OFFICE OF FISH AND WILDLIFE HEALTH AND FORENSICS
MONTHLY REPORT
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Jan Lovy, Ph.D., Research Scientist II
Nicole Lewis, M.S., D.V.M, Research Scientist II
Sarah Friend, M.S., Environmental Specialist
Tesia Lin, B.S., Seasonal Technician

FISH AND WILDLIFE HEALTH PROJECT (FW-69-R20)

Diagnosis of Diseases in Freshwater Fish (Job F-1)

Annual health inspection at the Pequest Trout Hatchery UPDATE:

Testing has been partially completed for the Pequest Trout Hatchery annual health inspection. Fish have been confirmed negative for all tested viruses of concern, negative for whirling disease caused by *Myxobolus cerebralis*, and negative for the bacterial diseases *Aeromonas salmonicida* (furunculosis) and *Yersinia ruckeri* (enteric redmouth disease). The only remaining pending test is for bacterial kidney disease caused by *Renibacterium salmoninarum*.

Fish health portion of the Warmwater Fish Management Plan:

Progress has continued on developing a warmwater/coolwater fish health management plan that will be included in the Bureau of Freshwater Fisheries Warmwater/Coolwater Fisheries Management Plan.

Diagnosis and research of Diseases in Marine Fish (Job F-2)

Black Sea Bass health- Fall sampling:

Histopathological assessment has been completed on Black Sea Bass collected from the artificial reef project. Samples were mostly free from pathologic agents. Two infectious processes were detected, one causing pathologic changes to the kidney and spleen, with granulomas related to an unknown etiology. It is suspected that these may be related to a bacterial etiology. Special histology stains will be applied in the future to learn more about the cause for these infections. Second a spore-forming organism occurred in the kidney of many fish. The presence of this organism did not cause any pathological changes and most likely does not cause any negative impacts to the Black Sea Bass. Other than these, the fish from the artificial reefs appeared in overall healthy condition.

Atlantic Menhaden mortality in North Jersey- November to December:

Ongoing and chronic mortality has occurred in Atlantic Menhaden in Northern New Jersey, New York, and into Connecticut throughout November and December. In New Jersey the mortality has been reported in Newark Bay, Raritan Bay, Navesink River, and the Hudson River. Hundreds to thousands of fish have been reported in each of these

areas. On December 1st investigation of the mortality was done in the region of Liberty State Park. Dying Atlantic Menhaden occurred along the shoreline with fish swimming disoriented, either swimming in a corkscrew pattern, circling near the surface, or swimming lethargic near the water surface. A total of 30 moribund fish with this irregular swimming behavior were captured by dip-net and transported to the Pequest Aquatic Animal Health Laboratory.

The affected fish were adults ranging in length from 24 cm to 32 cm and weighing between 200-300 grams and comprised a mix of males and females. Externally the fish were frequently infected with anchor worm, with 0-7 anchor worms attached to the muscle in each fish. Other external lesions noted were hemorrhage in the skin and occasionally at the base of the fins. The most common gross finding during necropsy was brain congestion (blood around the brain). Some fish also had severely distended gall bladders, indicating that they have not been feeding. Samples were taken from all fish to test for viruses using viral cell culture assays at the NJ Dept of Agriculture Animal Health Diagnostic Lab (AHDL). Samples are currently being screened on three cell lines, including BF-2, EPC, and CHSE-214 cells incubated at 15 degrees C. Virology test results are pending, though to this point there is no indication of virus within the samples. Histopathologic samples were taken from each fish to assess the condition of the internal organs of these fish.

Final histopathologic analysis is still pending, though preliminary analysis indicates disorders in multiple organs in these fish. The most obvious is hyperemia or congestion of the internal organs. This is documented as dilated blood vessels and increased numbers of blood cells within the organ vasculature. This was especially noticeable in the brain, which also led to damage to the blood vessels and hemorrhage. The congestion and hemorrhage in the brain may have contributed to the disoriented swimming in these fish. Another common finding was severely degenerative changes in the hematopoietic cells in the spleen and kidney. The degeneration of hematopoietic cells was characterized by karyorrhexis (fragmentation and condensation of the nucleus), and severe fragmentation of the cellular contents. This was often accompanied by cell hypertrophy (swelling of the cells). Lastly numerous fish had cuffs of degenerated cells peripheral to the blood vessels in the liver. Histopathologic evaluation of these samples will continue and a more comprehensive histopathological report will be provided in the future.

