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Abstract

Over the past four decades both original and reciprocal crosses of hybrid striped bass have been stocked in Kentucky reservoirs. Although both crosses of hybrid striped bass have been stocked, there is little known on the differences in growth, recruitment or maximum age and size of original versus reciprocal cross hybrid striped bass in Kentucky reservoirs. This study wasn't set up to examine maximum age and size, but rather to compare growth, condition and relative abundance of the two crosses of hybrid striped bass from age-1 to age-3.

Herrington Lake, Taylorsville Lake and Rough River Lake were selected as the study impoundments with 10 fingerlings/acre of each of the reciprocal and original cross hybrid striped bass stocked annually in June from 2015-17. Original cross were marked with oxytetracycline (OTC), whereas reciprocal cross were unmarked. Short-term post stocking survival was examined and was highly variable between crosses and exceptionally high some years leading to a tempering protocol being developed for stocking Morones. Fall gill netting was used from 2016-2020 to sample hybrid striped bass with length and weight data collected on all fish. Otoliths were removed and examined for an OTC mark to determine cross and for age and growth information.

Water quality was monitored at the three study lakes during the summer and early fall where temperature and dissolved oxygen were thought to be limiting factors to hybrid striped bass condition and survivability. A habitat suitability index for hybrid striped bass was utilized to help evaluate water quality data. All three study lakes had poor habitat for hybrid striped bass throughout the entire water column and in all reaches of the lake for part of the year. Water quality likely plays a key role in the success or failure of the hybrid striped bass fishery especially as these reservoirs age and experience eutrophication.

The relative abundance of each cross appears to be variable depending on survival and year class strength with no clear advantage on survivability to either cross when stocked at the same size. Herrington Lake was the only lake where the reciprocal cross was consistently more abundant for age-1 – age-3 fish examined. Potential growth differences between crosses and sex of hybrid striped bass were analyzed with one-factor analysis of variance (ANOVA). When summarizing comparisons of growth potential at all three lakes the following conclusion can be made. In all comparisons of growth between crosses that were significantly different, the reciprocal cross had a greater mean length at age compared to the original cross. In all comparisons of growth between sexes that were significantly different, females had a greater mean length at age compared to the males. Relative weights varied between crosses but tended to follow a pattern among year classes at all three study lakes. Patterns with relative weight comparisons between the sexes were more sporadic.

If it is desired to maintain hybrid striped bass populations in Kentucky reservoirs it is recommended to continue stocking reciprocal cross at 20 fingerings/acre. If original cross are thought to reach a larger maximum size, 50% of stocked hybrid striped bass could be stocked with original cross if fry can be procured from other states.

Introduction

The original cross of hybrid Morones consists of crossing the male white bass *Morone chrysops* with the female striped bass *Morone saxatilis (*Stevens 1965)*,* whereas the reciprocal cross consists of using a female white bass and male striped bass (Bayless 1967). While striped bass can suffer high mortality during late summer due to high water temperatures and low dissolved oxygen (Coutant 1985), hybrid striped bass are better suited to these lake conditions. However, the combination of temperature and dissolved oxygen are still two limiting factors to hybrid striped bass condition and survivability (DeMauro 1990). This led the Kentucky Department of Fish and Wildlife Resources (KDFWR) to first stocking hybrid striped bass into Herrington Lake in 1979, after striped bass stockings had failed at the lake (Axon 1979; Kinman 1987). Hybrid striped bass have been noted for their rapid growth in early life stages, good survival in both oligotrophic and eutrophic lakes, less tendency to migrate, high susceptibility to angling, and propensity to feed on clupeid fishes (Ware 1974; Axon and Whitehurst 1985; Kinman 1987).

Over the past four decades both original and reciprocal crosses of hybrid striped bass have been stocked in Kentucky reservoirs depending on availability of brood stock and trades with other states for fish. The state record hybrid striped bass weighing 20 pounds 8 ounces was caught in 1991 out of Barren River below Barren River Lake. It is unknown how long that record fish had been in the tailwater and what impact that had on its size. The previous two state record hybrid striped bass were from Barren River tailwater and the Ohio River. There are not lake specific records in Kentucky, so maximum size of hybrid striped bass in reservoirs is unknown. Original cross hybrid striped bass were stocked exclusively statewide through 1988 meaning this state record fish was almost certainly an original cross. However, the reciprocal cross has been stocked almost exclusively since the early 1990's. Hybrid striped bass are managed jointly with white bass under a statewide regulation with a daily creel limit of 15 fish with no more than five fish being greater than 15 in long. Although both crosses of hybrid striped bass have been stocked in Kentucky, there is little known on the differences in growth, recruitment or maximum age and size of original versus reciprocal cross hybrid striped bass in reservoirs.

Prior to this study, standardized fall gill net samples were failing to sample both significant numbers of reciprocal cross hybrid striped bass past age-3 and significant numbers of fish larger than 22 in at Taylorsville and Herrington lakes. Creel surveys have also observed very few fish over 22 in being caught from the lakes in recent years. Conversely, Rough River Lake seems to have a stable population of reciprocal cross hybrid striped bass with a maximum age of 10 years (Rister et al. 2011). Despite being long lived, very few of the reciprocal cross hybrids in Rough River Lake reach lengths of 23 in or greater.

It appears that the reciprocal hybrid cross hybrid striped bass have the potential to be relatively long lived as illustrated by age information collected at Rough River Lake. At this time, however it is unclear why the reciprocal cross are so much shorter lived or less abundant at larger sizes in both Taylorsville and Herrington Lakes. One possibility may be related to water quality. Both Taylorsville and Herrington Lakes have experienced eutrophication with age. While hybrid striped bass fish kills have been rare in Kentucky; even without overt fish kills, poor habitat conditions manifest in reduced growth rates, poor body condition and lowered immunity to fungal, bacterial, and viral infections. Although hybrid striped bass can tolerate warmer water temperatures, they prefer temperatures similar to striped bass. In Claytor Lake, Virginia, hybrid striped bass preferred water temperature 70.7 – 77.9 °F with dissolved oxygen greater than 4.5 mg/L. (Kilpatrick 2003). Other telemetry studies found that hybrid striped bass could occupy poor habitat with temperatures exceeding 80.6 °F if dissolved oxygen was > 4.0 ppm (Windham 1986, Muncy et. al 1990, Piner 1993); however, it wasn't clear what effect this warm water had on condition of fish over extended periods. Water quality likely plays a significant role in the success of a hybrid striped bass fishery.

The low numbers of large reciprocal cross hybrid striped bass (> 23 in) at each of these three lakes was the impetus for this study looking at the performance of the two crosses of hybrid striped bass.

Study Area

Herrington Lake is a 2,410-acre impoundment owned by Kentucky Utilities (Axon 1979). The lake was impounded in 1925, making it the oldest impoundment in the state. The lake is located in central Kentucky in Boyle, Garrard, and Mercer counties. Mean and maximum depths for Herington Lake are 78 and 249 feet, respectively (Kinman 1987). The lake was classified as eutrophic by the Kentucky Division of Water in 2021 (Johnson 2021). The lake has steep limestone bluffs (Kinman 1987) with sparse aquatic vegetation. Woody structure is also sparse within the lake due to the age of the reservoir and steep banks. Striped bass were stocked from 1958 through 1978. However, these stockings were stopped due to high mortality in late summer and lack of angler interest (Axon 1979). Hybrid striped bass were introduced to Herrington Lake in 1979 after the striped bass stockings were discontinued. Herrington Lake had original cross hybrid striped bass stocked from 1979-1988. Since 1989, only reciprocal cross hybrids have been stocked in the lake, with the exception of 1991-94 where a mix of both crosses were stocked. In addition to the stocked hybrid striped bass, the lake has an abundant white bass population.

Taylorsville Lake is a 3,050-acre impoundment owned by the US Army Corps of Engineers. The reservoir was impounded in 1983. The lake is located in central Kentucky in Anderson, Nelson, and Spencer counties. Mean and maximum depths for the lake were reported as 19 and 80 feet in 1992, respectively. The lake was classified as hypereutrophic in 2021 by the Kentucky Division of Water (Johnson 2021). The lake still has plentiful standing woody structure. Hybrid striped bass were first stocked in Taylorsville in 1989. The 1989-90 stockings were original cross hybrid striped bass with reciprocal cross being stocked from 1991 to the start of this study, except for 1997, where some original cross hybrids were stocked along with the reciprocals. In addition to the hybrid striped bass, Taylorsville Lake has a stable and abundant white bass population.

Rough River Lake is a 5,100-acre flood control reservoir owned by the US Army Corps of Engineers. The reservoir was impounded in 1959-61. The reservoir is located in northwest Kentucky in Breckenridge, Grayson, and Hardin counties. In 2021, the Kentucky Division of Water classified the lake as mesotrophic (Johnson 2021). Rough River Lake has a mean depth of 24 feet and a maximum depth of 72 feet. Winter drawdown is typically 25 feet. Habitat at Rough River Lake is primarily rocky ledges and sand or mud flats. The lake is highly dendritic, with standing timber left in small coves and creek mouths. A large die-off of white bass occurred in 1995. No white bass have been collected in fall gill net surveys or angler surveys since the die off. An abundant forage base of gizzard shad and the white bass fishery crash prompted the stocking of hybrid striped bass in 1995. Prior to this study, Rough River Lake had been stocked exclusively with reciprocal cross hybrid striped bass.

Methods

Stocking - During the first two weeks in June, 10 fish/acre of each of the reciprocal and original cross hybrid striped bass were stocked annually in the three study impoundments from 2015-17. Original cross hybrid striped bass were marked with 500 ppm oxytetracycline (OTC) as fingerlings before being stocked. Reciprocal cross hybrid striped bass were not marked with OTC. Each lake had three stocking sites selected and received both crosses of hybrid striped bass on the same day.

To determine 24-hr post stocking mortality, six 33-gallon holding drums were placed at a marina at one of the stocking sites at each lake. Upon delivery, approximately 100 fish of each cross were placed in each covered barrel and held for 24 hrs to account for stocking and hauling mortality. The barrels had a portion of the sides removed and the area replaced with fine mesh, allowing lake water to circulate with no escapement of the fingerlings. The temperature of water in the hauling truck and the receiving water was recorded. Each barrel had an opaque lid and signage stating that they were part of a KDFWR research study and should not be disturbed. At the end of the 24-hr period, KDFWR staff counted the number of living and dead fingerlings in each barrel. The percent mortality from each of three replicates was averaged to come up with an overall 24-hr percent mortality.

Water Quality Monitoring - Dissolved oxygen and temperature profiles were taken monthly at the three study lakes in three sections of the lake (upper, middle, lower). Water profiles were taken at a minimum

of three years from 2015-19 at each lake. Readings were taken at two-foot intervals down to 30 ft depths (20-ft at Rough River Lake), beyond that, readings were taken at five-foot intervals. To help evaluate the water quality data, a habitat suitability index for hybrid striped bass (Kilpatrick 2003) was utilized. This index reviewed and synthesized literature on water quality requirements/preferences of hybrid striped bass. The categories of optimal (selected for, water temperature 70.7 – 77.9 °F and dissolved oxygen $\geq$ 4.5 ppm), suboptimal (selected for only if suboptimal or poor habitat was available, water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), and poor (avoided by, or used as a last resort by fish, water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm). In the study lakes there were water profiles in early spring or late fall rated as suboptimal that had cooler than the optimal water temperatures; however, dissolved oxygen was $\geq$ 4.5 ppm. In these instances, we weren't as concerned with suboptimal habitat being a limiting factor, instead we were more concerned with the summer months where temperature and dissolved oxygen may be limiting factors to hybrid striped bass condition and survivability. The habitat suitability index numbers aren't definitive in the literature and should only be used as a guideline for helping interpret water quality data.

