	Disease Pathogen	Disease Acronym	Pathogen Acronym
viral hemorrhagic septicemia	virus	VHS	VE
infectious hematopoietic necrosis	virus	IHN	VH
ceratomyxosis	<i>Ceratomyxa shasta</i> protozoan	CS	SC*
proliferative kidney disease	sporozoan	PKD	SP*

RESTRICTED FISH DISEASES

whirling disease	<i>Myxobolus cerebralis</i> protozoan	WD	SW
infectious pancreatic necrosis	virus	IPN	VP
bacterial kidney disease	<i>Renibacterium salmoninarum</i> bacteria	BKD	BK
furunculosis	<i>Aeromonas salmonicida</i> bacterium	BF	BF
enteric redmouth	<i>Yersinia ruckeri</i> bacterium	ERM	BR
epizootic epitheliotropic disease	virus	EED	VL**

* Inspectors within the Great Lakes basin do not need to include these pathogens unless importations of fish from enzootic areas are known to have been made.

** Field diagnostic test not available.

SALMONID IMPORTATION REPORT

Agency U.S. Fish and Wildlife Service Region5, Lamar, PA

Reporting Period 01/01/16 – 12/31/16

I. A. Known importations since last report.

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>	<u>Imported to:</u>
1.	Eisenhower NFH N. Chittendon, VT	Lake trout - Champlain/Seneca 90,000	yearling	A-1	03/31/2015 (03/15/2016)	Barbash/Coll	Ontario	Stony Point, NY Oak Orchard, NY Lake Ontario
2.	Eisenhower NFH N. Chittendon, VT	Lake trout - Champlain/Seneca 80,000	fingerling	A-1	03/31/2015 (03/15/2016)	Barbash/Coll	Ontario	Oak Orchard, NY Lake Ontario
3.								

B. Proposed importations:

	<u>Source</u>	<u>Species/Number</u>	<u>Fish/Eggs Size</u>	<u>Fish Health Status</u>	<u>Certification Date</u>	<u>Certifying Official</u>	<u>Lake Basin</u>	<u>Imported to:</u>
1	Eisenhower NFH N. Chittendon, VT	Lake trout - Champlain/Seneca 100,000	yearling	A-1	(03/15/2016)	Barbash/Coll	Ontario	Oak Orchard, NY Lake Ontario

II. Lab Findings

III. Other



Fisheries
and Oceans

Pêches
et Océans

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Your file *Votre référence*

Our file *Notre référence*

15 March 2017

Department of Fisheries and Oceans Annual Report to Great Lakes Fish Health Committee March 2017

Overview – DFO Activities (Central and Arctic Region)

1) National Aquatic Animal Health Program (NAAHP)

a) Diagnostics

Following tests are being performed under the scope of ISO 17025 accreditation:

- 1) NAT-PROT-RT-qPCR-VHSV-1: Reverse Transcription Quantitative PCR for the Detection of Viral Hemorrhagic Septicemia Virus (VHSV)
- 2) NAT-PROT-RT-qPCR-IPNV-1: Reverse transcription quantitative PCR assay for the detection of infectious pancreatic necrosis virus (IPNV) nucleic acid
- 3) NAT-PROT-RT-qPCR-ISAV-1: RT-qPCR Test Method Protocol using TaqMan Universal PCR Master Mix for the Detection of Infectious Salmon Anemia Virus
- 4) NAT-PROT-RT-qPCR-IHNV-1: Reverse Transcription Quantitative PCR for the Detection of Infectious Hematopoietic Necrosis Virus (IHNV)
- 5) NAT-PROT-VI-1: Isolation of Viral Agents (IPNV, IHNV, EHN, ISAV, & VHSV) from Finfish by Cell Culture *

*IPNV

Additionally, lab has capability to conduct testing for Koi Herpes virus (KHV), Spring Viremia of Carp Virus (SVCV), Salmon Pancreatic Disease (SPDV) and White Sturgeon Iridovirus (WSIV), Red Sea Bream Iridovirus (RSIV) and Whirling disease.

On August 25th, 2016, Canadian Food Inspection Agency (CFIA) confirmed the first detection of whirling disease in Johnson Lake Alberta. This was the first case of whirling disease in Canada.

Since then detections are confirmed in the wild and aquaculture facilities in Alberta. As of Dec 2016, the National Aquatic Animal Health Laboratories (NAAHLS) in DFO have received and tested more than 1200 samples for whirling disease testing.

Summary of samples as of Dec 2016 for Winnipeg laboratory

	Total
Total submissions	30
Total samples submitted	2932
Total tests results reported	3100

To date Testing for all samples has been completed. Depending upon the reason of submission (response to notification, export, import, surveillance etc.), samples were tested for: IPNV, VHSV, IHNV, ISAV, SVCV, RSIV and whirling disease.

b) Research

Winnipeg lab is a reference laboratory for IPNV, KHV, SVCV, WSIV, RSIV and EHN and is responsible for developing and validating diagnostic assays as per OIE standards for these pathogens. Validation of diagnostic assays for IPNV, KHV and WSIV has been completed and is being used by DFO laboratories. Research focus for 2016 was to complete all the laboratory work for the completion of validation of diagnostic assays for SVCV. Analysis for SVCV will be completed in 2017-18. Following paper was published for the KHV:

Sharon C. Clouthier, Carol McClure, Tamara Schroeder, Megan Desai, Laura Hawley, Sunita Khatkar, Melissa Lindsay, Geoff Lowe, Jon Richard, Eric D. Anderson (2017). Diagnostic validation of three test methods for detection of cyprinid herpesvirus 3 (CyHV-3). DOA 123:101-122.

