

OFFICE OF FISH AND WILDLIFE HEALTH AND FORENSICS
MONTHLY REPORT
May 2022

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

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

Rainbow Trout at the Pequest Trout Hatchery (Apr 25):

Slightly elevated mortality was reported in Rainbow Trout with a suspected cause of bacterial gill disease (BGD) in the upper raceways of the Pequest Trout Hatchery. Moribund fish were collected for laboratory examination. Results confirmed BGD, caused by *Flavobacterium branchiophilum*, in all trout examined. One fish also had an infection with the flagellated parasite *Ichthyobodo necator*. This parasite infection is believed to be secondary to BGD. Hatchery staff treated the raceway with Chloramine-T to control BGD.

Polycystic liver disease in Rainbow Trout from Pequest fishing pond (May 2):

The Information and Education (I&E) Bureau reported a sick trout captured from the Pequest education/fishing pond. Upon cleaning, the fish had a large polycystic liver. The viscera were saved for examination in the laboratory. Fluid aspirates were collected from the severely enlarged and polycystic liver. Microscopic analysis indicated that the fluid-filled cysts contained amoebic organisms, likely archamoeba. We collected samples of the amoeba for PCR confirmation and samples were processed for histology. This appeared to only infect a single fish and no other fish were reported as diseased from the pond. We are unaware of archamoeba infecting livers of Rainbow Trout. Further work on characterizing this infection is pending.

Fish kills reported- though unable to obtain adequate samples:

Two fish kills were reported, one in the Raritan River in New Brunswick impacting several fish species and a second from Three Rivers in Montclair. The Montclair fish kill impacted many species and was likely attributed to an environmental cause (non-pathogen related cause). No fresh samples could be obtained from either of the fish kills, thus the cause could not be determined.

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

Abstracts for the Western Fish Disease Workshop:

Three scientific presentations were provided at the Western Fish Disease Workshop. These included two oral presentations and one poster presentation. Abstracts for the presentations are below:

Oral presentations:

Seasonal mortality of wild Atlantic Menhaden in coastal New Jersey and New York is associated with *Vibrio anguillarum* causing neurologic disease

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Atlantic Menhaden *Brevoortia tyrannus* are an abundant and highly migratory clupeid fish in the northwest Atlantic, ranging from Florida to Nova Scotia, Canada. Since at least the 1950's seasonal mortality of menhaden in the mid-Atlantic Bight was attributed to an IPN-like virus causing "spinning disease". Viral surveillance of spring mortality events between 2015 and 2020 failed to detect a viral etiology using viral cell culture assays and molecular methods. Between 2020 and 2021, three separate mortality events which likely impacted hundreds of thousands of fish, were subject to a more comprehensive investigation to determine their cause. Moribund fish showed neurologic signs including spinning at the surface and erratic swimming, observations consistent with historic reports. Histopathologic evaluation of moribund fish showed hemorrhagic meningitis and encephalitis associated with bacteria and degenerative changes in kidney and spleen. Metagenomic analysis of bacterial 16S rDNA sequences indicated high reads of a sequence consistent with *Vibrio anguillarum* in the brain, which was confirmed by isolation on TSA. *Vibrio anguillarum* was consistently isolated from moribund fish with a clear tropism for brain, a characteristic previously not reported for this bacterium. Serotyping showed that all isolates belonged to serogroup O3. Multi-locus sequence typing of isolates representing a wide temporal and spatial scale throughout the mortalities demonstrated a homogenous group of *V. anguillarum* strains suggesting a highly fit virulent clone transmitting through wild Atlantic menhaden. These results are discussed in the context of wild migrating fish populations and the potential biosecurity threats that exist to marine aquaculture.

Host and habitat influence the incidence of the parasitic pennellid copepod *Lernaeenicus radiatus*; the good, the bad, and the ugly

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The pennellid copepod, *Lernaeenicus radiatus*, commonly known as “anchor worm” is a highly visible parasite with a two-host life cycle infecting marine finfish, particularly found in the mid-Atlantic Bight. Our field studies have helped to uncover the parasite life cycle, transmission factors, genetics, and host pathology. In the mid-Atlantic Bight this parasite is a “host-specialist”, utilizing Black Sea Bass *Centropristis striata* as the first host in the life cycle to support parasite development and sexual reproduction. Gill attachment utilizes a novel attachment apparatus that results in branchitis and lamellar fusion at sites of infection. Following sexual reproduction, the mated female parasites sever their attachment and seek out a second fish host to support metamorphosis, producing an enlarged parasitic stage nearly unrecognizable from previous stages. The enlarged metamorphosed female uses an anchoring structure to secure it within muscle or adhere to bone of its second host. Field surveys indicate that the parasite is a “host-generalist” at this stage, infecting a wide range of marine finfish, though there is a preference for Atlantic menhaden *Brevoortia tyrannus* and Bay Anchovy *Anchoa mitchilli*. Herein we note high morphological plasticity in metamorphosed female forms which are related to host size and tissue tropisms, whereas these differences were historically thought to be markers that distinguished parasite species. To understand how habitat affects the parasite, we conducted a study to compare parasite incidence in Black Sea Bass collected from either artificial reef habitats or non-reef associated habitats. We detected 2 – 3.7 times higher parasite incidence in fish collected from reef habitats compared to non-structure habitats. This finding of increased parasitism is likely attributed to the higher biodiversity supported in reef habitats, leading to higher fish abundance and increased species interactions, all favoring parasite transmission. The increased gill parasitism and associated pathology suggests that gill impairment is occurring, though the extent of these impacts in wild populations is difficult to determine.