Fish Sampling - Monofilament gill nets were used to sample hybrid striped bass populations in the three study lakes during October and November. Net nights consisted of a 24-hr sampling period. Nets were 250-ft long, consisting of five 50-foot panels of 1.0-, 1.5-, 2.0-, 2.5- and 3.0-in bar mesh. Central Fisheries District and Urban Fisheries staff conducted sampling at Taylorsville Lake and Herrington Lake with the exception of 2018 at Herrington Lake where the Streams Investigation Branch assisted in place of Urban Fisheries due to sampling coinciding with the Rough River Lake hybrid striped bass sample. Sampling at Rough River Lake was conducted by Northwest Fisheries District in 2016 with Urban Fisheries assisting in 2017-20. All hybrid striped bass were measured to the nearest 0.1 in and weighed to the nearest 0.01 pounds. Otoliths were removed and examined for an OTC mark to determine cross and for age and growth information. To determine if there was differential growth rates between sexes of hybrid striped bass, fish used for aging were also sexed by dissecting for examination of gonads.

Due to concerns raised over misidentification between unmarked reciprocal cross hybrid striped bass and white bass, we did not include age-0 fish in the analysis, as hybrids seem to be recruiting to age-1 without issue in all three impoundments. By fall of their second growing season (age-1), there was a high degree of confidence in differentiating between white bass and hybrids, with all hybrid striped bass $\geq$ 11 in. Differences in performance of original and reciprocal hybrid striped bass in the three impoundments was determined by comparing growth, recruitment to age-1+, 2+, and 3+, condition, and relative abundance of the two crosses of hybrid striped bass.

Analysis - Potential growth differences between cross and sex of hybrid striped bass were analyzed with one-factor analysis of variance (ANOVA) with an alpha level of 0.05. Hybrid striped bass were separated into year classes within each lake and comparisons by year class of the two crosses and two sexes were made using total length and relative weight.

Results

Fish Stocking - The reciprocal cross hybrid striped bass in 2015 and 2016 were produced and hatched at Pfeiffer Hatchery and then fry were transferred to one-acre earthen ponds at Minor Clark Hatchery for grow out to 1.5-in fingerlings. In 2017, the reciprocal hybrid striped bass were purchased as fry from KEO Fish Farms in Arkansas and grown out in earthen ponds at Minor Clark Hatchery. The original cross were gifted from Alabama Department of Conservation and Natural Resources as fry in 2015 and 2016. In 2017, the original cross hybrid striped bass came from Tennessee Wildlife Resources Agency. Original cross fry were raised to 1.5-in fingerlings in one-acre earthen ponds at Minor Clark Hatchery.

Each of the three study lakes had three planned stocking sites where both crosses would be stocked concurrently. However, due to miscommunication, hybrid striped bass were only stocked at two of the three planned sites on Herrington and Taylorsville Lakes in 2016 (Tables 1 and 2). Gwinn Island at Herrington Lake and Possum Ridge on Taylorsville Lake were not stocked. Instead, Herrington Marina (Herrington Lake) and Settlers Trace (Taylorsville Lake) received twice as many fish, but the equal

stockings of each strain were always maintained. The effect on fish distribution and survival is unknown. The same three sites were stocked each year at Rough River Lake (Table 3).

The 24-hr hauling and stocking mortality study was conducted at each study lake from 2015-17. In 2015, mortality ranged from 4-8% for original cross and 2% for reciprocal cross hybrid striped bass at the three lakes (Tables 4-6). A 2015 mortality estimate for reciprocal hybrid striped bass was not taken at Rough River Lake because fish were stressing on the truck and immediately released. In 2016, mortality estimates were considerably higher, ranging from 18-20% for reciprocal, and 7-53% for original cross hybrid striped bass at the three study lakes. Water temperatures varied by as much as 18° F between the transportation truck and lake surface temperature, which could have contributed to high stocking mortality in 2016. Though the goal is to stock both crosses at equivalent sizes, there unfortunately was a considerable size difference between the original cross (1.8 in average length) and reciprocal cross (1.2 in average length) in 2016. A tempering protocol for hybrid striped bass stocking was developed and implemented in 2017. This entailed slowly raising the water temperature at the hatchery and hauling the fish at a water temperature that would closely match the waterbody being stocked. Hybrid striped bass 24-hr hauling and stocking mortality estimates ranged from 0-9% for reciprocal cross and 3-14% for original cross in 2017.

Water Quality Monitoring - Dissolved oxygen and temperature profiles were taken monthly from May – December 2015, April – November 2017 and May – October 2019 at Herrington Lake. In 2015, habitat was poor in August for the entire water column in all sections of the lake (Tables 7-9). By the end of June, habitat was already limited to the top 12 ft of water in the middle and upper sections of the lake with the lower end of the lake having more suboptimal habitat available. Water quality had slightly improved by early September 2015; however, only limited suboptimal habitat was available for hybrid striped bass with the rest of the water column falling into the poor category. Water quality at Herrington Lake in summer 2017 was not as dire as 2015, with optimal or suboptimal habitat available in all sections of the lake throughout all summer months (Tables 10-12). Water quality at Herrington Lake from July – September 2019 was rated mostly as poor with only water below 95 ft falling into the suboptimal category in the lower end of the lake in July and below 120 ft in August (Table 13). The habitat was poor in July and August 2019 in the mid and upper ends of the lake from the surface to bottom (Tables 14 and 15). By September only a small window of water was suboptimal in the lower end (18-20 ft) and mid-lake section (14-20 ft), with the remaining water column falling into the poor category. The upper end of the lake offered suboptimal habitat in the 8-20 ft range. These periods of poor water quality may be negatively influencing condition and survivability of hybrid striped bass in Herrington Lake in some years. Some years are worse than others for water quality. In 2015 and 2019 much of the water column was unsuitable for hybrid striped bass during the summer months at Herrington Lake.

Dissolved oxygen and temperature profiles were taken monthly from May – December 2015, April – November 2017 and May – October 2019 at Taylorsville Lake in three sections of the lake (upper, middle, lower). In 2015, habitat was poor in early August for the entire water column in all sections of the lake (Tables 16-18). During late June and late August, much of the water column was rated as poor in the lower and mid-lake sections with some suboptimal habitat available (4-16 ft; Tables 16 and 17). The upper and lower ends of the lake did offer some reprieve for hybrid striped bass in late September with optimal habitat available. In July and August 2017, suitable habitat was extremely limited in Taylorsville with only a small band of suboptimal water in the middle and lower lake sections in July; the remaining water column fell into the poor category in July and the entire water column in all sections of the lake was poor in August (Tables 19-21). By early September conditions had improved in all sections of the lake with optimal habitat available. Water condition in 2019 at Taylorsville Lake was grim for hybrid striped bass, with habitat rated as poor for the entire lake in July and August (Tables 22-24). Only a small band of water in the mid-lake section was rated at suboptimal by mid-September, with the remainder of the lake still falling into the poor category. This extended period of poor water quality may be a key factor for survival, longevity and condition of hybrid striped bass at Taylorsville Lake. Again, noting that some years are worse than others regarding habitat suitability for hybrid striped bass.

At Rough River Lake, the 2016 temperature and dissolved oxygen profiles were only taken from June – August. By mid-June habitat was already rated as poor for much of the lake with only a small band of

suboptimal water available in all sections of the lake (Tables 25-27). In late July the entire water column in all sections of the lake was rated as poor. By late August the lower lake section still had poor water conditions from top to bottom, the mid lake section had a narrow band of suboptimal water, while the upper lake section offered some refuge with optimal and suboptimal habitat available. Water quality was monitored in 2017, with water conditions deteriorating by mid-June in the lower and mid lake sections (Tables 28 and 29). Habitat suitability for hybrid striped bass was limited to a small band of suboptimal water in the 10-12 ft range in the lower lake section and 8-10 ft range in the mid lake section. The remainder of the water column fell into the poor category for hybrid striped bass habitat in the lower and mid lake sections for June. The upper end of the lake did still offer optimal habitat in mid-June at 10 ft with suboptimal habitat available from 8-16 ft (Table 30). By mid-July habitat was poor in the middle and lower lake sections, while the upper lake offered suboptimal habitat from 12-20 ft. By early September conditions had drastically improved throughout all sections of the lake. In 2018, water quality was again monitored from early June – early October. Similar to 2016 and 2017, by June the lower and mid-lake sections already had poor quality in much of the water column, with only a narrow band of suboptimal habitat in the 12-14 ft range in the lower section (Table 31) and 10-14 ft range in the middle section (Table 32). The upper lake still had optimal habitat at 8 ft, and suboptimal habitat in early June from 4-20 ft (Table 33). July and August had poor water quality for the entire water column in all sections of the lake with the exception of the upper lake at 12 ft where habitat suitability was rated as suboptimal. By early October 2018 water quality had improved with optimal habitat available in all sections of the lake. Water quality was monitored from June – September 2019; however, unlike previous years there was more suboptimal habitat available in early June in all sections of the lake (Tables 34-36). Optimal habitat was even available in the lower and upper lake sections in early June. However, by early July the entire water column in all sections of the lake was rated as poor for hybrid striped bass. By late August much of the water column in all sections of the lake was rated as suboptimal. As with the other two study lakes, habitat suitability for hybrid striped bass seems to be strained during the summer months in some years. This may factor into low relative weights observed most years. However, relative abundance and longevity of hybrid striped bass in Rough River Lake do not seem to be as negatively impacted by less than desirable water conditions.

Fish Sampling – The CPUE of hybrid striped bass at Herrington Lake was always higher for the reciprocal cross across all years sampled from 2016-20 (Table 37). However, original cross were stocked in less years (2012-13 and 2015-19) than the reciprocal cross. The largest hybrid striped bass sampled during the study was a 28-inch fish in 2019 from Herrington Lake that was an original cross. However, large fish $\geq$ 23 in remained low during the study period. Due to the lake depth, Herrington Lake is difficult to effectively sample with gill nets, with catch rates lower than the other study lakes in most years. The reciprocal cross catch rate was higher compared to the original cross across all years of sampling at Taylorsville Lake which was similar to Herrington Lake, but the CPUE of the original cross was within the margin of error in 2018 and 2020 (Table 38). Again, original cross were stocked in fewer years (2012 and 2015-19) compared to the reciprocal cross, which meant less overall number of fish stocked. Taylorsville Lake had the highest numbers of hybrid striped bass sampled $\geq$ 23 in. Many of these fish were sampled in the upper riverine section of the lake where saugeye were abundant in the gill nets with high incidental mortality. The largest fish ($\geq$ 26 in) were all reciprocal cross at Taylorsville Lake with the exception of one 26 in fish sampled in 2020 that was an original cross. At Rough River Lake not all hybrid striped bass were kept for age and growth data and verification of cross wasn't determined for fish still alive and released. The total CPUE includes all fish caught at this lake, even if cross was not determined. This was the case in 2016 where many fish were released alive outside the age-1 target size range and original cross had a higher CPUE compared to the reciprocal cross (Table 39). In the 2018 sample, the original cross CPUE was double the reciprocal cross, with reciprocal cross CPUE higher in 2017 and 2019-20. Despite a healthy hybrid striped bass population with high catch rates, few fish > 23 were sampled during the five years of the study.

At Herrington Lake the reciprocal cross hybrid striped bass have been sampled in greater abundance compared to the original cross in all five years (2016-20) and for all age groups, except for age-2 fish sampled in 2018 and age-3 fish sampled in 2019 (only 3 and 2 fish sampled, respectively; Table 40). The number of age-1 hybrid striped bass sampled in 2017 at Herrington Lake (22 fish), age-2 fish sampled in

2018 (3 fish), and age-3 fish sampled in 2019 (2 fish) was low and corresponds to the high stocking mortality observed in 2016 (53% mortality of original cross and 19% reciprocal cross; Table 4).

