Connecticut Department of
Energy & Environmental Protection
Bureau of Natural Resources
Fisheries Division

To: Jean Pillo CPESC, Watershed Conservation Project Manager Eastern Connecticut Conservation District
Eric Thomas, Watershed Manager, Watershed/Nonpoint Source Management Program, Water Planning and Management Division, Bureau of Water Protection and Land Reuse, Connecticut Department of Energy and Environmental Protection
Rick Harless, Roseland Lake park caretaker
Bet Z. Smith
From: Christopher McDowell, Fisheries Biologist 2
Re: Night electrofishing sampling results for Roseland Lake, Woodstock, Connecticut
Date: December 14, 2020

Thank you for requesting us to sample the fish population in Roseland Lake on May 14, 2019 and again on October 29, 2019 in regards to your concerns about perceived declines in the catchable size fish population voiced by anglers fishing the lake possibly due to declining lake water quality. This report provides a brief summary of our fisheries findings.

Background

- Roseland Lake is located in the Town of Woodstock, Connecticut. The lake is approximately 96.1 acres and runs northwest to southeast. The lake is fed by Muddy Brook from the north and Mill Brook from the west and by a third smaller unnamed stream along the western shore. The lake is natural in origin and drains southward through the only outlet which winds past the Putnam Fish & Game Property and then flows under Stonebridge Road into Sheppard's Pond. At the outlet of Roseland Lake is where the Little River begins.

- The maximum depth of the lake is 19 feet with a mean depth of nine feet.

- According to Jacobs and O'Donnell (2002), the transparency is considered "turbid" with only two feet of transparency in the summer. Lake stratification does occur.

- The State Board of Fisheries and Game Lake and Pond Survey unit originally sampled Roseland Lake in 1959. It was, however, not part of the original statewide lake and pond electrofishing survey that occurred between 1988 and 1995 conducted by the Connecticut Department of Environmental Protection (now known and Connecticut Department of Energy and Environmental Protection) Fisheries Division where nearly 200 lakes, ponds and large rivers

were sampled across Connecticut. The Fisheries Division has sampled Roseland Lake, though, four times on the following dates: October 27, 2003; November 4, 2004; May 14, 2019 and October 29, 2019. A sample was attempted on November 13, 2018, but water temperatures were too cold and negatively affected the collection of fish and so data from this sample was unusable.

- Roseland Lake has been stocked repeatedly with catchable size Brown and Rainbow Trout to create a put-and-take fishery. Due to in-lake conditions, trout do not holdover in Roseland Lake. Table 1 shows the trout stocking history for Roseland Lake from 2004 through 2020.

Table 1. Species and numbers of trout stocked in Roseland Lake from 2004 through 2020.

Trout Species Stocked			
Year	**Brown Trout Adult**	**Rainbow Trout Adult**	**Tiger Trout Adult**
2004	500	400	0
2005	500	200	200
2006	500	400	0
2007	500	200	0
2008	500	200	0
2009	386	200	0
2010	400	200	0
2011	440	160	0
2012	440	160	0
2013	600	0	0
2014	600	0	0
2015	600	0	0
2016	600	0	0
2017[1]	0	0	0
2018	600	0	0
2019	600	500	0
2020	600	500	0

[1]Dropped from stocking in 2017 due a reduction in production capacity at Kensington Fish Hatchery to achieve budgetary savings; critical maintenance of several production ponds at Quinebaug Trout Hatchery, which required them to be taken out of service and drained of water while repairs were made; and a moderate to severe statewide drought in 2015 and 2016 resulting in less flow of water to fill ponds, raceways and supply flow at all three hatcheries. However, after numerous requests for this location to be reinstated due to the lack of ponds in the area to fish for trout, stocking was resumed in 2018.

- The rationale for the most recent sampling (2018 then 2019) of Roseland Lake is because of concerns from the lake residents that catchable size fish were declining due to possible declining water quality.