Poster presentation:

Molecular detection of viral nervous necrosis virus in Black Sea Bass (*Centropristis striata*) off the coast of New Jersey

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Viral nervous necrosis virus (VNNV) is an important pathogen of concern for aquaculture worldwide, causing viral encephalopathy and retinopathy (VER) in over 50 mainly marine fish species. Highly susceptible, economically relevant species include the European and Asian Sea Bass (*Dicentrarchus labrax* and *Lates calcarifer*, respectively), groupers (*Ephinephelus spp.*), Striped Jack (*Pseudocaranx dentex*) and Atlantic Cod (*Gadus morhua*). This positive sense ssRNA virus infects the host central nervous system, resulting in up to 100% mortality in larval fish, but few reports have been made of such effects in adult fish. Surveillance for VNNV was conducted in adult Black Sea Bass (*Centropristis striata*) from the Mid-Atlantic Bight off the coast of New Jersey. In 2021, fresh brain tissue was aseptically dissected from 303 apparently healthy fish collected in collaboration with a Bureau of Marine Fisheries, NJ Fish and Wildlife stock-assessment project. Tissues were tested using a real-time reverse transcription polymerase chain reaction (rRT-PCR). Six initial detections were made by rRT-PCR and three were confirmed by endpoint PCR and Sanger sequencing of the amplicon. VNNV has a bipartite genome in which the 3.1kb RNA1 segment encodes the viral replicase, while the 1.4kb RNA2 segment encodes the coat protein. Various primer combinations were used to amplify overlapping portions of the VNNV genome and Sanger sequencing was conducted to determine virus genotype and genome diversity. Results indicated the virus sequences have a close identity to the red-spotted grouper genotype (RGNNV), making this the first recorded detection of this genotype in this region.

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

New Cases:

Bald Eagle, Sussex County, NJ:

CPO DellaVella received an eagle that was reported to have flown into live wires and died. The eagle was collected and transported to the Clinton Pathology Lab for evaluation. Examined was an adult female bald eagle with evidence of electrocution. We collected a liver sample for future toxicity studies.

White-tailed deer, Columbia, NJ:

A resident contacted stating that a deer had been standing just off his property in the woods drooling and not moving when approached. He also stated she appeared somewhat thin and had some hair loss. CPO Holmes euthanized the deer and transported it to the Clinton Pathology Lab for evaluation. The deer was a 1 ½ year old doe in poor body condition. The hair loss was attributed to losing her winter coat. On examination trauma was found on the right side of her skull and around the right eye, suggesting she had been hit by a vehicle.

Screech owl, Hillside Avenue, NJ:

A resident contacted about finding the dead screech owl in an area that is known to have numerous cases of rodenticide poisoning. On necropsy many adult parasitic worms were

seen around the lung area and on fecal examination an abundance of parasite eggs were noted. The parasites were diagnosed as *Syngamus sp.* commonly known to impact wild birds by suffocation.

Meetings:

- Dr. Lovy attended the monthly animal health meeting held virtually by the NJ Department of Agriculture.
- Dr. Lewis was interviewed by NBC on the ongoing HPAI outbreak
- Dr. Lewis gave a talk on wildlife diseases to the central region conservation officers
- Dr. Lewis attended a virtual meeting with Wildlife Futures Program partners and the Timmons group on the development of a wildlife disease reporting dashboard
- Dr. Lewis attended a virtual meeting to discuss the production of a peer reviewed article on the songbird mortality event
- Dr. Lewis attended a virtual collaborative meeting as part of the SARS-COV2 Animal Health grant partnership

NON-PROJECT ACTIVITIES:

- Dr. Lovy provided a presentation and overview of the office goals, highlights, and upcoming projects for 2022 to Assistant Commissioner, David Golden.
- Dr. Lovy had two committee meetings regarding the AFS FHS Blue Book. One meeting was with the Blue Book Steering Committee and a second was with the fish disease testing methods working group.
- Dr. Lewis performed a forensic necropsy on an illegal shooting of a black bear
- Dr. Lewis performed a forensic necropsy on two juvenile coyotes
- Dr. Lewis performed a forensic necropsy on the illegal shooting of a white-tailed deer
- Dr. Lewis performed a forensic necropsy on a black vulture suspected of illegal shooting
- Dr. Lewis attended the NEPARC Emerging Disease Working Group monthly virtual call
- Dr. Lewis assisted on wood turtle sampling for health assessments as part of the ongoing repatriation efforts
- Dr. Lewis assisted in the bog turtle sampling effort as part of a population health assessment
- Dr. Lewis assisted Kathy Clark in a juvenile eagle banding effort and blood collection