The catch rates were low at Taylorsville Lake for both crosses of hybrid striped bass past age-1 in the 2017-20 samples (Table 41). Age-1 reciprocal cross hybrid striped bass catch rates ranged from 1.4 – 2.6 fish/net-night, while original cross catch rates for age-1 hybrid striped bass ranged from 1.0 – 3.2 fish/net-night from 2016-18 with relatively large standard errors for both crosses. Relative abundance of age-1 fish was variable between years on which cross was more abundant.

The gill net sampling at Rough River Lake in 2018, 2019 and 2020 revealed an exceptionally strong 2017-year class, with a higher relative abundance of original cross (17.9 fish/net-night) compared to reciprocal cross (8.2 fish/net-night; Table 42) in the 2018 sample. However, the relative abundance between the two crosses was nearly equal at age-2 in 2019, with the original cross again more abundant in the 2020 sample (3.5 fish/net-night) compared to the reciprocal cross (2.6 fish/net-night). Not all presumed age-1 fish (14-16 in) in 2018, presumed age-2 fish (15-19 in) in 2019, or presumed age 3-fish (16-20 in) were aged, so catch rates were even higher than reported for each cross. The 2016-year class of hybrid striped bass also had a higher proportion of original cross (2.2 fish/net-night) compared to reciprocals 0.6 fish/net-night at age-2 in the 2018 sample. These original cross fish were also more abundant the previous year (2017) at age-1, with 5.3 fish/net-night compared to reciprocal cross at 2.9 fish/net-night. However, by age-3, the relative abundance of each cross was nearly identical. A small sample size in the 2019 sample of age-3 fish made any differences in abundance between the crosses undetectable. The 2016-year class of hybrid striped bass had significantly higher 24 hr stocking mortality for the reciprocal cross (18%) compared to originals (7%), with reciprocal cross also being smaller (1.2 in) compared to the original cross (1.8 in) at the time of stocking. This appears to have presented an advantage on survivability of the original cross. Conversely, there were more reciprocal cross hybrid striped bass sampled all three years (2016-18) from the 2015-year class. The relative abundance of each cross appears to be variable depending on survival and year class strength with no clear advantage on survivability to either cross when stocked at the same size.

Potential growth differences between crosses and sex of hybrid striped bass were analyzed with ANOVA (alpha level of 0.05). At Herrington Lake, only one comparison of the crosses was significant with the reciprocal cross (21.2 in) exhibiting faster growth in 2017 among age-2 fish compared to the original cross (20.5 in; Table 43). Age-2 and age-3 hybrid striped bass were sampled in relatively low numbers in 2018 and 2019 at Herrington Lake and no other significant differences between crosses occurred. There was a trend of differential growth between sexes at Herrington Lake, with females having a greater mean length compared to males in all comparisons; with the differences being significant in four comparisons. Females were significantly larger than males at age-2 in the 2017 sample, age-1 in the 2018 sample, age-2 in the 2019 sample, and age-3 in the 2020 sample (Table 44).

No significant differences in length were observed at Taylorsville Lake between crosses or sexes (Tables 45 and 46). The number of age-2 and age-3 fish in the 2017-20 samples was minimal and too small to make any meaningful conclusions.

The results from Rough River Lake were similar to Herrington Lake, with reciprocal cross hybrid striped bass exhibiting faster growth at age-2 compared to original cross in the 2017 sample (18.6 in and 18.0 in respectively; Table 47). The age-2 reciprocal cross also exhibited faster growth compared to original cross in the 2019 sample (17.4 in and 17.0 in, respectively). Additionally, age-1 reciprocal cross fish in the 2018 sample had a greater mean length (15.1 in) compared to the original cross (14.5 in). The low number of age-3 fish sampled from Rough River Lake in 2018 resulted in a lack of statistical power to make additional conclusions. Also similar to Herrington Lake, there was a significant difference in growth between sexes at Rough River Lake with females exhibiting a greater mean length compared to males in all comparisons except age-1 fish in the 2016 and 2017 samples which were not significantly different (Table 48).

When summarizing comparisons of growth potential at all three lakes the following conclusions can be made. In all comparisons of growth between crosses that were significantly different, the reciprocal cross

had a greater mean length at age compared to the original cross (Table 43 and Table 47). In all comparisons of growth between sexes that were significantly different, females had a greater mean length at age compared to the males (Table 44 and Table 48).

Additionally, potential differences in condition between crosses and sexes of hybrid striped bass were analyzed by comparing relative weights with ANOVA (alpha level of 0.05). While age-2 reciprocal cross hybrid striped bass at Herrington Lake had a significantly greater mean length in 2017, the relative weights were significantly greater for the original cross age-2 fish compared to the reciprocal cross in 2017 (Table 49). The age-2 original cross also had significantly greater relative weights in the 2018 sample. Age-1 original cross hybrid striped bass sampled in 2016 also had a significantly higher relative weight (91) compared to the reciprocal cross (84). Conversely, with the 2017-year class, the reciprocal cross had a significantly higher relative weight compared to the original cross (99 and 95, respectively) in the 2018 sample at age-1 and also for age-3 fish in the 2020 sample (96 and 90, respectively). When comparing the two sexes, the only significant difference was age-2 female hybrid striped bass in the 2019 sample having higher relative weights (94) compared to males (90) at Herrington Lake (Table 50).

At Taylorsville Lake, the relative weight for age-1 original cross hybrid striped bass (86) in the 2016 sample was significantly greater than the reciprocal cross (79; Table 51). The original cross relative weight (85) was also significantly higher in the 2019 sample for age-3 fish compared to the reciprocal cross (73). Conversely, the age-1 reciprocal cross had a significantly higher relative weight in the 2018 sample at Taylorsville Lake when compared to the original cross (89 and 84, respectively). When comparing differences in relative weights between the sexes, age-1 males had a significantly higher relative weight (87) compared to females (84; Table 52) in the 2018 sample at Taylorsville Lake. No other significant differences in relative weights between the sexes were observed at Taylorsville Lake.

At Rough River Lake, original cross hybrid striped bass from the 2016-year class exhibited a significantly higher relative weight (88) compared to the reciprocal cross (85) in the 2017 sample at age-1, as well as the 2018 sample at age-2 (86 and 80, respectively; Table 53). The original cross hybrid striped bass had a greater mean length at stocking in 2016 (1.8 in vs 1.2 in for reciprocals), which may have given them an advantage (Table 6). Conversely, the 2017-year class of reciprocal cross had significantly higher relative weights at age-1 in the 2018 sample compared to the original cross (92 and 85, respectively), at age-2 in the 2019 sample (88 and 81, respectively), as well as age-3 in the 2020 sample (84 and 81, respectively). Both crosses were stocked at a similar size in 2017, so the cause of the difference in relative weights in subsequent years is unknown. Males had significantly higher relative weights compared to females for age-1 and age-2 hybrid striped bass in the 2017 sample and age-1 fish in the 2018 sample (Table 54).

Relative weights varied between crosses with no clear advantage to either cross but tended to follow a pattern among year classes at all three study lakes. In the 2016 sample, the age-1 original cross had significantly higher relative weights at Herrington and Taylorsville Lakes compared to the reciprocal cross (Table 49 and Table 51). In the 2018 sample, the age-1 reciprocal cross had significantly higher relative weights compared to the original cross in all three study lakes (Table 49, Table 51 and Table 53). Patterns with relative weight comparisons between the sexes were more sporadic. Males had higher relative weights compared to females at Taylorsville and Rough River Lakes for age-1 and age-2 fish in 2017 and 2018 (Table 52 and Table 54); however, at Herrington Lake age-2 females sampled in 2019 had significantly higher relative weights compared to males (Table 50).

Discussion

Taylorsville and Herrington Lakes both have white bass populations which may create a competitive bottleneck for hybrid striped bass at some stages of their life history. There doesn't appear to be an issue with recruitment of hybrid striped bass at these two lakes as they are seemingly abundant to age-1, aside from the occasional variable year class due to poor survival of stocked fish. However, far fewer fish are sampled in older age classes at these two lakes. Hybrid striped bass tend to provide a more stable fishery than white bass. White bass populations tend to fluctuate with periodic strong year classes in response to optimal spring spawning conditions (Kinman 1987).

By fall of their second growing season (age-1), there was a high confidence in differentiating between white bass and hybrids, when all hybrid striped bass are ≥ 11 in. However, there were a few outliers for age-1 reciprocal hybrid striped bass at Taylorsville Lake in 2016 and 2018 that may still have been misidentified white bass. In these instances, mitochondrial DNA testing may have been useful to verify. The sample size of hybrid striped bass collected in gill nets at Taylorsville Lake past age-1 was insufficient most years to infer any significant differences. This may have been due to a low abundance of older fish but was also partly due to insufficient sampling effort. Catch rates of other sportfish was high in some gill nets at Taylorsville Lake with high incidental mortality, especially in the upper end of the lake. The decision was made after consulting with the central fisheries district not to run additional net nights and kill more sportfish. While more net nights would likely have increased the sample size of age-2 and age-3 target hybrid striped bass, suitable sites where hybrid striped bass could effectively be sampled were limited. The limited net sites, in addition to low numbers of age-2 and age-3 hybrid striped bass sampled, made it difficult to justify the continued high mortality of non-target fish.

This study did not examine fish escapement over or through the dam. There were some above average precipitation years during the study. Fish emigration was assumed to be equal for both crosses. Timing of precipitation and associated flooding may play a role in hybrid striped bass fingering survival.

There was significant mortality in the 24-hr stocking mortality study in 2016. However, we don't believe crowding in the holding drums was the cause of the mortality. While more fish were placed in the drums in 2016, there was plenty of space for fish to move around, and mortality wasn't high in all drums with high numbers of fish. This poor survival in the 2016-year class seemed to closely match subsequent years of gill net sampling at the three study lakes. The temperature difference between the hatchery truck and lake surface temperature varied by as much as 18 °F. A tempering protocol for stocking fish was subsequently established with the hatchery also raising the water temperature at the hatchery and in the hauling tanks before fish were loaded onto trucks to more closely match the lake surface temperatures.

This study was not set up to determine maximum age or maximum size of the two crosses of fish, due to study length and insufficient numbers of larger fish. A future study may be warranted to determine if one cross is longer lived or has the potential to reach a larger maximum size in these impoundments. However, making any determinations that are statistically different would require a larger sample size of older fish. This increased sample size would likely incur high mortality of smaller hybrid striped bass and other sportfish when sampling with standardized Morone gill nets. While reciprocal cross had a greater mean length at age where significantly different in this study in the first 3 years, it is quite conceivable that the original cross may eventually catch up and be longer lived or reach a larger maximum size.

There is also the issue with procuring hybrid striped bass fry. While Pfeiffer Fish Hatchery has historically spawned the reciprocal cross hybrid striped bass stocked across the state, the reciprocal cross fry are readily available commercially and are cheaper to purchase than holding brood stock and spawning at our state-run hatcheries. The reciprocal cross fry can be purchased over a wide window of time when conditions are suitable for stocking fry into hatchery ponds. Beginning in 2017, all reciprocal cross hybrid striped bass stocked in Kentucky have been purchased from KEO Fish Farms in Arkansas as fry. Procuring original cross has proven difficult with no commercial source available. For this study we were dependent on trading with other states for fish. The timing of receiving original cross fry was an issue as these fish were spawned further south and the hatchery ponds weren't always ready for stocking fingerlings. Pfeiffer Fish Hatchery attempted to produce original cross fry by collecting female striped bass from 2013-15 but finding suitable females was difficult. The consideration for stocking original cross hybrid striped bass in the future would be dependent on 1) successfully producing original cross hybrid striped bass, 2) original cross hybrids becoming commercially available, or 3) trading with other states for original cross fry.

Reciprocal cross hybrid striped bass seem to be the better option moving forward, due to the reciprocal cross having a greater mean length at age compared to the original cross where there were significant differences. However, there were many comparisons where mean length at age wasn't significantly

different. Relative abundance and condition were variable across years for the two crosses with no clear advantage to either cross when stocked at the same size.