2) Fish Health Certification Program

This program was rescinded as of Dec 31, 2015 so no testing was performed in this category.

3) Response to wild fish kills

No fish kills were reported to Winnipeg lab this year.

Sunita Khatkar
 Department of Fisheries and Oceans
 Winnipeg, MB

2016 MN DNR Annual Fish Health Report

3/7/17

State Coldwater Hatchery Annual Health Inspections

Annual health inspections were performed at all five Minnesota Department of Natural Resources coldwater fish hatcheries. The inspection program includes lethal sampling of all lots of fish at the time of inspection and ovarian fluid sampling during spawning. A total of 1,470 fish were inspected. No certifiable pathogens were detected. Ovarian fluid was screened for *Renibacterium salmoninarum* and viruses (2,038 samples) during spawning at four of the state hatcheries. Ovarian fluids from fish located at Crystal Springs Hatchery were not screened because there are not currently broodstock located at the facility. French River Hatchery continues to have a low level (4.8%) detection of *R. salmoninarum*. No *R. salmoninarum* or viruses were detected at the other three hatcheries.

Wild Egg Takes

Kamloops and Steelhead rainbow trout eggs were taken from Lake Superior this spring. Pair spawning was performed in an effort to cull fish infected with *Renibacterium salmoninarum*. A total of 160 Kamloops and 81 French River wild Steelhead ovarian fluids were tested for *R. salmoninarum* and viruses. Screening with ELISA, 3/160 Kamloops tested positive and all Steelhead tested negative for *R. salmoninarum*. No viruses were detected. Eggs from fish infected with *R. salmoninarum* were discarded.

Thirty Kamloops rainbow trout were tested for certifiable pathogens including *A. salmonicida*, *Y. ruckeri*, *R. salmoninarum* and various viruses. None were detected.

Crystal Springs Hatchery Depopulation

Crystal Springs hatchery was depopulated in December, 2015, due to an outbreak of furunculosis. The entire hatchery was disinfected in 2016. In December, the hatchery imported 50,000 brook trout eggs from Enfield hatchery in Maine.

On 2/1/2017, the Maine fish health official informed us that one of their BKT lots had tested positive for Rainbow Smelt Aquareovirus. This virus was first detected in Maine in 2014. Since 2014, they have detected this virus in 4 water bodies of the state. We tested of the 150 brook trout fry (hatched from eggs received from Maine) for Rainbow Smelt Aquariovirus using viral isolation. Samples were inoculated on to EPC and CHSE cells and incubated at 15°C for 14 days, and blind passed for additional 18 days. No CPE were observed.

Hatchery Diagnostic Cases

Three of the state coldwater hatcheries had diagnostic cases in 2016. A total of eight cases were submitted to the lab. At one hatchery, it was discovered that hydrogen peroxide had been used too extensively resulting in gill irritation. Fish recovered after the dosage was reduced to the appropriate level.

Wild Stream Brook Trout screening

In November 2016, we attempted to start a new “heritage” brook trout strain by taking gametes from wild brook trout in East Indian Creek. Pair spawning was performed in an effort to cull fish infected with certifiable pathogens. Ovarian fluid was collected from eleven females and screened for *Renibacterium salmoninarum* using ELISA. Six samples tested positive. As a result of the positive results, all eggs were discarded and not brought from the creek to the hatchery. An additional 8 streams were inspected in an attempt to find a disease-free source of heritage brook trout. No pathogens were found during the inspections.

Fertilized lake trout eggs were brought in to Peterson Hatchery from Mountain Lake in November 2016. Sixty-two ovarian fluid samples were tested for viruses and *R. salmoninarum*. No pathogens were detected.

Cool Water Fish Testing for VHS Surveillance

VHS susceptible fish species continue to be screened for VHS in MN. A total of 15,203 specimens were tested including specimen from 8 major recreational waters of the state. No virus was detected.

Fish Kill Investigation

A total of 24 fish kills were reported this year. Four relatively significant fish kills (all black crappies) were investigated. Samples were received at the Pathology Laboratory. Two of those fish kills (Cedar Lake and Indian Lake) are clear cases of Columnaris disease outbreak. The gills revealed heavy load of *flavobacteria* with lesions pathognomonic for the disease. One case was due to environmental changes during the spawning season.

Cold Water Hatchery Classification

Hatchery Classification Report

Hatchery Name	Location	Pathogen Acronym
Crystal Springs	Altura	C
Lanesboro	Lanesboro	A
French River	Duluth	B-BK
Peterson	Peterson	A
Spire Valley	Remer	A

Report Period: 1/1/16 – 12/31/16

Report prepared by: Ling Shen

Title: Fish Pathology Lab Supervisor

Phone Number: 651-259-5138

EMERGENCY FISH DISEASES

Disease	Disease Pathogen	Disease Acronym	Pathogen Acronym
viral hemorrhagic septicemia	virus	VHS	VE
infectious hematopoietic necrosis	virus	IHN	VH
ceratomyxosis	<i>Ceratomyxa shasta</i> protozoan	CS	SC*
proliferative kidney disease	sporozoan	PKD	SP*

RESTRICTED FISH DISEASES

Disease	Disease Pathogen	Disease Acronym	Pathogen Acronym
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furunculosis	<i>Aeromonas salmonicida</i>	BF	BF
enteric redmouth	<i>Yersinia ruckeri</i>	ERM	BR
epizootic epitheliotropic disease	virus	EED	VL**

* Inspectors within the Great Lakes basin do not need to include these pathogens unless importations of fish from enzootic areas are known to have been made.