- In an effort to get an adequate "picture" of the State of Connecticut's freshwater fisheries resources the Connecticut Department of Energy and Environmental Protection Fisheries Division samples a variety of freshwater lakes and ponds, which includes public waters, private water supply reservoirs, and when allowed, private lakes. Gathering data from different waterbodies allows us to assess the State's freshwater fisheries resources, make comparisons of fish population size, fish age, and fish growth based on varying usage types. Public waters see far more angler pressure than closed to fishing water supply reservoirs and private lakes and therefore the fish populations can be markedly different in terms of size and age structure in each type of waterbody.

- On May 14, 2019 and October 29, 2019, the Connecticut Department of Energy and Environmental Protection Fisheries Division performed a nighttime boat electrofishing fish population sample on Roseland Lake. A crew of five Connecticut Department of Energy and Environmental Protection Fisheries Division employees arrived at the lake around 8:00pm on May 14th and 6:00pm on October 29th, began the sample at 8:48pm on May 14th and at 6:48pm on October 29th, and completed the sample at 12:04am on May 15th and at 9:36pm on October 29th. Nearly the entire perimeter of the lake was sampled on each night and followed a similar path of the previous two samples conducted in 2003 and 2004.

Key Concepts

- The Connecticut Department of Energy and Environmental Protection Fisheries Division samples lake fish populations using night time boat electrofishing following standardized sampling protocols. The electrofishing boat is deployed at night approximately 30 minutes after sunset in the nearshore areas of a lake, typically in water depths of two to eight feet. The boat is piloted at slow speed (approximately less than one mile per hour) and DC current is pulsed into the water from an onboard generator through special stainless steel droppers that are suspended from two probes off the bow of the boat. Stunned fish are netted, counted and measured, then released back into the lake (electrofishing is mostly non-lethal).

- Relative abundance of fish species are expressed as catch-per-hour (CPH) of electrofishing time. CPH provides a standardized index of abundance that facilitates comparison of species densities among lakes or over time within a lake.

- For most species, CPH is calculated for two size-classes: fish that are "stock size" or larger (stock size is defined as the smallest size commonly caught by anglers), and those that are "quality size" or larger (quality size is defined as the size at which most anglers consider the fish desirable to catch). Definitions of stock and quality size for popular Connecticut fish species can

be found in Appendix A.

- Proportional Stock Density (PSD) is an index of size structure that describes the percentage of stock-size fish that are also quality size or greater. Explained more simply this is an index of the percentage of "big" fish within a population.

- In the tables throughout this document, species are sorted into three categories that roughly correspond to their trophic level (i.e. their position within the "food chain"):
    - "Top-Level": predators that reach large sizes and prey primarily on other fish.
    - "Mid-Level": species that reach intermediate sizes and may consume fish prey.
    - "Low-Level": smaller species that prey primarily on invertebrates.

Key Findings

- During the two sampling periods in 2019, 13 different species of fish were captured within Roseland Lake on May 14th and 14 on October 29th, which is similar to the species list captured during samples conducted in 2003 (12) and 2004 (15) (Table 2). There was a noticeable increase in the numbers of Largemouth Bass, Black Crappie, Bluegill, Pumpkinseed, and White Sucker captured in 2019 compared to previous years. Golden Shiner numbers do appear to be somewhat decreasing since the 2003 sample (Table 2).

Table 2. Numbers of each fish species sampled by the Connecticut Department of Energy and Environmental Protection Fisheries Division at Roseland Lake, Woodstock on four separate sampling dates using nighttime boat electrofishing.

Date	10/27/2003	11/04/2004	5/14/2019	10/29/2019
Top-level Species				
Largemouth Bass	35	52	46	144
Brown Trout	1	1	0	0
Rainbow Trout	0	3	1	9
Chain Pickerel	5	24	2	10
Mid-level Species				
Black Crappie	2	2	33	37
Yellow Perch	98	133	172	105
Brown Bullhead	0	1	1	0
Yellow Bullhead	0	0	1	1
White Catfish	0	3	0	0
Bluegill	145	206	153	620
Pumpkinseed	5	13	117	218
Redbreast Sunfish	2	0	0	1
Bluegill x Pumpkinseed hybrid	0	0	1	4
Low-level Species				
Fallfish	1	1	0	1
Golden Shiner	92	80	53	11
Banded Killifish	1	3	1	1
White Sucker	5	16	135	65
American Eel	0	3	0	0