Management Implications

If it is desired to maintain hybrid striped bass populations in these lakes it is recommended to continue stocking reciprocal cross at 20 fingerings/acre. Continued sampling is recommended the next few years to examine larger fish otoliths for OTC marks which could indicate original cross are longer lived or reach a larger maximum size. If original cross are thought to reach a larger maximum size, 50% of stocked hybrid striped bass could be stocked with original cross, if fry can be procured from other states.

Water quality likely plays a key role in the success or failure of the hybrid striped bass fishery. Extended periods of poor water quality may simply not support a hybrid striped bass population as these reservoirs age and become more nutrient rich. Water quality should be examined closely before considering new waterbodies to stock hybrid striped bass as the performance of either cross may not outweigh poor water quality. Poor water quality may manifest with low relative weights especially in larger fish and low numbers of older fish. Lake creel surveys and recent sampling data should be reviewed, and stocking of hybrid striped bass ceased if management objectives are not being met. Hybrid striped bass may be better utilized in other waters, and lakes with existing white bass population may be sufficient for anglers seeking a Morone fishery.

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Literature Cited

Axon, J. R. 1979. An evaluation of striped bass introductions in Herrington Lake. Fisheries Bulletin 63. Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky.

Axon, J. R. and D. K. Whitehurst. 1985. Striped bass management in lakes with an emphasis on management problems. Transactions of the American Fisheries Society 114:8-11.

Bayless, J. D. 1967. Striped bass hatching and hybridization experiments. Proceedings of the Annual Conference Southeastern Association of Game and Fish Commissioners 21:245-253.

Coutant, C. C. 1985. Striped bass, temperature, and dissolved oxygen: a speculative hypothesis for environmental risk. Transactions of the American Fisheries Society 114:31-61.

DeMauro, R. A. 1990. Movements, habitat associations, and food of hybrid striped bass in Ross Barnett Reservoir, Mississippi. M. S. Thesis, Mississippi State, Mississippi.

Johnson, C. 2021. Integrated report to Congress on the condition of water resources in Kentucky, 2018 & 2020 combined cycle: Assessment results with an emphasis on the 1) Salt and Licking Rivers, 2) Upper Cumberland and Four Rivers (Lower Cumberland, Ohio River, Mississippi River and Tennessee River), and 3) Green and Tradewater Rivers, along with a statewide update. Kentucky Environmental and Public Protection Cabinet Division of Water.

Kilpatrick, J. M. 2003. Habitat use, movements, and exploitation of striped bass and hybrid striped bass in Claytor Lake, Virginia. M.S. Thesis, Virginia Polytechnic Institute and State University, Virginia.

Kinman, B. T. 1987. Evaluation of hybrid striped bass introductions in Herrington Lake. Fisheries Bulletin 82. Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky.

Muncy, R. J., R. A. DeMauro, L. E. Miranda, and P. S. Phalen. 1990. Habitats used by radio-tagged adult hybrids in Ross Barnett Reservoir. Completion Report. Federal Aid to Fisheries Project F-82-1. Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State, Mississippi.

Piner, K. R. 1993. Seasonal distribution of hybrid striped bass in a power-plant cooling reservoir and a comparison to red drum. M. S. Thesis, Texas A&M University, Galveston, TX.

Rister, P. and 13 co-authors. 2011. Annual performance report district fisheries management part I project 1: lake and tailwaters fishery surveys. Kentucky Department of Fish and Wildlife Resources, F-50 Segment 33.

Stevens, R. E. 1965. A report on the operation of the Moncks Corner Striped Bass Hatchery, South Carolina Wildlife Resources Department. Special Report.

Ware, F. J. 1974. Progress with morone hybrids in freshwater. Proceedings of the Annual Conference Southeastern Association of Game and Fish Commissions 28:48-54.

Windham, W. T. 1986. Summer temperature selection of striped bass x white bass hybrids in a southern reservoir. M. S. Thesis, University of Georgia, Athens, GA.

Table 1. Numbers of original cross and reciprocal cross hybrid striped bass stocked at various sites on Herrington Lake from 2015-17. Production plan was for 25,000 fingerlings of each cross for Herrington Lake split evenly between three stocking sites (8,333 fish of each cross per site).

	2015		2016		2017	
Stocking Site	Original	Reciprocal	Original	Reciprocal	Original	Reciprocal
Camp Kennedy	8,392	8,448	9,133	8.783	8,505	8,545
Herrington Marina	8,392	8,448	18,266	17,566	8,505	8,545
Gwinn Island	8,392	8,448			8,505	8,545
Total	25,176	25,344	27,399	26,349	25,515	25,635

Table 2. Numbers of original cross and reciprocal cross hybrid striped bass stocked at various sites on Taylorsville Lake from 2015-17. Production plan was for 30,000 fingerlings of each cross for Taylorsville Lake split evenly between three stocking sites (10,000 fish of each cross per site).

	2015		2016		2017	
Stocking Site	Original	Reciprocal	Original	Reciprocal	Original	Reciprocal
Possum Ridge	10,070	10,027			10,206	10,196
Settlers Trace	10,070	10,027	21,600	20,900	10,206	10,196
Van Buren Ramp	10,070	10,026	10,800	10,450	10,206	10,196
Total	30,210	30,080	32,400	31,350	30,618	30,588

Table 3. Numbers of original cross and reciprocal cross hybrid striped bass stocked at various sites on Rough River Lake from 2015-17. Production plan was for 51,000 fingerlings of each cross for Rough River Lake split evenly between three stocking sites (17,000 fish of each cross per site).

	2015		2016		2017	
Stocking Site	Original	Reciprocal	Original	Reciprocal	Original	Reciprocal
North Fork Ramp	17,099	17,280	17,800	17,450	17,199	17,187
Laurel Branch Ramp	17,099	17,280	17,800	17,450	17,199	17,187
Peter Cave Ramp	17,099	17,280	17,800	17,450	17,199	17,187
Total	51,297	51,840	53,400	52,350	51,597	51,561

Table 4. Original cross and reciprocal cross hybrid striped bass 24-hr stocking mortality results from Herrington Lake from 2015-17.

	2015						2016						2017					
	Original			Reciprocal			Original			Reciprocal			Original			Reciprocal		
Tub number	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Number dead	9	12	7	2	0	6	108	123	120	43	14	45	8	2	0	0	0	0
Total number	126	103	130	142	117	125	213	239	216	158	217	172	147	125	87	47	73	192
Percent mortality	7%	12%	5%	1%	0%	5%	51%	51%	56%	27%	6%	26%	5%	2%	0%	0%	0%	0%
Total mortality estimate		8%			2%			53%			19%			3%			0%	
Average length (in)		1.5			1.5			1.8			1.2			1.4			1.4	
Air temperature (F)			90						86						81			
Reservoir surface water temperature (F)			82						84						82			
Truck water temperature (F)			66						67						80			

Table 5. Original cross and reciprocal cross hybrid striped bass 24-hr stocking mortality results from Taylorsville Lake from 2015-17.

	2015						2016						2017					
	Original			Reciprocal			Original			Reciprocal			Original			Reciprocal		
Tub number	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Number dead	3	10	3	2	1	5	49	12	11	42	47	37	22	17	13	12	5	16
Total number	122	157	154	96	134	116	220	194	230	186	207	229	125	114	133	101	135	119
Percent mortality	2%	6%	2%	2%	1%	4%	22%	6%	5%	23%	23%	16%	18%	15%	10%	12%	4%	13%
Total mortality estimate		4%			2%			11%			20%			14%			9%	
Average length (in)		1.5			1.6			1.8			1.2			1.4			1.4	
Air temperature (F)			90						88						87			
Reservoir surface water temperature (F)			82						85						84			
Truck water temperature (F)			66						67						81			

Table 6. Original cross and reciprocal cross hybrid striped bass 24-hr stocking mortality results from Rough River Lake from 2015-17.

	2015						2016						2017					
	Original			Reciprocal			Original			Reciprocal			Original			Reciprocal		
Tub number	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Number dead	1	9	4	Not estimated			4	23	Empty	57	75	24	3	10	3	4	4	8
Total number	136	125	137	Not estimated			130	236	Empty	229	327	313	45	131	152	99	97	103
Percent mortality	1%	7%	3%	Not estimated			3%	10%	Empty	25%	23%	8%	7%	8%	2%	4%	4%	8%
Total mortality estimate		4%		Not estimated				7%			18%			5%			5%	
Average length (in)		1.5		1.5				1.8			1.2			1.5			1.4	
Air temperature (F)			90						86						86			
Reservoir surface water temperature (F)			82						84						84			
Truck water temperature (F)			66						67						80			

Table 7. Dissolved oxygen (ppm) and temperatures (°F) collected at the mouth of Cane Run at Herrington Lake (lower lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 29		June 30		August 3		September 1		September 30		October 21		December 3	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	15.0	78.0	9.3	79.6	9.2	83.6	9.6	80.3	7.0	74.3	5.0	68.5	4.2	60.0
2	15.3	77.4	9.3	79.9	9.2	83.6	9.5	80.4	7.0	74.3	5.0	68.7	4.1	60.1
4	15.7	77.4	9.3	80.0	9.2	83.6	9.5	80.4	7.0	74.4	5.0	68.7	4.0	60.2
6	16.3	77.0	9.1	80.0	9.2	83.6	9.5	80.4	7.0	74.5	4.9	68.5	4.0	60.1
8	15.0	76.3	8.8	79.9	9.2	83.7	9.5	80.4	7.0	74.5	4.9	68.5	3.9	60.2
10	12.2	74.4	8.8	79.9	9.3	83.6	9.5	80.4	7.0	74.4	4.8	68.4	3.9	60.2
12	10.4	73.9	8.7	79.9	9.3	83.6	8.9	80.2	7.0	74.5	4.8	68.4	3.9	60.2
14	7.4	71.2	8.4	79.8	4.2	82.7	8.9	80.1	7.0	74.5	4.8	68.4	3.9	60.2
16	3.5	66.9	8.1	79.6	1.5	80.9	7.6	79.6	7.0	74.5	4.8	68.4	3.9	60.2
18	2.8	64.8	2.8	77.6	0.6	79.8	6.2	79.2	7.1	74.5	4.8	68.4	3.9	60.3
20	3.1	62.2	1.3	73.1	0.3	78.0	3.7	78.6	7.1	74.6	4.8	68.4	3.9	60.3
22	3.1	60.9	0.7	70.3	0.4	76.9	1.6	78.0	7.2	74.6	4.8	68.4	3.9	60.3
24	3.2	60.2	0.2	66.6	0.5	76.2	0.3	77.3	7.2	74.6	4.8	68.4	3.9	60.3
26	3.5	59.9	0.1	64.4	0.8	75.4	0.2	76.5	7.3	74.6	4.8	68.4	3.9	60.3
28	3.7	59.9	0.1	62.6	0.4	74.6	0.2	75.7	7.3	74.6	4.8	68.4	3.9	60.3
30	3.7	59.6	0.1	61.2	0.2	74.1	0.2	76.1	7.3	74.6	4.8	68.4	3.9	60.3
35	3.7	59.4	0.4	60.3	0.1	73.0	0.1	74.0	6.8	74.5	4.8	68.4	3.9	60.3
40	3.6	59.0	1.2	59.4	0.1	72.2	0.1	72.9	0.4	73.0	4.8	68.4	3.9	60.3
45	3.7	58.7	1.5	59.1	0.1	71.7	0.1	72.1	0.3	72.0	4.8	68.3	3.9	60.3
50	3.7	58.6	1.8	58.5	0.2	71.1	0.1	71.5	0.2	71.5	4.8	68.3	3.9	60.3
55	3.9	58.5	2.1	58.6	0.2	70.8	0.1	71.1	0.2	71.0	4.8	68.3	3.9	60.3
60	3.9	58.3	2.4	58.6	0.1	70.5	0.1	70.7	0.2	70.6	4.8	68.3	3.8	60.3
65	4.1	58.2	2.5	58.4	0.1	70.1	0.1	70.3	0.2	70.1	4.8	68.3	3.8	60.3
70	4.2	58.0	2.7	58.1	0.6	69.1	0.1	69.7	0.2	69.5	4.9	68.3	3.8	60.3
75	4.5	57.8	3.0	58.0	0.1	66.4	0.1	68.7	0.2	68.1	4.8	68.3	3.8	60.3
80	4.8	57.6	3.0	57.8	0.1	63.3	0.1	65.8	0.1	66.1	4.8	68.2	3.8	60.3
85	4.8	57.4	3.3	57.6	0.1	61.3	0.1	64.1	0.1	64.2	2.8	67.4	3.8	60.3
90	4.9	57.2	3.5	57.3	0.1	60.5	0.1	62.1	0.1	61.8	1.1	66.6	3.9	60.3
95	4.8	56.9	3.6	57.1	0.1	60.0	0.1	60.9	0.1	60.8	0.3	65.0	3.9	60.3
100	4.9	56.7	3.6	56.8	0.1	59.5	0.1	59.9	0.1	59.8	0.1	63.8	3.9	60.3
110	5.2	56.1	3.9	56.3	0.3	59.0	0.1	59.3	0.1	59.2	0.1	61.1	4.5	60.1
120	5.4	55.2	4.1	55.4	0.7	58.6	0.1	58.8	0.1	58.7	0.1	60.2	5.5	59.1
130	5.7	54.1	4.5	54.3	1.3	58.2	0.1	58.4	0.1	58.4	0.1	59.2	2.3	58.3
140	5.9	52.9	4.7	53.2	0.4	58.1	0.1	58.2	0.1	58.1	0.1	58.8	0.6	56.6
150	5.6	51.7	4.5	51.9	0.4	57.8	0.1	58.0	0.1	57.8	0.1	58.4	3.3	55.5
160	4.6	50.0	4.3	50.3	0.1	57.4	0.0	57.6	0.1	57.5	0.1	57.8	4.1	54.5