** Field diagnostic test not available

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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NYSDEC Agency Report to the Great Lakes Fish Health Committee for 2016

March 7, 2017

Statewide Fish Health

Two separate pathogen surveillance programs are conducted annually in New York. The first is an ongoing statewide survey to identify waters where regulated pathogens may be present in fish populations. Cornell University Aquatic Animal Health Program, in Ithaca, NY performs the second survey through a program to investigate diseases in wild fish.

Wild Fish Pathogen Surveillance Program: For the statewide survey, a wide range of fish species were collected from 35 locations (1,953 fish) and clinical testing was performed at the USFWS Fish Health Center in Lamar, PA. Pathogens of interest isolated from fish in New York waters in 2016 included Salmonid Herpes Virus 5 (SalHV5), Epizootic Epitheliotropic Disease Virus (EEDV), Largemouth Bass Virus (LMBV), and an undescribed betaproteobacteria from Lake Trout gill tissue. EEDV was isolated from Lake Trout in Keuka Lake. EEDV isolations from Finger Lakes is not uncommon, it was detected in Seneca Lake in 2016. SalHV5 was isolated from Lake Ontario and Lake Erie Lake Trout in August and September sampling events where it has been isolated before. LMBV has routinely been isolated in southern tier waters of New York, having been found in 2015 in Smallmouth Bass in the Susquehanna River and Rushford Lake and from Largemouth Bass in Chautauqua Lake. In 2016, LMBV was isolated from Largemouth Bass far north in Butterfield Lake on the St. Lawrence River drainage. Epitheliocystis due to a betaproteobacterial infection in the fall of 2015 resulted in a mass Lake Trout mortality at the Allegheny National Fish Hatchery in Pennsylvania. In our 2016 surveys, the same betaproteobacteria was included in the pathogen screening plan and was isolated from Lake Ontario Lake Trout in April and May testing efforts.

Wild Fish Disease Investigations: Cornell conducted 10 fish disease investigations in 2016. In June, furunculosis was determined to be the cause of disease in some lethargic Atlantic Salmon from Salmon River near Altmar. In July, severe Mycobacteriosis was evident in a number of Freshwater Drum in Sodus Bay, Lake Ontario. In August, a kill event was investigated where a large number of lethargic Smallmouth Bass were from Sherwin Bay, Lake Ontario had died due to hypoxia as a result of oxygen depletion. Later that month, a mortality event in Golden Shiners from Prospect Park in New York City resulted from a harmful algal bloom. Severe gill necrosis was evident which is consistent with this type of event.



In 2015, a massive Atlantic Menhaden kill was reported in May from many locations on the eastern U.S. coast from New Jersey to Maine. In New York, kills were evident all around Long Island and far up the Hudson River. Fish were collected from Upper Nyack on the Hudson, the mouth of Peconic Bay on the far eastern end of Long Island, and Port Washington on the western end of Long Island Sound. An unidentified virus was isolated from all fish tested. Hypoxia due to oxygen depletion contributed to the kill in both Long Island locations. In 2016, a similar event occurred, although at a much smaller scale. In September, an unidentified virus was isolated from Atlantic Menhaden from Port Jefferson on the Long Island Sound. Virus identification is pending.

Hatchery Fish Health and INAD Projects

The overall health of fish in our hatchery system has been good for several years. Many diseases routinely encountered in previous years, such as prominent Saprolegnia in our trout brood stock, Gyrodactylus infestations in our Brook Trout, and the furunculosis epizootic at Rome in 2012 have been mostly resolved. Also, our hatchery system has been free of program viruses, such as IPN, for decades. We do have recurring common bacterial disease issues that are addressed routinely.

Progress of Furunculosis Abatement at Rome SFH- In the summer of 2012, a serious epizootic of furunculosis occurred at the Rome hatchery and was linked to the importation of very susceptible Brown Trout lot from Virginia. By September, an abatement plan was developed that included (1) destroying 800,000 infected fish, (2) bi-annual inspections of all lots at 2% prevalence interval for two years, and (3) only Rome strain trout could be cultured on site. Rome strain Brook trout and Brown Trout on site during the event were spared because they were largely unharmed during the epizootic. *Aeromonas salmonicida* was not detected in 2013 or 2014 inspections, so the hatchery classification was upgraded to 'A' in September 2014. However, during spawning activities at Rome Field Station in November, clinical furunculosis was evident in a few dozen adult Rome Strain Brown Trout. In 2015, clinical furunculosis reappeared in about a dozen spawning Brown Trout, and in Brook Trout in 2016, but losses were minimal and subsequent testing of all production lots at Rome Hatchery and other Rome Lab lots were negative. Rome Hatchery continues to be classified 'As', but there has been no sign of the pathogen other than the spawning activities taking place at Rome Lab in the late fall. Because the hatchery and lab are on a shared property with no biosecure boundary between them, the downgrade is necessary. It appears that the metabolic demands of spawning over the last few years have allowed latent furunculosis to become lytic. This phenomenon was not seen in our brood stock prior to the 2012 furunculosis epizootic and may be related to the introduction of the Virginia strain of *A. salmonicida*.

Rome Strain Revitalization- Rome strain Brook and Brown Trout have been the predominant domestic trout strains for over sixty years. They were developed for furunculosis resistance and have served our agency well, but concern over heterozygosity loss has grown. To abate this, we have identified a wild population of Rome Strain Brown Trout in Oriskany Creek that have survived on their own without

Commented [GE1]: How does the hatchery go back to As, when the problem was here? And how does Scott have Tem? Maybe some clarification?

additional stocking since the 1990's. In 2015, we fertilized domestic Rome Strain Brown with milt from Oriskany Brown Trout. In June of 2016, those fingerlings were challenged with *A. salmonicida* and their survival was not significantly different than our domestic Brown Trout. Plans for how to incorporate these into our brood stock population are still being developed, but we will likely use milt from wild Rome Strain Brown Trout every year for some of our trout production.

