

OFFICE OF FISH AND WILDLIFE HEALTH AND FORENSICS
MONTHLY REPORT
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FISH AND WILDLIFE HEALTH PROJECT (FW-69-R20)

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

Review of fish health records for private hatcheries:

March 1st is the deadline for private hatcheries to submit a fish health history form and provide health inspection records to become an approved source for fish stocking in the state's inland waters. Preliminary review of submissions has occurred, and a tentative list of approved hatcheries has been prepared. A final version will be updated following the deadline.

Fish health portion of the Warmwater Fish Management Plan:

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

Update: Mortality in Rainbow Trout fry at the Pequest Trout Hatchery:

Bacterial cultures have confirmed coldwater disease, caused by the bacterium *Flavobacterium psychrophilum*, was responsible for elevated mortality of Rainbow Trout fry at Pequest. This is a common salmonid bacterium known to cause problems for hatchery-raised trout world-wide. An antibiotic treatment, Aquaflor (florfenicol) was orally administered over a 10-day period to the affected fish. Treatment was effective at eliminating the mortality caused by the disease.

Investigation of White Perch mortality (started January 22nd):

Increased mortality and hemorrhagic skin lesions were reported in White Perch, originally collected from the Passaic and Mullica Rivers, held at the NOAA Sandy Hook lab. Moribund fish were transported to the Pequest Aquatic Animal Health Laboratory for necropsy. The elevated mortality and most severe skin lesions occurred mainly in fish collected from the Passaic River. Based on necropsy this was determined to be caused by Ichthyobodiasis, a flagellated protozoan *Ichthyobodo necator*, causing skin disease. Severe, hemorrhagic skin lesions were associated with large numbers of *Ichthyobodo*, few *Trichodina* (ciliated protozoan) and opportunistic infection with bacteria, observed on wet mounts. Bacteriological assessment indicated that there was no systemic bacterial infection. Histopathologic evaluation confirmed *Ichthyobodo*, as well as a number of other pathogens. These included epitheliocystis (a chlamydia-like organism) in the gills, a

coccidian infection (*Goussia bayae*) in the hepatic bile ducts, and one fish with a microsporidium infection in the brain. No significant lesions were associated with these other pathogens and these were likely incidental findings. Otherwise no evidence for systemic disease was found in any of the fish and viral screening with cell culture assays using three different cell lines were negative. *Ichthyobodo necator* is common in wild fish and can quickly multiply to cause skin disease in fish held in captivity.

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

Research to understand the cause of Atlantic Menhaden mortality:

Processing of samples is ongoing to understand the cause of the Atlantic Menhaden mortality that occurred along northern NJ and as far north as Rhode Island in November and December 2020. Our investigation, highlighted last month, indicated pathology affecting the brain and hematopoietic tissue suggesting an infectious etiology. Also, the presence of bacteria in the brain from a small number of samples and suspicious cellular inclusions suggest that a bacterium may be involved. Currently we are processing samples to 1) understand the nature of the lesions to determine a cause by doing transmission electron microscopy (TEM) on the affected tissues to determine if there is an infectious agent present, and 2) to determine if a bacterium is associated with the affected organs using molecular methods. Processing of samples for TEM has been ongoing through the month and will continue into next month. For molecular analysis of the organs we are generating a 16S rDNA library of the samples using next generation sequencing. This will indicate all bacteria that are present in the samples and if one seems to be consistently found. Our samples have been submitted to Genewiz for analysis and we hope to receive and analyze the results in the next month.

Comparative analysis of *Lernaeenicus radiatus* (anchor worm) in sea bass populations:

We have previously worked with the Bureau of Marine Fisheries on understanding the ecology of anchor worm (*Lernaeenicus radiatus*) in marine fish populations. We showed that the copepod parasite is highly specific to Black Sea Bass as a first host that supports parasite development. Our work indicated that gill infections with the parasite are most abundant around the artificial reef habitats, likely due to a larger concentration of fish and closer interactions with black sea bass and a common second host, the Atlantic Menhaden. With this finding we have been investigating other sea bass populations on the east coast to determine how the ecology of the parasite compares to our findings in New Jersey. To accomplish this, we have examined Black Sea Bass from the Gulf of Maine and this month we received Rock Sea Bass from southern waters. The Rock Sea Bass is a close relative of the Black Sea Bass and a known host for the parasite in more southern waters. Gill infections from the Rock Sea Bass have been assessed this month and genetic samples were collected. In the next month we will be comparing the genetics (mitochondrial cytochrome oxidase gene) of this parasite from NJ to the other populations from north and south. This will help to understand the transmission dynamics of the parasite and to know if it is geographically stratified or if the parasite mixes (is transmitted) between southern and more northern populations.

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

New Cases:

Dovekies, multiple locations:

Three dovekies had been collected along the NJ shoreline. On necropsy they were found to be emaciated. On histological examination each bird had evidence of heterophils (a type of inflammatory cell usually present during acute infections) throughout their lungs and in their kidneys. Bacterial culture isolated *Enterobacter*, though it is unlikely to be the cause of their mortality but an incidental finding. Other reports were being made in Maine as well. It was determined that the birds died of emaciation resulting from what is known as a “wreck.” Weather patterns, such as high winds, push these birds to land where they can no longer find food and they often die of starvation.