Table 8. Dissolved oxygen (ppm) and temperatures (°F) collected near Gwinn Island Marina at Herrington Lake (mid lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 29		June 30		August 3		September 1		September 30		October 21		December 3	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	16.1	76.2	8.9	80.7	11.6	84.0	10.8	81.0	4.9	74.2	3.3	69.1	6.0	58.7
2	16.1	76.1	8.8	80.3	11.6	84.0	11.0	80.7	5.0	74.2	3.1	68.9	5.9	58.9
4	16.2	75.9	8.7	80.2	11.7	84.0	11.4	80.2	5.0	74.3	2.8	68.4	5.9	58.9
6	16.1	75.7	8.3	80.0	11.5	83.8	11.1	80.0	4.9	74.3	2.7	68.3	5.7	58.6
8	11.9	74.7	8.3	80.0	11.3	83.8	10.4	79.9	4.9	74.3	2.7	68.2	5.6	58.6
10	9.4	73.8	7.7	79.8	11.2	83.8	9.1	79.7	4.8	74.4	2.7	68.2	5.5	58.6
12	2.0	70.3	4.8	78.9	10.5	83.7	7.3	79.4	4.8	74.4	2.6	68.2	5.5	58.6
14	0.5	68.5	0.6	77.6	1.3	81.4	4.2	79.1	4.8	74.4	2.6	68.2	5.5	58.6
16	0.3	66.8	0.2	76.2	0.4	80.0	3.2	79.0	4.8	74.4	2.6	68.2	5.5	58.6
18	0.2	65.1	0.2	73.6	0.3	78.5	2.0	78.7	4.8	74.4	2.6	68.2	5.5	58.6
20	0.4	63.4	0.2	70.2	0.2	77.2	1.2	78.5	4.8	74.4	2.6	68.1	5.5	58.6
22	1.9	61.5	0.2	68.1	0.2	76.6	0.3	78.3	4.7	74.4	2.6	68.1	5.5	58.6
24	2.5	60.8	0.2	65.7	0.2	75.7	0.2	77.6	4.5	74.4	2.6	68.1	5.5	58.6
26	2.7	60.5	0.1	63.6	0.2	75.1	0.2	76.5	4.3	74.4	2.6	68.1	5.5	58.6
28	3.0	60.0	0.1	62.1	0.2	74.3	0.2	75.7	4.1	74.4	2.6	68.1	5.5	58.6
30	3.0	59.9	0.1	61.1	0.2	73.9	0.2	75.2	3.8	74.3	2.6	68.1	5.5	58.6
35	3.0	59.6	0.7	59.9	0.6	72.6	0.2	73.8	0.2	73.8	2.6	68.1	5.5	58.6
40	3.3	59.2	1.0	59.2	1.2	71.8	0.2	73.0	0.2	72.8	2.6	68.1	5.6	58.2
45	3.5	58.9	1.3	59.0	1.2	71.3	0.1	72.3	0.2	72.6	2.6	68.1	6.1	56.8
50	3.8	58.6	1.7	58.6	1.2	71.0	0.1	71.5	0.2	71.4	2.5	68.1	6.2	56.2
55	3.8	58.5	2.0	58.4	1.1	70.6	0.1	71.0	0.25	70.8	2.5	68.1	6.2	55.9
60	3.8	58.4	2.0	58.3	0.5	70.2	0.1	70.6	0.14	70.3	2.4	68.0	6.2	55.5
65	3.7	58.4	1.3	58.3	0.2	69.8	0.1	70.2	0.1	70.0	2.0	67.9	6.2	55.4
70	3.4	58.4	0.8	58.2	0.1	69.1	0.1	69.6	0.1	69.8	1.1	67.7		
75	2.8	58.3	0.4	58.2	0.1	67.9	0.1	68.4	0.1	69.8				
80	2.7	58.3	0.2	58.1	0.1	65.2	0.1	66.5	0.1	69.9				
85	2.7	58.3	0.1	58.1	0.1	62.8	0.1	65.7	0.1	69.9				
90	2.7	58.3	0.1	58.2	0.1	62.7	0.1	65.6	0.1	69.9				
95	2.7	58.3	0.1	58.2	0.1	62.6	0.1	65.5	0.1	69.8				
100	2.7	58.3	0.1	58.2			0.1	65.4	0.1	69.8				
110	2.7	58.3	0.1	58.1			0.1	65.3	0.1	69.8				
120	2.7	58.3	0.1	58.1			0.1	65.1	0.1	69.8				
130	2.7	58.3	0.1	58.1			0.1	65.0						
140	2.7	58.3	0.1	58.1			0.1	65.0						
150	2.7	58.3	0.1	58.1			0.1	65.0						
160	2.6	58.3	0.1	58.1			0.1	64.9						

Table 9. Dissolved oxygen (ppm) and temperatures (°F) collected near Kings Mill Marina at Herrington Lake (upper lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 29		June 30		August 3		September 1		September 30		October 21		December 3	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	14.5	75.9	11.8	81.8	11.4	84.0	11.2	81.1	4.7	73.8	4.9	68.2	10.3	52.3
2	14.5	75.8	12.0	81.7	11.5	84.1	11.3	81.0	4.7	73.8	4.8	68.1	10.2	52.3
4	14.5	75.6	10.2	80.7	11.3	83.9	10.5	80.4	4.7	73.9	4.7	67.8	10.2	52.3
6	12.8	75.1	8.9	80.4	10.3	83.6	9.7	80.0	4.6	74.0	4.1	67.2	10.2	52.3
8	8.2	74.1	8.4	80.3	9.0	83.4	4.4	79.4	4.6	74.0	3.9	67.0	10.2	52.3
10	5.0	72.9	4.7	79.0	3.6	82.3	2.8	79.2	4.6	74.0	3.6	66.9	10.1	52.3
12	1.9	70.6	2.4	77.4	2.6	81.6	1.5	78.9	4.6	74.0	3.3	66.8	10.1	52.3
14	0.6	68.7	0.8	75.4	1.8	80.9	0.9	78.7	4.6	74.0	3.3	66.8	10.1	52.3
16	0.2	67.6	0.3	73.7	1.5	80.2	0.5	78.5	4.6	74.0	3.5	66.6	10.1	52.3
18	0.2	66.2	0.2	71.7	0.9	78.7	0.5	78.4	4.5	74.0	3.6	66.5	10.1	52.3
20	0.2	65.1	0.2	67.4	0.4	77.6	0.3	78.2	4.5	74.0	4.1	66.0	10.1	52.3
22	0.1	63.7	0.1	64.0	0.2	76.8	0.2	77.9	4.5	74.0	4.5	65.4	10.1	52.3
24	0.1	63.2	0.1	63.0	0.2	76.0	0.2	77.5	4.6	74.0	4.9	64.2		
26	0.1	62.6	0.1	62.5	0.2	75.3	0.2	77.1	4.0	74.0	4.8	63.7		
28	0.1	62.0	0.1	61.9	0.2	74.9	0.1	76.5	3.4	73.8	4.7	63.6		
30	0.1	61.6	0.1	61.6	0.2	74.3	0.2	75.9	1.5	72.6				
35			0.1	61.2	0.2	74.0	0.1	74.5						