Flavobacterial Diseases: The usual epizootics of bacterial gill disease, bacterial cold water disease, and columnaris disease appeared throughout our hatchery system in 2016 along with other undescribed, yet very similar Flavobacteria. These comprise the majority of our clinical hatchery work. In our quest to reduce Terramycin use, we did have success using Perox-Aid and Chloramine T in combatting columnaris disease and bacterial coldwater disease on several occasions. This approach was continued in 2016 with success. We found the key was early detection and early drug administration. The global Chloramine T shortage in 2016 created problems for us. Summertime bouts of BGD are frequent in most of our hatcheries and we typically find Perox-Aid to be less effective than Chloramine T.

INAD Work- INAD projects included Chloramine T (INAD 9321), AQUI-S (11-741), OTC immersion (INAD 9033) and OTC (INAD 9332) this year. The Chloramine T approval does not include cool water species like Muskellunge or Tiger Muskellunge, so our INAD participation benefitted our South Otselic and Chautauqua Hatcheries production programs. Many effective treatments were conducted at these hatcheries to treat Bacterial Gill Disease and Columnaris Disease. Our have been very pleased with AQUI-S for mild sedation at many of our locations. We have found it to be much safer than MS-222 and it results in a much more consistent level of mild sedation for egg collection.

We collaborated with AADAP staff in conducting another INAD trial at Our South Otselic Hatchery, this time to address OTC-HCl static bath efficacy in treating an early-onset *F. columnare* infection. Fish were treated on three consecutive days at 150 mg/l in a 60 minute static bath and mortalities were monitored for 18 days. A negative control group was used for comparison. In this trial, the OTC treatment was considered ineffective because the mean cumulative mortality in the control group was not significantly higher than the OTC-treated group. In 2014, we conducted a similar study at South Otselic and found Chloramine T to be very effective in treating an early-onset columnaris infection.

Hatchery Inspection Program

The DEC's Fish Disease Control Unit (FDCU) annually inspects all lots of fish in DEC culture programs, both domestic and from wild sources. In 2016, our inspections included domestic trout cultured in our hatcheries, plus various species of wild fish used in egg collections intended for hatchery propagation. In all, we conducted 50 inspections and necropsied more than 4,000 fish. For the first time in years, *Aeromonas salmonicida* was not isolated from adult Chinook, Coho, or Steelhead

Salmon during egg collections at the Salmon River. We typically find *A. salmonicida* in 10-20% of Chinook and 5-10% of Coho and Steelhead. As mentioned previously, *A. salmonicida* was isolated from 3-yr Brook Trout at Rome but no other lots on site. That year class was destroyed. At Randolph, *Yersinia ruckeri* was isolated from 2/60 adult Brook Trout. This is the first incidence of this in a New York state hatchery and will be closely monitored. No signs of disease were evident and the fish appeared very healthy. In 2014, *Y. ruckeri* was isolated from Brook Trout in a pond in the Big and Little Hill Ponds in the Adirondacks, the first isolation of *Y. ruckeri* in New York in decades. However, it was not detected in follow-up collections of the same ponds in 2015 and 2016. No other program pathogens were detected in our hatcheries.

Andrew D. Noyes
Pathologist 2 (Aquatic)

New York State Fish Hatchery Disease Classification Report

Report Period: Jan 1, 2016 to Dec 31, 2016

Hatchery	Location	Classification
Adirondack	Saranac Lake, NY	A-2
Bath	Bath, NY	A-2
Caledonia	Caledonia, NY	A-2
Catskill	Livingston Manor, NY	A-2
Cedar Springs	Caledonia, NY	A-2
Chateaugay	Chateaugay, NY	A-2
Chautauqua	Mayville, NY	A-2
Oneida	Constantia, NY	A-2
Randolph	East Randolph, NY	BR-2 (10/16)
Rome	Rome, NY	BF-2 (11/16)
Salmon River Culture Facility	Altmar, NY	A-2
Salmon River Spawning Station	Altmar, NY	BF-2 (10/16)
South Otselic	South Otselic, NY	A-2
Van Hornesville	Van Hornesville, NY	A-1
Wild Broodstock		
Coho Salmon - Lake Ontario	Altmar, NY	BF-2 (10/15)
Chinook Salmon - Lake Ontario	Altmar, NY	BF-2 (10/15)
Steelhead Salmon- Lake Ontario	Altmar, NY	A-2
Walleye-Oneida Lake	Constantia, NY	A-2
LLS - Little Clear Lake	Saranac Inn	A-2
Lake Trout - Cayuga Lake	Cayuga Lake	A-2
Lake Trout - Raquette Lake	Raquette Lake	A-2
Rainbow Trout	Cayuga Lake	A-2
Round Whitefish	Little Moose Pond	A-2
Brook Trout	Twin Ponds	A-2
Brook Trout	Boot Tree Pond	A-2
Brook Trout	Big Hill Pond	A-2
Brook Trout	Mountain Pond	A-2
Brook Trout	Deer Pond	A-2
Brook Trout	Fish Brook	A-2
Cisco	Lake Ontario	A-2
Sturgeon	St. Lawrence River	A-2

Report Prepared by: Andrew D. Noyes, Pathologist 2 (Aquatic)
 Phone: 315-337-0910 Report Date: March 7, 2017

Classification Designation:

- A-1 Closed water supply, free of fish, no serious infectious disease
- A-2 Open water supply, fish present, no serious infectious disease
- B One or more serious infectious diseases present
- C No inspection or clinical disease data available for the last twelve months

Disease Identification (acronym):

- VP Viral infectious pancreatic necrosis (IPN)
- VH Viral hemorrhagic septicemia (VHS)
- WD Whirling Disease
- BF Bacterial furunculosis
- BK Bacterial kidney disease (BKD)
- BR Bacterial redmouth disease (ERM)

Example:

As-2 (11/01): Furunculosis detected within the last 12 months and date of isolation in parentheses. Above example applies to classifications in 2002 when BF was isolated in most recent inspection.