There are numerous hypotheses explaining the cause for the Atlantic Menhaden mortality, including oxygen deprivation, trauma related to predators and industrial equipment, starvation, cold thermal shock, and infectious disease. Atlantic Menhaden are migratory and migrate southward in the winter and northward in the spring and summer. It is interesting to note that this similar mortality pattern (chronic mortality with fish showing disoriented swimming) has been recorded near annually in the early spring in this region, whereas this is the first report in recent times of this occurring in the late fall. Observations from the Bureau of Marine Fisheries noted that massive numbers of Atlantic Menhaden have been holding around North Jersey and abundant predators, including Bluefish, dolphins and humpback whales have been feeding on them. Despite the large numbers of dead fish, this is only suspected to represent a tiny percentage of the fish that are holding in the area. In the past, mortality has been reported off North Carolina in December and it was witnessed that massive schools of Atlantic Menhaden,

when chased by predators, led to mortality of fish within the center of the school due to depleted dissolved oxygen. Atlantic Menhaden are highly active fish with high metabolic activity thus may be sensitive to low dissolved oxygen levels, which may occur in the center of a large school. The massive numbers of menhaden combined with observations of predators chasing them may support this as a contributing factor to the mortality. Trauma from predator activity is another potential factor, particularly with the observations of hemorrhage and congestion in brain and other organs. It is also possible that thermal shock from fluctuating temperatures and/or starvation may be a factor, as less food sources are available to the fish during this time of year.

The preliminary histopathologic evaluation indicates hyperemia/congestion, ischemic necrosis in liver, and severe degeneration of hematopoietic cells. Hyperemia could be an indicator of hypoxia (lack of oxygen). Something that still requires explanation is the severe degenerative changes of the hematopoietic cells. It has been suggested in other studies that starvation and catabolism may lead to degenerative changes of hematopoietic cells. Infectious disease is another possible cause for this. Research and analysis of these samples will continue to better understand the cause of this pathology. In the future, transmission electron microscopy will be conducted on the samples to determine if an infectious disease may be contributing to this mortality. It is anticipated that these results will be delayed due to the COVID-19 situation.

Wildlife Disease Surveillance and Investigations (Job W-1) and Wildlife Toxicology (Job W-2)

Updates:

Red tailed hawk (Hillsborough NJ)
A resident alerted ENSP staff of a dead hawk that had been found near an eagle nesting site in Hillsborough. The hawk was submitted to Raptor Trust, who performed a precursory necropsy where significant hemorrhaging was found, which was suggestive of rodenticide poisoning. The hawk was then submitted to the Clinton Pathology Lab and tissues were submitted for testing. Toxicology was negative, histopathology is still pending.

White-tailed deer (Carney's Point, Salem County, NJ)
An adult doe was found drooling, staggering, and slowly walking around a resident's soybean field for several days. A conservation officer was called to dispatch the deer and it was transported to the Clinton Pathology Lab for necropsy. The deer had two oral ulcers and an apparent lesion in the cerebrum. The deer was negative for EHD and BT, histopathology is still pending.

Canada Geese (Warton Borough, NJ)
Dr. Lewis received an email from Raptor Trust about 2 geese that a resident reported as neurologic from Washington Pond. The geese had been taken to Raptor Trust for treatment. Lead levels were normal as was blood chemistry. After several days of supportive care there was no improvement and it was determined that the best course of

action was euthanasia. The two geese were submitted to the Clinton Pathology Lab for necropsy. Necropsy did not reveal any gross lesions and toxicology was unremarkable and histopathology is still pending.

New Cases:

White-tailed deer, button buck, Cape May Courthouse, Cape May Co (11/25/2020):
Resident reached out to USDA WS with a photo and video of a young deer with its head hanging low and not responsive to humans touching and handling it. The deer was euthanized by a shot in the chest and was transported to the Clinton Pathology Lab for necropsy. On necropsy a green apple slice was found lodged deep in the deer's throat. The deer was suffering from choke.

Ring-necked pheasants, adult, female, Black River WMA (12/4/2020):
Received an email from Fish and Wildlife staff regarding two hens that were suspected of being shot and left on the property. They stated that there were other pheasant parts around, indicating that hunters were cleaning their birds on site. The birds were frozen on collection and transported to the Clinton Pathology Lab for necropsy. Multiple pellets were found in both birds signifying that the birds died from gunshot.