Table 10. Dissolved oxygen (ppm) and temperatures (°F) collected at the mouth of Cane Run at Herrington Lake (lower lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 7		July 5		August 9		September 7		October 5		November 14	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	15.0	59.4	10.3	68.3	12.1	77.4	9.9	82.3	8.3	79.8	6.2	75.4	7.8	74.0	5.2	62.7
2	15.0	59.4	10.5	68.3	12.1	77.5	9.5	82.1	8.3	77.8	6.1	75.5	7.8	74.0	5.2	62.9
4	15.0	59.1	10.5	68.3	12.1	77.5	9.7	81.9	8.3	79.8	6.1	75.6	7.8	73.9	5.2	63.0
6	15.1	58.9	10.5	68.3	12.2	77.5	9.5	81.6	8.3	79.7	6.1	75.6	7.8	73.9	5.2	63.0
8	15.0	58.2	10.6	68.2	12.2	77.5	9.4	81.4	8.3	79.7	6.0	75.6	7.8	73.8	5.1	63.0
10	14.8	57.9	10.6	68.2	12.2	77.4	9.3	81.3	8.4	79.7	6.0	75.6	7.8	73.7	5.1	63.1
12	14.7	57.7	10.6	68.2	11.9	77.2	9.1	81.3	8.4	79.7	6.0	75.6	7.9	73.7	5.1	63.1
14	14.5	57.6	10.6	68.2	5.8	72.9	7.5	80.3	8.4	79.7	5.9	75.6	7.9	73.7	5.1	63.1
16	14.4	57.4	10.6	68.2	3.5	71.6	3.8	78.0	7.5	79.6	5.9	75.6	8.0	73.6	5.1	63.1
18	14.4	57.4	10.4	68.1	1.1	69.2	2.3	76.8	4.3	79.0	5.9	75.6	8.0	73.6	5.1	63.1
20	14.4	57.4	10.3	68.1	0.8	68.3	1.2	75.3	2.6	78.7	5.9	75.6	7.3	73.6	5.0	63.1
22	14.4	57.4	8.9	66.8	0.7	67.2	0.3	73.9	0.9	77.7	5.8	75.6	6.5	73.5	5.0	63.1
24	14.3	57.2	8.1	65.0	0.7	66.4	0.2	72.1	0.3	76.4	5.8	75.6	5.5	73.4	5.0	63.1
26	14.2	57.1	6.5	61.4	0.7	65.9	0.2	70.2	0.2	74.9	5.6	75.6	4.9	73.4	5.0	63.1
28	13.8	56.7	6.6	59.8	0.6	65.1	0.2	68.9	0.2	74.3	5.6	75.6	4.5	73.4	5.0	63.2
30	13.0	55.7	6.9	59.1	0.6	64.3	0.2	68.1	0.2	73.9	5.0	75.5	2.9	73.2	5.0	63.2
35	12.1	54.3	7.1	57.9	0.6	62.9	0.2	66.3	0.2	72.9	4.1	74.8	1.2	72.9	5.0	63.2
40	10.7	52.1	7.3	57.2	1.1	60.8	0.2	64.4	0.2	69.8	1.3	73.8	0.3	72.4	5.0	63.2
45	10.5	51.4	7.5	56.2	2.4	58.8	0.1	62.7	0.1	67.0	0.2	72.4	0.2	71.5	5.0	63.2
50	10.3	51.1	7.5	55.1	3.5	57.4	0.1	61.0	0.1	64.8	0.4	71.1	0.2	70.5	4.9	63.2
55	10.1	50.8	7.5	53.5	4.1	56.6	0.2	58.8	0.1	63.4	0.2	69.8	0.2	69.6	4.9	63.2
60	9.9	50.6	7.7	52.3	4.9	55.5	1.4	57.5	0.1	61.8	0.2	68.3	0.1	69.0	4.9	63.2
65	9.8	50.4	8.1	51.4	5.2	54.3	2.6	56.3	0.1	60.2	0.1	66.1	0.1	68.2	4.9	63.2
70	9.5	50.3	8.1	51.1	6.1	53.1	3.5	55.3	0.1	58.8	0.1	64.6	0.1	66.7	4.9	63.2
75	9.5	50.2	8.0	50.8	6.5	55.1	4.1	54.3	0.1	57.6	0.1	63.1	0.1	64.6	4.9	63.2
80	9.3	50.1	7.8	50.6	6.5	54.5	4.8	53.2	0.2	56.2	0.1	61.7	0.1	62.7	4.9	63.2
85	9.2	50.1	7.7	50.5	6.5	51.2	5.4	52.4	2.4	55.2	0.1	60.4	0.1	61.5	4.8	63.2
90	9.1	50.1	7.8	50.4	6.6	50.8	5.9	51.4	3.4	53.8	0.1	59.2	0.1	60.1	4.9	63.2
95	9.0	50.1	7.8	50.3	6.6	50.6	6.0	50.9	3.8	53.0	0.1	58.1	0.1	59.0	4.9	63.2
100	8.9	50.1	7.7	50.2	6.7	50.5	6.0	50.8	4.9	52.4	0.1	56.8	0.1	57.8	4.9	63.1
110	8.0	49.8	7.4	50.0	6.6	50.4	5.9	50.5	4.4	51.3	0.2	55.2	0.1	56.5	3.1	62.0
120	7.4	49.5	6.9	49.8	6.6	50.1	6.0	50.3	4.6	50.8	1.9	53.8	0.2	54.6	0.2	61.2
130	6.9	49.1	6.9	49.5	6.3	49.9	6.0	50.1	4.9	50.4	3.4	52.5	1.2	53.5	0.5	60.1
140	6.6	48.9	5.6	49.2	5.9	49.7	5.8	49.9	4.6	50.2	3.8	51.4	2.1	52.3	0.6	59.2
150	6.2	48.6	4.5	49.0	5.0	49.5	5.1	49.6	3.7	50.0	3.7	50.7	1.8	51.3	0.2	58.4
160	5.8	48.1	3.3	48.7	3.8	49.0	3.8	49.4	2.0	49.9	3.1	50.4	0.7	50.9	0.2	57.8

Table 11. Dissolved oxygen (ppm) and temperatures (°F) collected near Gwinn Island Marina at Herrington Lake (mid lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 7		July 5		August 9		September 7		October 5		November 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	7.7	59.7	9.7	67.0	13.4	78.0	9.9	81.2	8.9	81.2	6.8	75.6	8.2	74.4	2.8	61.4
2	7.8	59.5	9.7	66.9	13.5	78.1	9.9	81.3	8.9	80.6	6.6	75.7	8.2	74.2	2.7	61.5
4	7.8	59.2	9.5	66.7	13.8	78.1	9.9	81.3	8.9	80.7	6.6	75.7	7.9	73.7	2.7	61.6
6	7.7	59.0	9.4	66.6	14.0	78.0	10.1	81.2	8.6	80.2	6.2	75.7	7.8	73.5	2.6	61.6
8	7.7	59.0	9.3	66.6	14.0	78.0	10.2	81.2	8.2	80.0	5.6	75.5	7.9	73.5	2.6	61.7
10	7.8	58.8	9.0	66.3	13.7	77.9	10.0	81.2	8.1	79.9	5.4	75.5	7.9	73.5	2.6	61.7
12	7.6	58.5	8.8	66.1	11.9	77.7	6.4	80.3	8.1	79.9	5.0	75.3	7.8	73.5	2.6	61.7
14	7.4	58.1	8.8	66.1	4.8	74.9	2.0	79.1	8.0	79.8	5.0	75.3	7.8	73.5	2.5	61.7
16	7.3	57.7	8.9	65.7	1.0	72.6	0.8	78.2	8.0	79.8	5.0	75.3	7.6	73.4	2.5	61.8
18	7.3	56.5	7.6	64.7	1.9	70.8	0.4	77.2	7.3	79.7	5.0	75.3	7.0	73.4	2.5	61.8
20	7.3	56.0	4.4	62.4	2.3	69.6	0.3	76.5	6.0	79.6	5.1	75.2	6.4	73.4	2.5	61.8
22	7.3	55.8	3.6	61.9	2.0	68.6	0.2	75.1	3.0	78.8	5.0	75.2	5.8	73.4	2.5	61.8
24	7.4	55.0	3.1	61.0	1.0	67.4	0.2	73.8	0.3	76.8	4.9	75.2	3.4	73.3	2.5	61.8
26	7.8	54.5	3.0	60.6	0.4	66.6	0.2	73.0	0.2	75.7	4.4	75.2	0.7	73.1	2.4	61.8
28	8.2	52.6	3.0	60.2	0.2	66.6	0.1	71.3	0.2	74.7	3.8	74.6	0.6	72.9	2.4	61.8
30	8.3	52.2	3.1	59.1	0.2	65.1	0.1	70.0	0.2	74.2	2.1	74.4	0.5	72.8	2.4	61.8
35	8.3	51.1	3.4	58.2	0.2	63.5	0.1	67.0	0.2	74.0	5.6	74.0	0.6	72.5	2.4	61.9
40	8.3	50.7	3.7	57.3	0.1	61.6	0.1	64.6	0.2	72.3	6.7	73.4	1.0	72.0	2.4	61.9
45	8.1	50.5	4.1	56.5	0.1	60.0	0.1	62.6	0.2	69.7	4.7	71.8	0.6	71.0	2.3	61.9
50	8.0	50.4	4.4	55.5	0.4	58.3	0.1	62.0	0.2	67.1	5.9	70.4	0.2	70.3	2.3	61.9
55	8.0	50.3	5.3	54.2	1.5	56.5	0.1	59.2	0.1	65.4	3.8	69.2	0.2	69.7	2.3	61.9
60	7.8	50.2	6.1	52.2	2.0	55.7	0.1	57.3	0.1	63.4	3.5	68.6	0.2	69.2	2.3	61.9
65	7.7	50.1	5.8	51.2	2.7	54.5	0.4	56.1	0.1	61.3	2.4	68.1	0.2	68.5	2.3	61.9
70	7.6	50.0	5.7	50.9	2.9	53.7	0.8	55.0	0.1	59.9	0.2	65.9	0.2	66.7	2.3	61.9
75	7.3	49.9	5.7	50.7	1.7	52.2	0.7	53.8	0.1	58.8	0.2	63.4	0.2	65.4	2.3	61.9
80	7.4	49.8	5.8	50.5	1.1	51.5	0.2	52.9	0.1	57.7	0.2	61.7	0.1	63.4	2.3	61.9
85	6.8	49.7	5.6	50.4	1.2	51.1	0.1	52.1	0.1	56.6	0.2	60.2	0.1	62.0	2.3	61.9
90	6.6	49.6	5.3	50.3	1.5	50.8	0.1	51.6	0.1	55.5	0.1	58.9	0.1	60.4	2.3	61.9
95	6.3	49.9	4.0	50.1	1.1	50.6	0.1	51.2	0.1	53.7	0.1	58.0	0.1	59.6	2.3	61.9
100			2.9	50.1	0.6	50.4	0.1	51.0	0.1	53.1	0.1	57.5	0.1	58.8	2.2	61.9
110					0.2	50.3	0.1	50.8	0.1	52.4	0.1	55.7			2.1	61.9

Table 12. Dissolved oxygen (ppm) and temperatures (°F) collected near Kings Mill Marina at Herrington Lake (upper lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 7		July 5		August 9		September 7		October 5		November 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	9.6	60.4	11.7	69.1	12.1	76.9	10.7	81.5	7.1	80.6	10.3	76.1	10.2	75.5	6.2	56.7
2	9.7	60.0	11.7	69.1	12.1	77.0	10.6	81.1	7.2	80.5	10.1	76.7	9.8	74.5	6.1	56.8
4	9.7	57.8	11.2	68.8	12.1	77.1	10.1	81.0	7.1	79.8	9.9	76.3	9.0	74.1	6.1	56.9
6	9.6	57.4	10.8	68.2	12.0	77.1	9.4	80.9	6.9	79.5	7.8	75.4	7.9	73.8	6.1	56.9
8	9.6	57.1	10.1	68.1	11.3	76.8	7.7	80.2	6.1	79.2	7.3	75.3	6.4	73.7	6.1	56.9
10	9.5	56.9	8.9	67.9	10.9	76.8	6.7	79.7	5.7	79.0	7.1	75.3	5.0	73.6	6.1	56.9
12	9.5	56.7	8.3	67.5	4.9	73.8	5.9	78.3	5.4	78.9	7.0	75.3	4.5	73.5	6.1	56.9
14	9.4	56.6	8.0	67.3	3.5	72.1	5.5	77.3	5.3	78.8	7.0	75.3	4.1	73.5	6.0	56.4
16	9.4	56.5	7.8	67.1	2.7	70.9	5.2	76.8	5.3	78.8	7.0	75.2	3.6	73.4	8.6	49.6
18	9.3	56.4	7.6	67.0	1.9	69.9	4.6	76.2	5.2	78.8	7.0	75.2	3.4	73.4	9.2	47.9
20	9.1	56.1	6.9	66.7	1.4	69.2	4.2	75.5	5.1	78.8	7.2	74.8	3.3	73.3	9.2	47.9
22	9.0	56.0	7.0	66.6	1.1	69.0	3.8	74.7	5.0	78.7	7.2	74.7	3.0	73.3	6.2	56.7
24	8.9	55.9	1.7	60.5	0.3	68.3	3.7	74.4	2.2	78.1	7.2	74.3	2.9	73.2		
26	8.4	55.7	1.7	58.9	0.2	67.7	3.5	74.1	0.4	76.9	7.3	73.5	3.0	73.2		
28			1.5	58.3	0.2	67.3	3.4	73.9	0.3	75.8	6.9	71.4	3.3	73.0		
30			1.1	58.0	0.2	66.7	2.9	73.5	0.2	75.0	6.0	69.7	3.1	72.9		
35					0.2	66.4	0.7	68.6	0.2	74.3	5.9	69.3				