A-2 (BF)(11/01): Furunculosis not present during previous inspection, but present within last three inspections. Above example applies to 2003 and 2004 classifications **IF** BF was not detected. If no BF was isolated in 2005, parenthetical disease acronyms and dates are dropped and hatchery is upgraded to A-2.

As-2-T: A hatchery with an 'A' classification is downgraded to **B-BF-T** if it receives fish from a hatchery classified as B-BF. Note that a B-BF facility may transfer disinfected eggs to an 'A' facility without downgrading the receiving hatchery classification.



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Division of Wildlife
Raymond Petering, Chief
2045 Morse Road, Bldg. G-3
Columbus, Ohio 43229

February 28, 2017

TO: Great Lakes Fishery Commission – Great Lakes Fish Health Committee
FROM: Ohio Department of Natural Resources – Division of Wildlife (ODNR-DOW)
SUBJECT: 2016 Fish Health Report

In 2016, the ODNR-DOW once again cooperated with the Ohio State University to sub-contract Dr. Jim Brick, DVM, to oversee fish health inspection procedures. Dr. Brick accompanied ODNR-DOW staff on all collections in 2016. Samples were examined and tested at the U.S. Fish and Wildlife Service's LaCrosse Fish Health Center. All fish lots to be stocked by the ODNR-DOW into Ohio waters were tested for reportable diseases following the guidelines in the Great Lakes Fishery Commission – Great Lakes Fish Health Committee (GLFHC) Model Fish Health Program. One state fish hatchery employee is pursuing the AFS Aquatic Animal Health Inspector certification; another has registered to start fish health training in early 2017.

Pre-Stocking Fingerlings

Six salmonid bacterial lots, 6 salmonid DFAT lots, and 4 salmonid whirling lots (60 fish per lot) from three Ohio State Fish Hatcheries (SFHs) were tested prior to stocking in 2016. The species tested included one lot of brown trout (*Salmo trutta*) and five lots of rainbow trout (*Oncorhynchus mykiss*). ODNR-DOW did not maintain salmonid broodstock in 2016; salmonid eggs are acquired from external partners and private aquaculture operations. Twenty-seven viral lots from six Ohio SFHs were tested prior to stocking in 2016. These included rainbow trout, steelhead trout, brown trout, muskellunge (*Esox masquinongy*), hybrid striped bass (*Morone chrysops x Morone saxatilis*), bluegill sunfish (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), blue catfish (*Ictalurus furcatus*), largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), saugeye (*Sander vitreus x Sander canadensis*), and walleye (*Sander vitreus*). In 2016, golden shiner virus was isolated from muskellunge fingerlings at Kincaid SFH; however, no other pathogens were detected in the pre-stocking fish health testing.

Feral Broodstock

In 2016, seven broodfish lots (150 fish per lot) were tested from the following water bodies: Maumee River, Rocky Fork, Berlin Lake, Clearfork Reservoir, Mosquito Reservoir, Ohio River, and Leesville Reservoir. The ODNR-DOW collected feral sauger, walleye, common carp, and muskellunge from the aforementioned water bodies. No pathogens were detected in 2016 feral broodstock testing from Great Lakes Basin waterbodies; however, largemouth bass virus was isolated in samples collected from one Ohio River Basin reservoir (a recurrent location).



Forage Fish

In 2016, we tested broodfish lots (60 fish per lot) of forage fish at the following state fish hatcheries: Hebron, Kincaid, London, and St Marys SFHs, fathead minnows (*Pimephales promelas*) and London SFH (*Cyprinus carpio*). At Kincaid SFH, golden shiner virus was detected. At Hebron SFH, a novel virus was detected in fathead minnows, USFWS LaCrosse personnel are planning to complete more research in an attempt to isolate and describe what they found.

VHSV Surveillance

In 2016, there were no detections of VHSV in any ODNR-DOW fish tested. The last detection occurred in spring 2009 at Clear Fork Reservoir in north central Ohio. Subsequent testing at Clear Fork Reservoir (2010, 2014, 2015 and 2016) has not produced any detections of VHSV.

Great Lakes Restoration Initiative Project

The St. Marys SFH lies on the eastern shore of Grand Lake St. Marys (GLSM). GLSM has been identified as a connection between the Mississippi River basin and the Great Lakes basin. Historically, and presently, the fish hatchery has used lake water for fish hatchery production and discharged the water into a tributary of the St. Marys River within the Great Lakes (GL) basin. A consulting firm was hired to assess closure options at St. Marys State Fish Hatchery. The preferred option to eliminate the inter-basin connection was a post-treatment (i.e., water filtration) alternative. With this alternative, the hatchery will continue to use water from GLSM, but lake water will be returned back to GLSM, and other (well) water going into the GL basin and any water leaving GLSM bound for the GL basin will be treated and screened prior to being released into the GL basin. The following modifications to the hatchery infrastructure have been completed:

- installation of a new two new wells;
- installation of two new sand (iron) filters;
- concrete raceway replacement and expansion of the hatching house;
- construction of a debris strainer at the entrance to the hatchery water intake at GLSM.