Grackles, Carney Point NJ:

A resident reached out about multiple dead grackles on their property. The birds were all found at the same time. The birds were then transported to the Clinton Pathology Lab for examination. No obvious gross lesions were seen on necropsy, the birds' stomachs were all full of corn. Samples were sent for organic toxicological screening and were also collected for histopathology. Results are pending.

White-tailed deer, Somerset Co, NJ:

A resident contacted about a deer that local PD had euthanized because it had been acting abnormally. The deer was transported to the Clinton Pathology lab where it was found to have a broken jaw that appeared to be an old injury. It was severely emaciated from its inability to eat. CWD samples were also collected and were negative.

White-tailed deer, Burlington Co, NJ:

Officer Garofalo received photos of a buck recently shot during a game drive with all four hooves sloughing and bleeding. The deer was transported to the Clinton Pathology lab where samples were collected from the hooves and the retropharyngeal lymph nodes were collected (the buck had been field dressed and therefore no internal organs remained). Samples were sent to the Foreign Animal Disease laboratory in Plum Island to test for foot and mouth disease (a vesicular disease of cloven hooved animals, different from the disease that causes hand, foot and mouth disease in humans). The samples were negative. In discussion with the Southeastern Wildlife Disease Cooperative it was determined, based on the clinical appearance that this was a chronic case of EHD. Though the midges were no longer present, this deer was likely infected in November, survived but had chronic symptoms related to the disease.

White-tailed deer, Burlington Co, NJ:

A resident contacted about a deer with severe diarrhea, no fear of people and running into things. It was found dead on their property shortly after and was transported to the

Clinton Pathology Lab. The fawn was emaciated with significant diarrhea down the back of its hindlegs. Internally, there were multiple abscesses in the lungs and small tan lesions throughout the surface of the liver. Feces was collected for examination for intestinal parasites and samples were collected for histopathology. It is suspected that the animal suffered from a parasitic overburden that involved multiple organs. Results are pending.

Bobcat rodenticide monitoring:

A study of 38 bobcats looked at rodenticide levels in the bobcat population to determine exposure levels and the impact it may be having on the population. Of the 38 bobcats tested, 17 were female and 21 were male of those 25 were adults and 13 were juveniles. Eleven different rodenticides were examined in each of the samples including, Warfarin, Coumafuryl, Diphacinone, Pindone, Brodifacoum, Difenacoum, Bromadiolone, Chlorophacinone, Difethialone, Dicoumarol, and Coumachlor.

Of the 38 samples tested 2 had elevated Brodifacoum levels (≥ 0.010 ppm), 2 had elevated Diphacinone levels (≥ 0.050 ppm), and 5 had elevated Bromadiolone levels (≥ 0.025 ppm). No rodenticides were detected in the rest of the samples or were below detectable limits. Only one animal, an adult male had multiple rodenticides (Brodifacoum and Bromadiolone) present.

Meetings:

- Dr. Lovy attended the monthly animal health meeting hosted by the NJ Department of Agriculture and provided office updates.
- Dr. Lewis attended a virtual CWD information sharing meeting, which involved state and provincial wildlife and agricultural agencies to discuss the creation of a CWD information sharing platform.
- Dr. Lewis attended a virtual seabird mortality monitoring meeting where she recorded the minutes. This meeting consisted of various groups along the east coast as an initial step to create better communication between the various agencies, which will in turn provide more information on seabird die-offs and collaborative efforts on surveillance and monitoring.

NON-PROJECT ACTIVITIES:

Shellfish health monitoring:

A new project has been initiated in 2021 with the Bureau of Shellfisheries to monitor for diseases in farmed and wild shellfish populations along the states coast. External funding has been received from USDA-APHIS Veterinary Services to support this work in 2021, and other funding will be provided from the Bureau of Shellfisheries. A shellfish health monitoring plan has been drafted for 2021, which will plan to conduct surveillance for hemocytic neoplasia (an infectious cancer) in hard clams *Mercenaria mercenaria*. Additionally, oysters will be monitored for three pathogens known to be associated with disease, including dermo disease caused by *Perkinsus marinus*, MSX

caused by *Haplosporidium nelsoni*, and SSO caused by *Haplosporidium costale*. Wild oysters will also be surveyed by histology for *Bonamia* species.

We have been working with the Animal Health Diagnostic Lab, NJ Department of Agriculture, to set up a molecular assay to detect and quantify the three oyster pathogens from a tissue sample. We have adapted methods from the Shellfish Research Laboratory at Roger Williams University in collaboration with Dr. Roxanna Smolowitz. This month we have done sequence analysis of the pathogens to synthesize plasmid DNA that we will use for controls for the assay. Positive control material has been acquired and soon we will have the new assay set up.

Other activities:

- Dr. Lewis attended a virtual Terrapin Meeting and presented the health screening work done the previous summer in cooperation with the Terrapin Project, ENSP Brian Zarate, and other Terrapin groups.
- Dr. Lewis performed a forensic necropsy as part of an investigation of illegal hunting