Table 13. Dissolved oxygen (ppm) and temperatures (°F) collected at the mouth of Cane Run at Herrington Lake (lower lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 16		June 12		July 15		August 13		September 16		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	14.9	69.7	11.9	76.7	13.2	88.0	10.6	83.9	11.4	81.7	7.5	70.6
2	15.0	69.1	12.0	77.2	10.2	88.3	10.6	83.9	11.4	81.7	7.5	71.1
4	14.2	68.4	12.2	77.2	10.2	88.1	10.6	84.0	11.5	81.7	7.6	71.1
6	14.2	68.1	12.0	77.1	10.2	87.6	10.7	83.9	11.8	81.3	7.5	71.1
8	14.9	68.0	11.3	76.9	10.3	87.0	10.6	83.9	11.7	81.0	7.4	71.2
10	14.8	67.8	10.4	76.8	10.2	86.6	10.6	83.8	11.5	80.9	7.4	71.2
12	14.9	67.6	10.2	76.6	9.2	85.6	10.6	83.8	11.3	80.8	7.4	71.2
14	14.7	67.5	8.5	75.7	2.7	82.2	10.6	83.7	11.2	80.7	7.3	71.2
16	12.4	67.4	5.6	74.8	0.9	79.3	4.8	82.3	11.1	80.7	7.3	71.2
18	11.5	66.8	3.3	73.7	0.4	77.6	1.5	81.1	6.5	80.2	7.2	71.2
20	9.3	65.8	2.5	73.4	0.4	76.7	0.2	79.6	3.0	79.5	7.2	71.2
22	7.7	64.2	0.4	72.1	0.3	75.3	0.1	78.4	1.6	78.9	7.1	71.2
24	7.7	63.2	0.3	71.5	0.3	74.6	0.1	76.7	0.4	78.2	7.1	71.3
26	7.7	62.1	0.3	71.0	0.3	73.8	0.1	75.7	0.2	76.8	7.1	71.3
28	7.7	60.8	0.2	70.2	0.3	73.1	0.1	74.7	0.2	75.6	7.1	71.3
30	7.8	60.3	0.2	69.4	0.3	72.6	0.1	73.7	0.1	74.0	7.1	71.3
35	7.2	58.6	1.0	67.8	0.3	71.6	0.1	72.2	0.1	72.6	7.1	71.2
40	6.8	57.3	1.9	66.2	0.2	71.0	0.0	71.3	0.1	71.7	6.1	71.1
45	6.6	55.8	2.0	64.0	0.2	70.3	0.0	70.7	0.1	70.8	1.1	70.5
50	7.4	54.5	3.1	61.9	0.2	69.8	0.0	69.9	0.1	70.0	0.4	69.6
55	7.6	52.8	3.9	59.7	0.2	69.4	0.0	69.3	0.1	69.4	0.2	68.9
60	9.3	51.4	4.2	58.5	0.2	69.0	0.0	68.9	0.1	68.9	0.2	68.4
65	8.6	50.6	4.5	56.6	0.2	68.6	0.0	68.3	0.1	68.3	0.1	67.9
70	8.2	49.9	4.6	56.0	0.2	67.9	0.0	67.7	0.1	67.7	0.1	66.7
75	7.9	49.3	4.9	54.7	0.2	66.5	0.0	66.6	0.0	66.9	0.1	64.3
80	7.9	48.8	5.5	53.4	0.2	65.3	0.0	64.8	0.0	64.9	0.1	63.9
85	7.8	48.6	5.9	52.3	0.2	62.5	0.0	62.2	0.0	62.8	0.1	62.1
90	7.8	48.4	6.7	51.1	0.2	60.8	0.0	60.2	0.0	61.2	0.0	60.8
95	7.8	48.2	6.7	50.2	2.1	59.0	0.0	58.8	0.0	59.5	0.0	58.9
100	7.8	47.8	6.7	49.7	2.5	57.7	0.0	57.6	0.0	58.2	0.0	58.0
110	7.9	47.6	6.7	49.2	2.9	55.9	1.5	55.7	0.0	56.4	0.0	56.4
120	4.4	47.6	6.4	48.7	3.3	54.6	2.4	54.3	0.0	54.7	0.0	54.7
130	3.6	47.6	6.8	48.1	3.3	54.2	2.9	52.5	1.2	53.3	0.0	53.2
140	3.4	47.6	6.9	47.6	3.2	54.1	2.6	51.1	1.2	51.7	0.0	51.5
150	3.3	47.6	5.5	47.3	3.1	54.1	1.7	50.1	1.0	50.4	0.0	50.8
160	3.2	47.5	5.3	46.4	3.0	54.1	0.8	49.5	0.3	49.6	0.0	49.8

Table 14. Dissolved oxygen (ppm) and temperatures (°F) collected near Gwinn Island Marina at Herrington Lake (mid lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 16		June 12		July 15		August 13		September 16		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	11.8	69.7	18.6	76.1	12.5	87.5	10.6	83.2	10.3	82.1	6.3	69.8
2	12.0	69.8	18.4	76.3	12.6	87.6	10.6	83.4	10.5	81.9	6.2	70.5
4	12.2	68.9	16.6	76.4	12.8	87.5	10.6	83.5	10.7	81.7	6.3	70.6
6	12.1	68.5	11.7	76.2	13.2	86.7	10.6	83.5	10.7	81.5	6.1	70.7
8	11.8	68.2	10.9	76.1	13.3	86.4	10.4	83.6	10.8	81.3	6.0	70.8
10	11.2	68.1	10.2	75.9	5.4	84.1	10.2	83.6	9.7	81.0	6.0	70.8
12	10.6	67.9	8.3	75.1	2.8	83.2	9.2	83.6	8.9	80.7	6.0	70.8
14	9.4	67.7	5.8	73.0	0.8	81.1	0.9	82.8	8.4	80.6	6.0	70.9
16	8.3	67.4	5.4	71.1	0.5	79.0	0.2	81.8	8.4	80.5	6.0	70.9
18	7.8	67.1	5.6	70.5	0.4	77.8	0.2	79.5	8.3	80.5	5.9	70.9
20	5.9	66.8	5.6	69.9	0.3	76.9	0.1	78.3	3.5	80.1	5.8	70.9
22	3.7	65.5	5.5	69.6	0.3	75.7	0.1	76.6	0.4	79.6	8.8	70.9
24	3.8	62.8	5.6	69.4	0.3	74.7	0.1	75.7	0.2	78.6	8.7	70.9
26	3.2	61.7	5.7	69.3	0.3	73.7	0.1	74.6	0.2	78.2	5.7	70.9
28	2.7	60.7	5.7	69.2	0.3	73.0	0.1	73.8	0.2	75.8	5.6	70.9
30	2.7	59.8	5.6	69.1	0.3	72.4	0.1	73.0	0.2	74.8	5.6	70.9
35	3.2	58.7	5.4	68.8	1.0	71.7	0.1	71.9	0.1	73.3	5.6	70.9
40	4.0	56.8	5.2	68.5	1.3	71.0	0.1	71.0	0.1	71.8	5.6	70.9
45	4.1	55.7	5.3	68.5	1.4	70.6	0.0	70.4	0.1	71.0	0.3	70.6
50	3.8	54.8	0.5	61.5	1.2	70.2	0.0	69.8	0.1	70.0	0.2	69.6
55	3.7	53.4	1.1	59.2	0.7	69.6	0.0	69.3	0.1	69.6	0.2	69.1
60	4.4	51.8	1.4	57.6	0.5	69.1	0.0	68.8	0.1	69.1	0.1	68.7
65	3.8	51.3	1.6	55.9	0.3	68.5	0.0	68.4	0.1	68.7	0.1	68.1
70	3.1	50.8	1.2	54.7	0.3	67.8	0.0	67.7	0.1	68.1	0.1	67.7
75	1.8	50.1	0.6	53.5	0.2	66.2	0.0	67.0	0.1	67.2	0.1	67.0
80	1.1	49.7	0.2	52.1	0.2	64.3	0.0	64.9	0.1	65.5	0.1	64.8
85	0.4	49.3	0.2	51.5	0.2	62.4	0.0	63.0	0.0	63.3	0.1	62.9
90	0.0	48.8	0.2	50.9	0.2	60.8	0.0	61.0	0.0	61.6	0.0	61.4
95	0.0	48.7	0.0	50.4	0.2	59.5	0.0	60.0	0.0	60.3	0.0	60.2
100	0.0	48.6	0.1	49.8			0.0	59.0	0.0	59.2	0.0	58.7
110							0.0	57.9			0.0	58.5

Table 15. Dissolved oxygen (ppm) and temperatures (°F) collected near Kings Mill Marina at Herrington Lake (upper lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 16		June 12		July 15		August 13		September 16		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	14.7	70.4	14.1	73.0	19.0	90.2	13.7	83.5	6.4	82.3	7.3	70.1
2	13.3	69.5	12.2	73.1	19.4	90.1	13.6	83.6	6.3	82.7	7.1	70.4
4	11.1	68.9	13.5	72.8	22.4	88.7	13.5	83.7	6.2	81.4	7.1	70.5
6	10.3	68.7	11.0	72.4	9.6	87.7	13.5	83.7	4.9	80.9	7.0	70.6
8	9.7	68.5	11.3	72.2	4.5	86.0	12.4	83.8	4.4	80.4	6.8	70.6
10	4.6	67.7	10.3	72.1	2.4	84.2	5.7	83.4	3.5	80.2	6.6	70.6
12	3.9	67.3	10.0	71.9	1.3	83.1	4.6	83.3	3.3	80.1	6.3	70.6
14	3.5	67.1	8.8	71.4	0.5	80.7	0.6	82.8	3.1	80.0	6.2	70.6
16	2.3	66.6	8.3	71.1	0.4	78.7	0.2	81.6	3.0	80.0	6.1	70.6
18	1.8	66.3	6.8	70.6	0.3	76.3	0.2	80.1	2.9	80.0	6.1	70.6
20	1.5	66.1	6.5	70.1	0.3	75.3	0.1	78.4	2.8	80.0	6.0	70.6
22			6.2	69.7	0.3	74.4	0.1	76.2	1.7	79.9	6.0	70.7
24			6.0	69.4	0.3	73.5	0.1	75.1	0.4	79.7	6.0	70.7
26			5.9	69.3	0.3	73.0	0.1	73.9	0.3	78.8	6.1	70.6
28			5.6	68.9	0.3	72.8	0.1	73.4	0.3	77.3	6.1	70.6
30			4.9	68.8			0.1	72.8				

Table 16. Dissolved oxygen (ppm) and temperatures (°F) collected from the mouth of Ashes and Jack's Creek at Taylorsville Lake (lower lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen > 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 28		June 29		August 3		August 31		September 22		October 26		December 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	11.9	75.5	10.6	80.9	10.5	85.0	8.1	81.3	7.4	77.6	1.5	65.4	6.2	54.3
2	11.9	74.9	10.6	80.7	10.5	84.7	8.1	80.5	7.4	77.5	1.5	65.4	6.1	54.3
4	10.	73.8	10.5	80.6	10.5	84.9	8.0	80.8	7.2	77.1	1.5	65.4	6.1	54.3
6	9.7	73.3	9.6	80.2	9.3	84.3	7.8	80.2	7.1	76.5	1.4	65.4	5.9	54.2
8	9.2	73.1	9.2	80.1	7.2	83.8	7.1	80.0	6.1	75.9	1.4	65.4	5.7	54.2
10	9.0	72.9	6.7	79.2	5.6	83.3	6.9	79.8	5.8	75.9	1.4	65.5	5.4	54.1
12	8.4	72.8	4.3	78.5	6.5	82.0	4.1	79.5	5.6	75.8	1.6	65.5	5.3	54.1
14	6.4	72.0	0.3	76.9	0.4	80.8	2.7	79.4	5.5	75.7	1.5	65.5	5.3	54.1
16	3.9	70.8	0.2	75.7	0.3	79.8	1.9	79.2	5.4	75.7	1.7	65.5	5.3	54.1
18	2.4	69.1	0.2	74.4	0.2	78.4	1.1	79.1	5.3	75.6	1.8	65.4	5.3	54.1
20	1.6	67.8	0.2	73.5	0.2	77.3	0.4	78.8	5.6	75.6	1.8	65.4	5.3	54.1
22	1.2	65.5	0.1	71.9	0.2	76.3	0.2	78.4	5.6	75.6	1.8	65.4	5.3	54.1
24	1.5	63.0	0.1	70.4	0.2	75.7	0.2	77.8	5.5	75.6	1.8	65.5	5.2	54.1
26	1.9	61.6	0.1	68.6	0.2	74.8	0.2	76.8	5.5	75.5	1.8	65.5	5.3	54.1
28	1.9	61.0	0.1	66.3	0.2	74.3	0.1	75.2	4.9	75.3	1.8	65.4	5.8	54.0
30	1.2	60.5	0.1	63.7	0.2	73.8	0.1	74.3	2.0	74.1	1.9	65.4	7.1	53.9
35	0.8	59.0	0.1	60.7	0.2	72.8	0.1	72.5	0.3	72.1	1.9	65.4	6.2	53.6
40	0.2	59.5	0.1	59.5	0.2	72.0	0.1	71.2	0.2	70.8	2.0	65.4	4.6	53.4
45	0.1	58.4	0.1	58.5	0.1	71.5	0.1	69.9	0.1	69.9	1.9	65.4	4.5	53.2
50	0.1	57.7	0.1	57.5	0.1	70.7	0.1	68.4	0.1	68.5	1.2	65.3	4.2	52.9
55	0.1	57.0	0.0	56.9	0.1	69.1			0.3	66.2	0.1	64.9	4.1	52.5
60					0.1	66.8					0.1	63.7	4.1	52.0