- **<u>Stock-size assessment:</u>** Relative to the State average for other public lakes open to fishing the last four samples conducted at Roseland Lake (Table 3) revealed for stock-size fish that:
    - Largemouth Bass – appear back in high abundance.
    - Chain Pickerel – appear to be overall below State average.
    - Brown Bullhead and Yellow Bullhead – too few individuals were sampled during the four nights of sampling. As such, we cannot make meaningful determinations on size structure for these species, but we can say that there are likely not many of these species in Roseland Lake.
    - Black Crappie – abundance appears to be trending upward.
    - Yellow Perch – in general appear to be in high abundance.
    - Bluegill – abundance appears to be increasing.
    - Pumpkinseed – abundance appears to be increasing.
    - Redbreast Sunfish - too few individuals were sampled during the four nights of sampling. As such, we cannot make meaningful determinations on size structure of this species, but we can say that there are likely not many of these species in Roseland Lake.
    - For the species in the "low-level" category the Connecticut Department of Energy and Environmental Protection Fisheries Division does not typically employ stock- and quality-size cutoffs for this grouping of species (and therefore does not calculate PSD). However, the Connecticut Department of Energy and Environmental Protection Fisheries Division does look at catch-per-hour for all sizes caught for each low-level species and compares the catch rate to a State average catch rates for those species. Therefore for :
        - Golden Shiner you will note that after three samples of above average catch per hour the final sample conducted on October 29, 2019 returned below average numbers, this could likely be the result of any number of factors outside the control of our sampling equipment and could very well be the day that we were there in October 2019 and Golden Shiners were just not in areas where we were sampling.
        - White Sucker the catch per hour for the 2019 samples were both above State averages compared to the previous two samples that were below. In looking at the numbers of White Suckers captured in Table 2 there does appear to be a large increase in the abundance of this species in the lake.

Table 3. Stock-size catch-per-hour (CPH) of selected fish species in Roseland Lake during the four nights of boat electrofishing samples relative to the State average for public lakes. Entries of "Average" indicate CPH was within ± 10% of State average. For "Low-Level" species, CPH values represent all fish captured regardless of size (the Fisheries Division does not typically calculate stock-size cutoffs for these species).

Date	10/27/2003	11/04/2004	5/14/2019	10/29/2019
Top-level Species[1]				
Largemouth Bass	Above	Below	Below	Above
Chain Pickerel	Below	Above	TF[2]	Below
Mid-level Species[1]				
Black Crappie	TF	TF	Below	Above
Yellow Perch	Above	Above	Above	Average
Brown Bullhead	NS[3]	TF	TF	NS
Yellow Bullhead	NS	NS	TF	TF
Bluegill	Average	Below	Below	Above
Pumpkinseed	Below	Below	Above	Above
Redbreast Sunfish	TF	NS	NS	TF
Low-level Species[1]				
Golden Shiner	Above	Above	Above	Below
White Sucker	Below	Below	Above	Above
American Eel	NS	Below	NS	NS

[1]Stock-size catch-per-hour rates are not available for the following species that were captured while sampling Roseland Lake because not enough lakes across the State contain these species to calculate an accurate statewide measurement: Brown Trout, Rainbow Trout, White Catfish, Bluegill x Pumpkinseed hybrid, Fallfish and Banded Killifish.
[2]TF = too few individuals sampled to make meaningful interpretations of size structure.
[3]NS = None sampled.