Other planned modifications on site at St Marys SFH and GLSM for 2017 and 2018 include:

- replacement of pumps and control valve to return lake water used by the hatchery to GLSM;
- replacement of a strainer system for importing water from GLSM to the hatchery;
- construction of a filter and screen system for GLSM lake water that maintains critical flows in the canal and river system which is destined for the GL basin.



Ohio Department of Natural Resources

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Ontario Ministry of Natural Resources and Forestry 2016 Annual Report for the Great Lakes Fish Health Committee

March 2017

The Ontario Ministry of Natural Resources and Forestry (OMNRF) is actively involved in assessing fish health in the province by means of its Fish Culture Program (routine monitoring; disease investigations; spawn collections) and various programs for wild fish monitoring and disease diagnosis (Broadscale Monitoring; Fish Die Off Reporting). Program details and pathogen detections for 2016 are outlined below.

OMNRF Fish Culture Program

OMNRF operates nine fish culture stations (FCS) throughout the province, stocking more than 8 million fish each year for species restoration, wild population enhancement and recreational fishing opportunities.

Fish health testing is completed by the Fish Health Laboratory at the University of Guelph under the supervision of Dr. Roselynn Stevenson and Dr. Lucy Mutharia. The lab provides services to OMNRF fish culture stations including:

- Routine fish health monitoring/surveillance
- Disease/mortality investigations
- Screening of wild fish and gametes for spawn collections

For routine surveillance, each FCS is sampled at the facility level (95% confidence, 1.8% prevalence) with 165 samples (split appropriately between species and lots) submitted throughout the year. Stations with broodstock submit based on a ratio of 70:30 (production:brood), with spawning fish being sampled across the entire spawning period.

Emergency pathogen detections:

There were no detections of emergency pathogens in fish submitted as part of the Fish Culture Program in 2016.

Restricted pathogen detections:

Renibacterium salmoninarum is considered to be endemic in Ontario and is present in OMNRF Fish Culture Stations at low levels. Detections for 2016 are reported in Table 1. None of these detections were associated with clinical disease or gross lesions.

Table 1. *Renibacterium salmoninarum* detections by IFAT in 2016.

Location	Month	Species	Detection Details
Chatsworth FCS Substation	February	Lake Trout	Low numbers in 1 of 128 fish
Blue Jay Creek FCS Substation	October	Walleye	Low numbers in 1 of 127 fish

Aeromonas salmonicida detections (found in wild collection fish only) for 2016 are reported in Table 2.

Table 2. *Aeromonas salmonicida* detections in 2016.

Location	Month	Species	Detection Details
Chatsworth FCS Saugeen River	April	Rainbow Trout	Wild Collection – Saugeen River 1 positive of 30 fish
Normandale FCS Ganaraska River	October	Chinook	Wild Collection – Ganaraska River 12 positive of 60 fish
Normandale FCS Credit River	October	Chinook	Wild Collection – Credit River 1 positive of 60 fish

Yersinia ruckeri detections for 2016 are reported in Table 3. Detection was not associated with clinical disease or gross lesions.

Table 3. *Yersinia ruckeri* detections in 2016.

Location	Month	Species	Detection Details
North Bay FCS	March	Brook Trout	Routine Monitoring 4 positive of 51 fish
North Bay FCS	July	Brook Trout	Mortality Investigation Common colony in 6 fish submitted (Mortality was determined to be cause by Bacterial Gill Disease)
North Bay FCS	July	Rainbow Trout	Routine Monitoring 1 positive of 17 fish

OMNRF Wild Fish Monitoring and Disease Diagnosis

OMNRF monitors wild fish populations for pathogens via the Broadscale Monitoring Program and Fish Die-Off Reporting. Samples are collected from specific water bodies and submitted for screening – primarily to detect the potential spread of VHS. OMNRF also oversees a direct phone line for public reporting of wild fish die-offs, with samples being submitted for disease diagnosis when applicable. Wild fish health testing is performed by the Fish Pathology Laboratory at the University of Guelph under the direction of Dr. John Lumsden.

Emergency pathogen detections:

There were no detections of emergency pathogens in fish submitted as part of any wild fish monitoring program in 2016.

Restricted pathogen detections:

There were no detections of restricted pathogens in fish submitted as part of any wild fish monitoring program in 2016.

In 2016, no evidence was detected of the further spread of VHS (IVb) across the province, therefore no changes have been made to either the Lake Simcoe Management Zone or VHS Management Zone (Figure 1). Lake Nipissing (outside the current zones) has been sampled extensively in recent years with all results negative for VHS.

