



Assessing the Impact of “Tiger Trees” on Tank-Raised Tiger Muskellunge at Oneida Hatchery, 2022 Interim Report



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Cover photos: Left side- "Tiger Trees" installed in a tiger muskellunge tank in 2021; Upper right – tiger muskellunge fingerling; Lower right - "Tiger Trees" at Oneida Fish Culture Station

Introduction

The Bureau of Fisheries has traditionally raised tiger muskellunge in open tanks without structure. However, tiger muskellunge are adapted to rely on cover both for protection from predators when they are young and for ambushing prey. Therefore, adding an element of cover to the tanks during the rearing process may have beneficial implications. In 2021, staff at the Oneida Hatchery installed “Tiger Trees” (in-house manufactured artificial cover) in one tank to determine if there was a positive response to the added cover. Tiger muskellunge did congregate under these structures indicating a preference for cover. It was speculated that this was a stress reduction behavior (i.e., tiger muskellunge were more comfortable under cover), which could have a secondary benefit of more efficient feeding due to fish being situated directly under feeders. A more comprehensive assessment was necessary to determine if these structures have a positive impact on tank-raised tiger muskellunge. The objective of this study was to determine if tiger muskellunge raised in tanks with Tiger Trees have better growth, lower mortality, and a larger average size at stocking than those raised in tanks without added structure.

Methods

On June 7, 2022, 54,628 tiger muskellunge fry were transported from Pleasant Mount Hatchery (PA) to Oneida Hatchery. Fifty thousand of these fry were evenly distributed into 10 tanks at 5,000 fish per tank. The remaining fish went into another tank that was not counted in the experiment. Fish were confined to the upper 1/3 of each tank via screen and four Tiger Trees were placed in 5 of the 10 tanks. Trees were equidistantly suspended from Loudon feeders and touched the bottom of each tank. Water supply, flow rates, rearing space, feeding, treatments, monitoring, and cleaning for all tanks were identical throughout the study period. Feeding occurred via computer controlled Loudon feeders every 5 minutes, 24 hours per day. As fish grew, the rearing area in each tank was increased equally until the entire tank was utilized. Tiger Trees were added, at the same spacing, as more rearing space became available. Tank cleaning occurred and mortality was recorded daily. Length-weight samples were taken weekly and food size and quantity was adjusted accordingly. Treatments for disease were administered as needed. Stocking of the fish in this study was initiated on August 15th and was conducted through August 22nd. Fish size (measured as number of fish per pound), mortality, and final average size (length at week 8) were compared to determine if there was a difference between tank treatment types.

Results

The size of tiger muskellunge in Tiger Tree tanks ranged from 208/lb on June 15 (week 1) to 16/lb on August 1 (week 8). Non-Tiger Tree tank fish ranged from 223/lb to 17/lb during the same time period (Table 1, Figure 1). Weekly mortality counts were similar between treatments, except during weeks 5 and 7 when 2 and 3 times the number of dead fish were observed in the non-Tiger Tree tanks, respectively. The total mortality in non-Tiger tree tanks (804) was almost twice that in the Tiger Tree tanks (449). The final average size was the same for both treatments, approximately 8.4 inches.

Table 1. Size (#fish/lb) of tiger muskellunge in tanks with and without tiger trees at the Oneida Fish Hatchery, June 15 – August 1, 2022.

Date	Tiger Tree tank (#f/lb)	Non-Tiger Tree tank (#f/lb)	% Difference
6/15/2022	208	223	7.21
6/21/2022	115	128	11.30
6/27/2022	85	95	11.76
7/5/2022	48	53	10.42
7/12/2022	41	47	14.63
7/19/2022	29	31	6.90
7/26/2022	23	24	4.35
8/1/2022	16	17	6.25