- **Quality-size assessment:** Relative to the State average for other public lakes open to fishing the last four samples conducted at Roseland Lake (Table 4) revealed for quality-size fish that:
  - Largemouth Bass - overall continues to be above State averages.
  - Chain Pickerel – though the October 29, 2019 sample was average compared to the State average, it is still below the abundance of quality-size individuals sampled in 2003 and 2004.
  - Black Crappie – the number of quality-size individuals appears to be steadily increasing within the lake.
  - Yellow Perch – continues to be above the State average.
  - Brown and Yellow Bullhead – too few individuals were sampled during the four nights of sampling. As such, we cannot make meaningful determinations on size structure of these species, but we can say that there are likely not many of these species in Roseland Lake.
  - Bluegill – abundance appears to be increasing.
  - Pumpkinseed – abundance appears to be increasing.
  - Redbreast Sunfish - too few individuals were sampled during the four nights of

sampling. As such, we cannot make meaningful determinations on size structure of this species, but we can say that there are likely not many of these species in Roseland Lake.

- For low-level species, the Fisheries Division does not employ quality-size cutoffs.

Table 4. Quality-size catch-per-hour (CPH) of selected fish species in Roseland Lake during the four nights of boat electrofishing samples relative to the State average for public lakes. Entries of "Average" indicate CPH was within ± 10% of State average. For "Low-Level" species, quality-size CPH are not calculated.

Date	10/27/2003	11/04/2004	5/14/2019	10/29/2019
Top-level Species[1]				
Largemouth Bass	Above	Below	Above	Above
Chain Pickerel	Above	Above	TF[2]	Average
Mid-level Species[1]				
Black Crappie	TF	TF	Below	Average
Yellow Perch	Above	Above	Above	Above
Brown Bullhead	NS[2]	TF	TF	NS
Yellow Bullhead	NS	NS	TF	TF
Bluegill	Above	Below	Below	Above
Pumpkinseed	Below	Below	Above	Above
Redbreast Sunfish	TF	NS	NS	TF
Low-level Species[1]				
Golden Shiner	NC[3]	NC	NC	NC
White Sucker	NC	NC	NC	NC
American Eel	NC	NC	NC	NC

[1]Quality-size catch-per-hour rates are not available for the following species that were captured while sampling Roseland Lake because not enough lakes across the State contain these species to calculate an accurate statewide measurement: Brown Trout, Rainbow Trout, White Catfish, Bluegill x Pumpkinseed hybrid. For Fallfish and Banded Killifish the Fisheries Division does not typically calculate stock and quality size estimates.
[2]NS = None sampled.
[3]NC = FD does not typically employ quality-size cutoffs for these species.

- **Proportional stock density (PSD) assessment:** Relative to the State average for other public lakes open to fishing the last four samples conducted at Roseland Lake (Table 5) revealed that the percentage of "big" fish within each species' population at Roseland Lake appears overall quite good and fishing should be good.
  - Largemouth Bass – a highly sought after sportfish, in general, is average to above the State average.
  - Chain Pickerel – one of Connecticut's few top-level native species has the majority of individuals we sampled above the State average.
  - Black Crappie – the number of large individuals within the population is below State average, however, as seen in Table 3 the stock-size individuals sampled during the October 29, 2019 sample are above State average, and in Table 4 the number of quality-size individuals is average, which could mean in a few years the total proportion of

quality-size individuals in this population could increase making for some great fishing.

- Yellow Perch – have maintained above average abundance of large individuals during all four samples conducted.
- Brown and Yellow Bullhead – too few individuals were sampled during the four nights of sampling. As such, we cannot make meaningful determinations on size structure of these species, but we can say that there are likely not many of these species in Roseland Lake.
- Bluegill and Pumpkinseed - abundance of large individuals for both these species are overall above average.
- Redbreast Sunfish - too few individuals were sampled during the four nights of sampling. As such, we cannot make meaningful determinations on size structure of these species, but we can say that there are likely not many of this species in Roseland Lake.
- For low-level species, the Fisheries Division does not calculate PSD. However, as I was out on both 2019 samples, I can attest that the White Suckers we captured were quite large in size, and though not specifically a sportfish, they can be caught easily on hook and line and can provide some terrific action.

Table 5. Proportional stock density (PSD) (i.e. the index of the percentage of "big" fish within a population) of selected fish species in Roseland Lake during the four nights of boat electrofishing samples relative to the State average for public lakes. Entries of "Average" indicate PSD was within ± 5 percentage points of State average. For "Low-Level" species, the Fisheries Division does not typically calculate stock- and quality-size cutoffs for these species, and therefore does not calculate PSD.