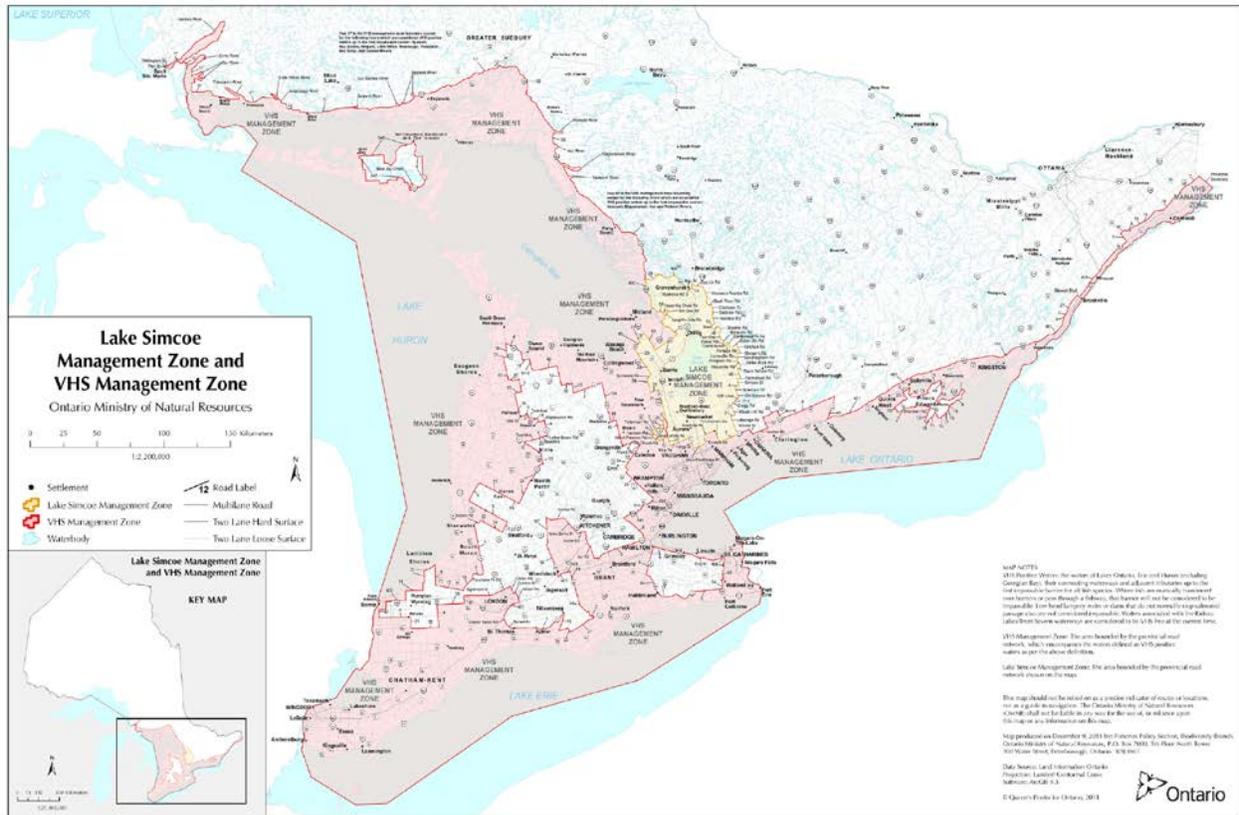


Figure 1. Lake Simcoe Management Zone and VHS Management Zone.

Miscellaneous Detections:

Flavobacterium branchiophilum was found in a significant number of groups of fish at almost all of the Fish Culture Stations in 2016. All stations (with the exception of Dorion) treated with Halamid and/or hydrogen peroxide successfully.

Flavobacterium psychrophilum was detected at several Fish Culture Stations in 2016.

Normandale FCS treated a group of juvenile Atlantic salmon experiencing associated mortality with Aquaflor. The fish responded well to the treatment with no adverse effects noted.

March 2017

Prepared by Kerry Hobden, Fish Health Coordinator

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Pennsylvania Fish and Boat Commission

Annual Hatchery Disease Classification and Importation Report

January 1, 2016 –December 31, 2017

Restricted Pathogens

Aeromonas salmonicida with varying antibiotic resistance was confirmed at several PFBC hatcheries in 2016. Detections were made while conducting diagnostic examinations and fish health inspections. Diagnostic cases associated with increased mortality increased greatly in 2016 from previous years. The state experienced above average temperatures and drought conditions throughout the year, it is hypothesized that the unusual environmental conditions in combination with the introduction of naive strains of Brook Trout may have contributed to the increase in epizootics. Improved biosecurity and changes in hatchery standard operation procedures (SOP) including a vaccination program initiated in 2010 have had positive results and are helping to control mortality due to *Aeromonas salmonicida*.

Infectious pancreatic necrosis (IPNV) has been detected at 8 PFBC hatcheries during 2016, these detections were made while conducting fish health inspections and diagnostic examinations. Significant Brook Trout fry mortality was attributed to IPNV at 1 facility in 2016. Pair spawning, improved SOP's, importation and isolation IPNV free eggs and an increased emphasis on biosecurity are being implemented at several hatcheries in an attempt to reduce the incidences of IPNV.

Myxobolus cerebralis was not detected at any PFBC facilities in 2016, the pathogen was detected a single facility in 2014.

Renibacterium salmoninarum was detected at 4 PFBC hatcheries in 2015. Mortality was only associated with the pathogen at the Oswayo SFH.

Yersinia ruckerii was cultured from a single adult Steelhead Trout from Lake Erie, and a Chain Pickerel from the Delaware River Drainage in 2016, these detections were from wild brood that were being held in isolation at state facilities. All eggs were disinfected and holding containers were disinfected. The pathogen was not isolated from progeny at

either facility. The pathogen was also detected in a wild caught Burbot from Lake Erie in 2015.

Viral Hemorrhagic Septicemia (VHSv) No detections were documented in the PFBC hatchery system or by the PFBC in 2016.

Cutthroat Trout Virus (CTV)

Cutthroat Trout Virus was not detected in 2016, it was detected at one PFBC facilities in 2015. CTV was detected in 2 hatcheries in 2014, the pathogen was first detected in the PFBC hatchery system in late 2012. The PFBC is currently monitoring for the virus, however no management plan has been developed.

PFBC Cooperative Nurseries

2016 Fish Health Inspections have been completed at the eight PFBC cooperative nurseries within the Lake Erie Basin. IPNV was detected at several Cooperative Nurseries in 2011. The nurseries were depopulated and disinfected in 2012. To date, results from all nurseries have been negative for IPNV and other Emergency and Restricted pathogens since 2012.