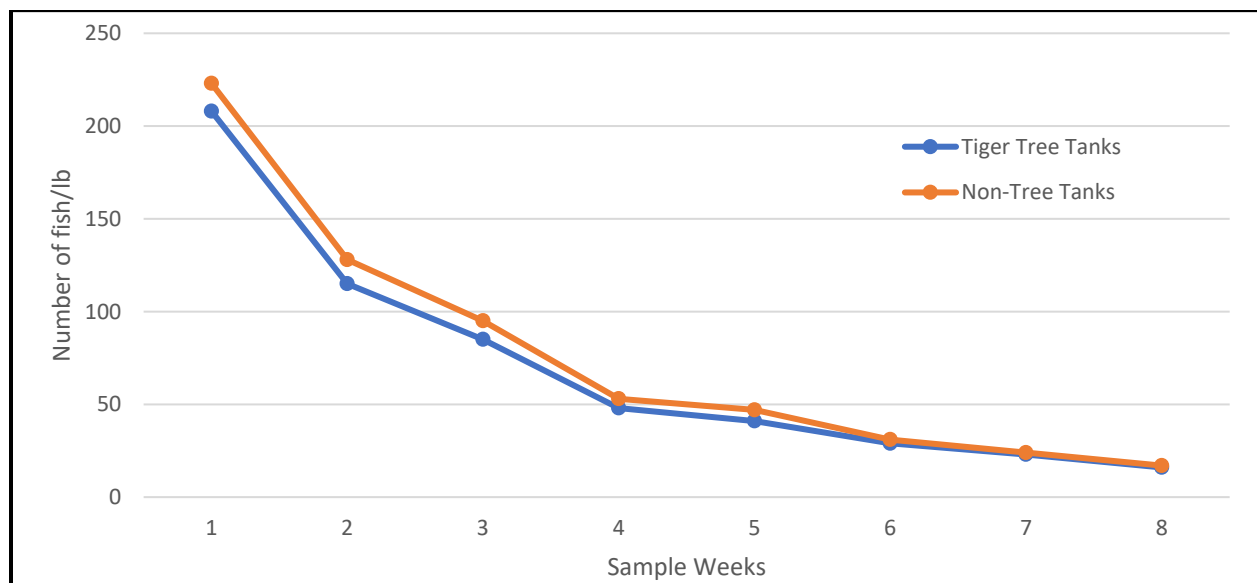


Figure 1. Size (#fish/lb) of tiger muskellunge in tanks with and without tiger trees at the Oneida Fish Hatchery over eight weeks of growth, 2022.

Table 2. Weekly mortality counts of tiger muskellunge in tanks with and without tiger trees at the Oneida Fish Hatchery, June 14 – August 2, 2022.

Date	Tiger Tree tank	Non-Tiger Tree tank	% Difference
6/14/2022	27	16	-40.74
6/21/2022	49	41	-16.33
6/28/2022	88	68	-22.73
7/5/2022	28	29	3.57
7/12/2022	37	78	110.81
7/19/2022	41	56	36.59
7/26/2022	109	417	282.57
8/2/2022	70	99	41.43
Total	449	804	79.06