Date	10/27/2003	11/04/2004	5/14/2019	10/29/2019
Top-level Species[1]				
Largemouth Bass	Above	Below	Above	Average
Chain Pickerel	Above	Above	TF[2]	Above
Mid-level Species[1]				
Black Crappie	TF	TF	TF	Below
Yellow Perch	Above	Above	Above	Above
Brown Bullhead	NS[3]	TF	TF	NS
Yellow Bullhead	NS	NS	TF	TF
Bluegill	Above	Below	Above	Above
Pumpkinseed	Below	Below	Above	Above
Redbreast Sunfish	TF	NS	NS	TF
Low-level Species[1]				
Golden Shiner	NC[4]	NC	NC	NC
White Sucker	NC	NC	NC	NC
American Eel	NC	NC	NC	NC

[1]Proportional stock densities (PSD) are not calculated for the following species that were captured while sampling Roseland Lake because not enough lakes across the State contain these species to calculate an accurate statewide measurement of stock and quality size individuals and thus PSD cannot be calculated: Brown Trout, Rainbow Trout, White Catfish, Bluegill x Pumpkinseed hybrid. For Fallfish and Banded Killifish, the Fisheries Division does not typically calculate stock and quality size estimates and thus PSD cannot be calculated.
[2]TF = Too few individuals were caught to calculate a meaningful estimate.
[3]NS = None sampled.
[4]NC = FD does not typically employ stock- and quality-size cutoffs for these species, and therefore does not calculate PSD for these species.

Summary

The fish community at Roseland Lake contains a typical assemblage of warmwater fish species for Connecticut lakes/ponds. Our night electrofishing sampling provides a single snapshot of a lake's fish population on that night. It is not unusual for fish to experience strong year-classes when conditions are favorable and weak year-classes when conditions are unfavorable. Having multiple successive years of samples on a given lake is extremely beneficial in terms of detecting trends in a fishery. Though we now have four nights of samples at Roseland Lake, there is a very large gap (15-16 years) between the two early samples and the most current samples, which does make it somewhat difficult to make strong statements about this lake's fishery. However, when looking at the data, it would appear that there is nothing out of the ordinary in regards to the concern about the catchable size portion of the fishery suffering in relation to the concern about "poor" water quality. Many warm water fish species

actually find water that is properly high in the correct nutrients beneficial because this creates a strong foundation to the food web, which allows for abundant forage and therefore strong year classes of many of the fish species that are found in Roseland Lake. Additionally, not having any angler survey data we cannot make statements as to how anglers are actually performing in regards to catch of various species, but from our night sampling data it would appear that there are many species that are above State average for stock and quality size, and many of the species have populations with an abundant number of large individuals. As such, fishing should be good at Roseland Lake.

If you have any questions please feel free to contact Chris McDowell (phone: 860-424-4143; email: christopher.mcdowell@ct.gov) or Edward Machowski (phone: 860-424-3927; email: edward.machowski@ct.gov).

Appendix A. Stock-size and quality-size cutoffs for various Connecticut fish species.

	Metric (cm)			English (inches)	
Species	Stock Size	Quality Size		Stock Size	Quality Size
Top-Level					
Largemouth Bass	20	30		8	12
Smallmouth Bass	20	30		8	12
Brook Trout	20	33		8	13
Brown Trout	20	33		8	13
Rainbow Trout	20	33		8	13
Chain Pickerel	25	38		10	15
Mid-Level					
Black Crappie	13	20		5	8
White Perch	13	20		5	8
Yellow Perch	13	20		5	8
Brown Bullhead	15	23		6	9
White Catfish	20	30		8	12
Bluegill	8	15		3	6
Pumpkinseed	8	15		3	6
Redbreast Sunfish	8	15		3	6
Rock Bass	8	15		3	6
Low-Level					
Golden Shiner	-	-		-	-
American Eel	-	-		-	-