Lake Erie Winter Steelhead

Ovarian fluid and milt samples are currently being collected from Lake Erie Winter Steelhead Trout brood stock. Samples are analyzed at the Penn State University Animal Diagnostic Laboratory (PSUADL). No viral pathogens were detected in the 2016-2017 brood collections. IPNV was detected in several wild fish in 2014. The 2014 detections were the only detections since 2007.

Wild Brood Monitoring

Depending on the species and the availability of fish, lethal or non-lethal sampling techniques were employed to monitor for viral pathogens in all lots of wild brood fish used for production by the PFBC. To date, wild brood stock monitoring has taken place in seven bodies of water located in the Delaware River Basin, the Ohio River Basin and the Lake Erie Basin. Species sampled include Steelhead Trout, Walleye, Yellow Perch, White Crappie, Bluegill, Muskellunge, Northern Pike, American Shad, and Golden Shiner. Except for steelhead, all species sampled were collected from waters outside of the Lake Erie Basin. However, since neither these fish nor their eggs are being brought into the PFBC production system, this preventative activity is applicable to this report.

Egg Disinfection

Currently, all PFBC hatcheries involved in the production of cool/warm water species are following the GLFHC Basinwide Coolwater Egg Disinfection Protocol.



Pennsylvania Fish and Boat Commission Annual Salmonid Importations

Salmonid Importations 2016

Source	Species/Number	Fish/Egg Size	Fish Health Status	Certification		Lake Basin
				Date	Official	
Tout Lodge	RBT 240,000	Eggs	A	6/15/2016	S. Nepper	Inland
NY Randolph Hatchery	BNT 200,000	Eggs	A-2	10/3/16	A. Noyes	Erie
Paint Brook NFH	BKT 200,000	Eggs	B**	1/31/17	G. Glenney	Inland
White sulfur Springs NFH	RBT 275,000	Eggs	A	1/4/2017	G. Glenney	Inland
Sullivan Creek NFH	LAT 175,000	Eggs	A	9/15/16	C. Puzach	Inland
Maine- Enfield SFH*	BKT 300,000	Eggs	A*	12/12/2015	D. Russel	Inland
VT Salsburg FCS	BKT 800,000	Eggs	B	11/2/2016	T. Jones	Inland

*recently detected Rainbow Smelt Aquareovirus (2017), **recently detected ERM

Proposed Salmonid Importations 2017

Source	Species/Number	Fish/Egg Size	Fish Health Status	Certification		Lake Basin
				Date	Official	
Tout Lodge	RBT 240,000	Eggs	A	6/15/2016	S. Nepper	Inland
Paint Brook NFH	BKT 200,000	Eggs	A	1/31/17	G. Glenney	Inland
Sullivan Creek NFH	LAT 175,000	Eggs	A	9/15/2016	C. Puzach	Inland
VT Salsburg FCS	BKT 800,000	Eggs	B	11/2/2016	T. Jones	Inland
Erwin NFH	RBT 200,000	Eggs	A	4/25/2016	R. Cook	Inland
Ennis NFH	RBT 200,000	Eggs	A	5/24/2016	R. Martin	Inland

**Pennsylvania Fish and Boat Commission
2016 GLFHC Hatchery Classification report**

Hatchery	Location	Disease Classification	Date (*Results Pending)
Bellefonte SFH	Bellefonte	B- AS16,RS16, MC14, IPN16, CTV14	12/7/2016
Benner Spring SFH	State College	B- AS16, IPNv 16	10/4/2016
Corry SFH	Corry	B- AS17,RS17, IPN17	2/7/2017
Fairview SFH	Fairview	B- IPNv 15	2/1/2017
Huntsdale SFH	Huntsdale	B- As16, IPN16	7/27/2016
Linesville SFH	Linesville	B-IPN 14	11/3/2016
Oswayo SFH	Oswayo	B- As 16, IPN16, RS16	1/12/2017
Pleasant Gap SFH	Pleasant Gap	B- AS16, RS16, IPN16, CTV13	8/1/2016
Pleasant Mount SFH	Pleasant Mount	B- AS13 ror, IPN14	9/28/2016
Reynoldsdale SFH	Reynoldsdale	B- AS 16, IPN15	5/5/2016
Tionesta SFH	Tionesta	A- (IPN 15)	10/27/2016
Tylersville SFH	Tylersville	B- AS14, IPN16, CTV14	5/18/2016
Union City SFH	Union City	B – AS 14	10/31/2016
Van Dyke SFH	Van Dyke	A-2	6/11/2016

Lake Erie Drainage Cooperative Nurseries

Albion	Fairview	B	1/23/2016
Mitchel 3CU	Girard	B	9/21/2016
Ro-Ze 3CU	Girard	B	9/20/2016
Mission 3CU	Girard	B	9/21/2016
Peck 3CU	Fairview	B	12/13/2016
Kendra	Girard	B	12/13/16
Tom Ridge Environmental Center	Erie	B	9/20/2016
Wesleyville	Wesleyville	B	12/13/2016

Wild Brood

Steelhead	Lake Erie	C – IPNV 15	2/3/2016*
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Disease	Pathogen	Abbreviation
Whirling disease	<i>Myxobolus cerebralis</i>	MC
Infectious Pancreatic Necrosis	IPN virus	IPN
Cutthroat Trout Virus	CTV Virus	CTV
Bacterial Kidney Disease	<i>Renibacterium salmonarum</i>	RS
Epizootic Epitheliotropic Disease	<i>EED virus</i>	EED
Furunculosis	<i>Aeromonas salmonicida</i>	AS

TMR -Terramycin Resistant, ROR-Romet Resistant
() indicates transfer of fish from positive hatchery

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