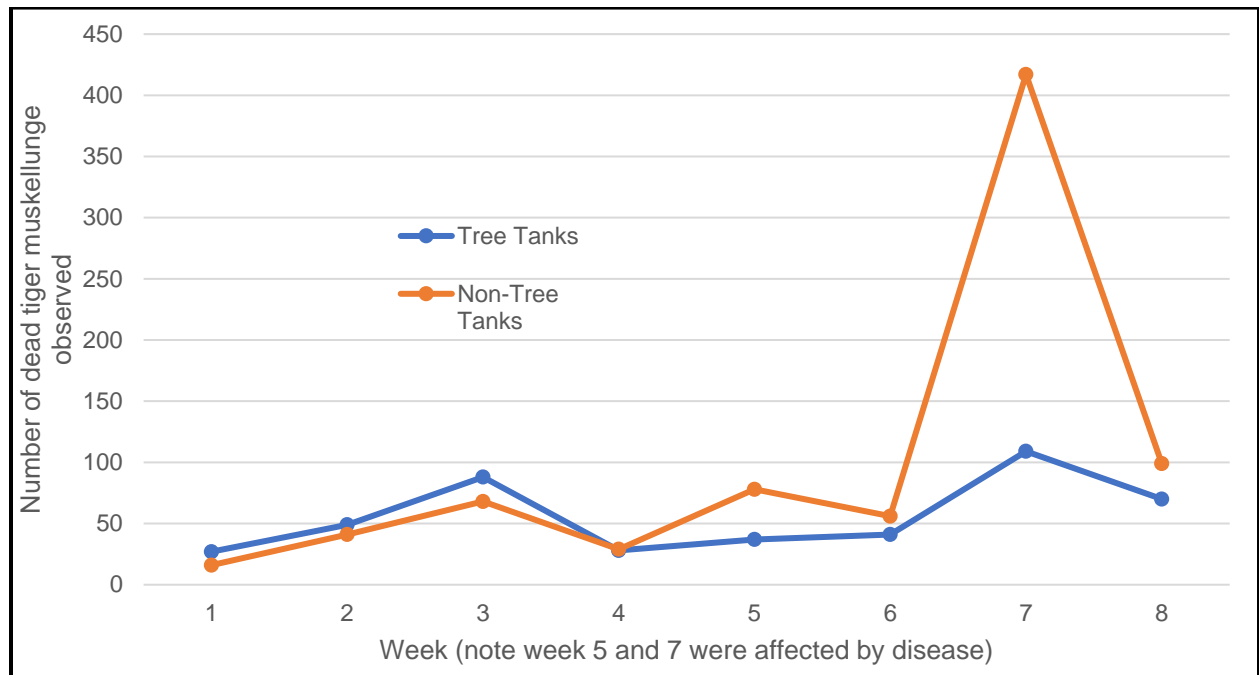


Figure 2. Mortality count of tiger muskellunge in tanks with and without Tiger Trees per sample week at the Oneida Fish Hatchery, 2022.

Discussion

Pleasant Mount Hatchery had disease issues and was unable to provide the requested number of tiger muskellunge fry of 105,000. Fish received had visible columnaris and treatments began immediately. Limited rainfall throughout the rearing season resulted in drought conditions, limiting water and resulting in lower than normal dissolved oxygen levels. Despite these hurdles, tiger muskellunge grew to 8.4" by mid-August.

Another experiment to raise fish to 12" part way thru the rearing season shortened the study duration. Fish for two water bodies were fin clipped and separated, which occurred the week of August 2. Half of the clipped fish were to be stocked at 9" and half stocked at 12". Due to the density inconsistencies resulting from clipping and separating those fish, the Tiger Tree study ended at week 8.

Although limited, there were some signs that Tiger Trees had a positive impact on tiger muskellunge growth and mortality during the rearing process. From week 1 (June 15) through week 5 (July 12) of the study, fish in the Tiger Tree tanks were approximately 10% larger than those in non-Tiger Tree tanks, but by week 6 the difference declined to 6.9%. By weeks 7 and 8, the difference was 4.4 and 6.3 respectively. It is speculated that fish density became high enough that fish were using each other as cover, therefore all tanks were seeing benefits of cover. This coupled with lower densities in non-tree tanks due to higher mortality, allowed non-tree tank fish to catch up to those in tiger tree tanks. Mortality was initially lower in tanks without tiger trees, but by week 6 mortality was substantially higher in these tanks. Interestingly, the two weeks of severe columnaris disease were week 5 and week 7 and the tanks with tiger trees had much lower mortality. This could be due to calmer behavior observed in the tiger muskellunge in Tiger Tree tanks, which likely resulted in less biting and wounding – contributing factors in the severity of disease. Natural causes and fish jumping from the tanks also contributed to mortality. The use of Tiger Trees should continue for another three seasons to determine if the positive impact is consistent year to year, if the benefits are greater if fish are acquired in better health, or if any benefits seen were anomalies.

Acknowledgements

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