White-Tailed Deer Male, 3.5+ years, Milford NJ (12/11/2020)**:**
Resident contacted USDA WS with pictures of a buck that had died at the back of their property. The pictures showed a very thin older buck. Dr. Lewis transported the deer to the Clinton Pathology Lab for necropsy. The deer had a large oral ulcer on the hard palate with bone fracture and infection. This likely made it difficult for the deer to eat, making him thin. He eventually succumbed to his injuries. Retropharyngeal lymph nodes were collected and submitted for CWD testing; results are still pending.

White-Tailed Deer, buck 3.5 years, Franklin Twp. Somerset Co (12/8/2020):
Resident hunter shot the buck and took him to the butcher for processing. Butcher refused to process due to facial abscess and large abscess in the lung that was adhered to the chest wall. The deer was brought to the Clinton Pathology Lab as the butcher was concerned about TB. Testing for TB was negative. Results of culture show *Trueperella pyogenes*, an opportunistic bacteria that is known to cause abscesses in the lungs of cervids and some livestock species. It is not a concern for humans.

Bald eagle, male, adult, Skillman NJ (12/9/2020)**:**
A Montgomery ACO found a dead bald eagle in a football field in Skillman. The eagle had no leg bands. Residents said they saw an eagle flying around the area for several days. No one noticed anything abnormal prior to its death. On necropsy there was a significant amount of hemorrhage in the skull and on the brain and well as around the heart and lungs suggestive of trauma.

Bald eagle, female, adult from Daretown NJ (12/9/2020):
On Saturday, December 5th the eagle was delivered to Tri-State by conservation officers for showing neurological symptoms. The eagle had some older injuries as well and was

treated for several days at Tri-State and appeared stable until 12/7/2020 when it suddenly crashed and was put in the O2 chamber where it eventually died. The eagle was then transported to the Clinton Pathology Lab for necropsy. On necropsy there was approximately 10 mL of straw-colored fluid in the sac surrounding the heart as well as the presence of fibrin, which is suggestive of an active infection. There was also a grey/silver sheen over the organ surfaces and air sacs, suggestive of a fungal infection. Impression smears and histopathology are still pending.

Bald Eagle, female, juvenile from Cumberland Landfill (12/9/2020):
A bald eagle was brought to Tri-State from Cumberland Co. Landfill with neurological signs classic of poisoning. The eagle died shortly after arriving at Tri-State and was submitted to the Clinton Pathology Lab for necropsy. On necropsy the presence of sarcocystis (a common parasite seen in the liver of birds) was seen. There were multiple tan lesions throughout the heart. Samples were sent for toxicology testing and are pending. Histopathology is also pending.

White-Tailed Deer, female, 1.5yr, Columbus NJ (12/15/2020)**:**
USDA WS was contacted by a resident who had a doe that was neurologic on their property on 12/13 and they found it dead the next morning. CPOs Bickerton and Garafolo picked up the deer and transported it to the Clinton Pathology Lab for necropsy. On necropsy the liver was rounded and significantly congested with blood, the lungs were also congested with blood and there was petechial (pinpoint) hemorrhage on the surface of the heart. On examination of the skull, there was a significant amount of congestion in the muscles surrounding the skull. Histopathology and additional testing is still pending.

Chronic wasting disease Sampling:
CWD sampling has been completed in the northern region with approximately 450 samples collected. These will be combined with the central and southern regions samples and submitted for testing.

Meetings

- Dr. Lewis continues to participate in weekly One Health SARS-COV2 calls hosted virtually by the CDC.
- Dr. Lewis attended the 3-day Virtual Trilateral Symposium, "SARS-COV2 Incidence: Response by Animal Health Research in North America

NON-PROJECT ACTIVITIES:

- Dr. Lovy received funding from a USDA APHIS Veterinary Services District 1 Aquaculture grant to conduct shellfish disease surveillance in collaboration with the Bureau of Shellfisheries and the Rutgers Haskin Shellfish Laboratory. A statement of work has been completed.
- Dr. Lovy attended the Animal Health monthly meeting comprised of the NJ Dept of Agriculture, Health Department, Fish and Wildlife, and USDA APHIS.

- Dr. Lovy completed a collaboration with the University of Florida and University of Georgia to describe a novel microsporidium in fish. A collaborative paper was accepted into the journal Parasitology Research.
- Dr. Lewis assisted law enforcement on a forensic case.
- Dr. Lewis held a training for a Rutgers researcher and her graduate student and technician on proper drug handling and sedation techniques in wildlife with the help of Mike Madonia.