Table 17. Dissolved oxygen (ppm) and temperatures (°F) collected from Big Beech Creek, near Settler's Marina, at Taylorsville Lake (mid lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 28		June 29		August 3		August 31		September 22		October 26		December 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	11.9	75.6	9.7	81.8	9.6	85.7	9.4	81.9	3.4	75.5	4.1	65.7	6.0	54.3
2	12.1	75.2	10.0	81.2	9.2	85.2	9.3	81.4	3.6	75.4	4.0	65.7	6.0	54.3
4	10.6	74.1	9.3	80.4	9.4	84.7	8.7	80.8	3.2	75.3	4.0	65.7	6.0	54.2
6	9.7	73.9	8.9	80.1	8.8	84.4	8.0	80.6	3.2	75.3	4.0	65.7	6.0	54.2
8	9.3	73.8	8.1	80.0	8.1	84.0	8.1	80.5	3.2	75.3	4.0	65.7	5.9	54.2
10	9.2	73.8	7.6	79.9	7.0	83.6	8.1	80.4	3.2	75.3	3.9	65.7	5.9	54.1
12	9.1	73.6	7.4	79.9	9.7	83.5	7.9	80.3	3.2	75.3	3.9	65.8	5.9	54.1
14	8.5	73.2	6.6	79.7	6.2	83.4	6.8	80.2	3.2	75.3	3.9	65.8	5.8	54.1
16	7.2	72.3	1.9	78.8	0.7	81.9	5.2	80.0	3.2	75.3	3.9	65.8	5.8	54.1
18	2.6	68.1	0.2	77.5	0.4	78.5	1.1	78.8	3.2	75.3	3.9	65.8	5.7	54.1
20	1.6	65.2	0.2	77.5	0.3	76.9	0.3	78.2	3.2	75.3	3.8	65.7	5.7	54.1
22	1.6	64.1	0.2	73.3	0.2	76.4	0.2	77.4	2.5	75.3	2.2	65.7	5.7	54.0
24	2.1	62.3	0.1	71.9	0.2	75.8	0.1	76.3	1.4	75.2	2.1	65.7	5.7	54.0
26	2.1	61.6	0.1	70.4	0.2	75.5	0.1	75.5	0.4	75.1	2.1	65.7	5.2	53.9
28	1.9	60.8	0.1	67.7	0.2	74.7	0.1	74.4	0.2	75.0	1.9	65.6	5.1	53.9
30	1.8	60.6	0.1	66.1	0.2	73.9	0.1	73.9	0.1	74.4	1.4	65.5	5.2	53.8
35	1.2	60.1	0.1	61.5	0.2	73.2	0.1	72.4	0.1	72.5	0.3	65.4	5.3	53.7
40	0.2	59.3	0.1	59.8	0.2	72.4	0.1	71.4	0.1	70.9	0.2	65.3	5.5	53.3
45			0.1	58.2	0.2	71.8							5.9	52.9

Table 18. Dissolved oxygen (ppm) and temperatures (°F) collected from the Van Buren/Chowning Lane area at Taylorsville Lake (upper lake section) during 2015. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 28		June 29		August 3		August 31		September 22		October 26		December 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	10.7	76.5	12.6	81.2	11.9	86.8	11.5	82.4	11.3	77.3	8.1	64.6	9.9	53.1
2	10.4	75.3	12.7	81.2	12.1	86.5	8.7	81.3	11.1	77.1	8.0	64.7	9.8	53.1
4	8.9	74.6	12.4	80.9	12.4	86.1	5.3	80.0	10.3	75.7	7.9	64.7	9.8	53.1
6	6.0	73.9	11.2	80.7	9.0	84.1	5.7	79.6	7.4	75.0	7.9	64.7	9.8	53.1
8	3.5	73.2	10.1	80.2	8.6	83.7	2.6	79.4	6.8	74.6	7.6	64.7	9.8	53.0
10	2.5	72.6	9.3	79.9	5.3	83.3	1.5	79.2	6.8	74.4	7.2	64.6	9.8	53.0
12	1.6	72.1	7.6	79.3	1.0	82.3	1.3	79.1	6.8	74.3	7.1	64.6	9.8	52.9
14	0.5	71.4	6.9	78.7	0.5	80.9	0.6	79.0	6.3	74.2	6.9	64.5	9.7	52.8
16	0.2	70.2	4.9	77.2	0.3	79.2	0.4	78.8	3.6	73.8	6.6	64.4	9.5	52.6
18	0.2	69.5	4.4	76.5	0.3	77.6	0.3	78.8	3.0	73.3	6.2	64.4	9.5	52.6
20	0.2	68.3	3.6	75.4	0.2	76.6	0.2	78.5	2.8	72.8			9.4	52.6
22	0.1	67.1	1.0	74.1	0.2	75.7			2.4	72.4			9.2	52.2
24	0.1	64.5	0.2	70.0	0.2	75.4							8.7	51.6
26			0.2	68.9	0.2	74.8							8.4	51.1

Table 19. Dissolved oxygen (ppm) and temperatures (°F) collected from the mouth of Ashes and Jack's Creek at Taylorsville Lake (lower lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and/or dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 6		July 6		August 2		September 5		October 2		November 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	12.3	57.8	12.7	68.4	15.3	78.3	10.8	81.2	10.9	85.6	6.4	75.5	7.6	73.9	2.2	61.6
2	12.3	57.7	12.6	68.4	15.4	78.6	10.8	81.3	10.6	84.6	6.3	75.6	7.6	74.0	2.1	61.6
4	11.5	56.8	12.9	68.1	15.3	78.6	10.3	81.2	10.1	84.7	6.2	75.6	7.6	73.8	2.1	61.5
6	11.4	56.8	12.8	67.8	14.9	78.6	8.5	81.0	9.9	83.8	6.0	75.7	7.5	73.6	2.0	61.5
8	10.9	56.3	11.8	67.1	14.8	78.6	4.8	80.8	9.4	83.7	5.8	75.7	7.3	73.6	1.9	61.5
10	10.2	55.8	11.6	66.7	14.7	78.6	2.1	80.3	8.6	83.5	5.5	75.7	7.2	73.6	1.9	61.5
12	9.9	55.5	11.2	66.1	5.1	76.7	1.0	79.2	4.0	83.0	4.8	75.5	6.6	73.4	1.9	61.5
14	9.6	55.2	10.3	65.6	0.7	73.9	0.5	78.2	1.7	82.2	3.2	75.2	6.5	73.3	1.8	61.4
16	9.6	54.9	9.7	65.0	0.3	73.3	0.3	76.7	0.6	81.7	2.6	75.0	5.2	73.0	1.8	61.4
18	9.2	54.4	9.3	64.9	0.2	71.6	0.2	75.7	0.4	81.0	1.7	7.43	3.6	72.6	1.8	61.4
20	8.5	54.0	9.1	64.8	0.2	70.9	0.2	74.9	0.3	78.9	1.2	74.0	1.1	72.4	1.8	61.4
22	8.4	53.8	8.8	64.7	0.2	67.5	0.2	74.0			0.5	73.4	0.3	72.0	1.8	61.4
24	8.0	53.1	8.7	64.6	0.2	66.5	0.2	73.0			0.3	73.0	0.2	71.2	1.8	61.4
26	7.7	52.6	7.2	63.7	0.2	65.0	0.2	72.4	0.2	76.3	0.2	72.5	0.2	71.0	1.8	61.4
28	7.7	52.1	5.4	59.8	0.3	64.1	0.2	72.0			0.2	71.8	0.2	70.6	1.8	61.4
30	7.6	51.7	5.2	59.3	0.3	63.5	0.2	71.2	0.2	71.9	0.2	71.2	0.1	70	1.8	61.4
35	7.4	50.9	5.1	57.8	0.2	62.5	0.2	69.2	0.2	69.9	0.2	69.5	0.1	69.0	1.3	61.3
40	6.6	50.2					0.1	64.7	0.2	66.9	0.2	67.7	0.1	69.6	0.2	60.9
45													0.1	65.6	1.1	60.5
50															1.7	60.1
55															0.5	59.6
60															0.2	59.4

Table 20. Dissolved oxygen (ppm) and temperatures (°F) collected from Big Beech Creek, near Settler's Marina, at Taylorsville Lake (mid lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and/or dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 6		July 6		August 2		September 5		October 2		November 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	9.6	57.6	12.6	69.2	12.6	78.3	11.2	81.4	11.5	85.9	6.4	75.6	8.5	73.9	2.6	61.8
2	9.6	57.5	12.8	69.0	12.8	78.5	11.1	81.6	11.0	84.5	6.4	75.7	8.5	73.9	2.6	61.7
4	9.6	57.5	12.9	68.6	12.8	78.6	10.9	81.6	10.2	84.1	6.3	75.7	8.2	73.5	2.5	61.6
6	9.6	57.4	12.6	68.1	12.5	78.6	9.9	81.5	9.3	83.7	6.3	75.8	7.9	73.5	2.4	61.5
8	9.5	57.2	11.3	67.8	12.4	78.6	9.3	81.4	8.6	83.5	6.2	75.8	7.6	73.4	2.4	61.4
10	9.5	56.9	10.9	67.4	11.6	78.5	5.5	81.0	8.4	83.5	6.2	75.8	7.4	73.3	2.4	61.4
12	9.5	56.6	10.6	67.2	0.5	75.7	4.0	80.5	6.6	83.3	6.2	75.8	7.3	73.2	2.3	61.4
14	9.5	56.4	10.1	67.1	0.2	73.0	0.9	79.3	3.2	82.5	6.1	75.8	7.3	73.2	2.4	61.4
16	9.5	56.3	9.4	66.8	0.2	71.0	0.4	78.2	2.9	82.3	5.9	75.8	6.9	73.1	2.3	61.4
18	9.3	56.0	9.2	66.7	0.2	69.6	0.2	76.4	1.1	80.6	5.8	75.8	6.9	73.0	2.3	61.4
20	8.9	55.8	7.7	65.7	0.2	68.1	0.2	75.1	0.3	78.2	4.3	74.8	5.0	72.9	2.3	61.4
22	8.9	55.5	5.0	61.6	0.2	66.7	0.2	73.6	0.2	75.8	3.6	73.2	3.7	72.4	2.3	61.4
24	8.6	55.1	4.7	60.5	0.1	65.4	0.2	73.0	0.2	74.6	0.6	72.0	2.7	72.1	2.3	61.4
26	8.1	54.5	4.4	59.2	0.1	64.7	0.2	72.6	0.2	73.5	0.4	71.4	1.4	71.8	2.3	61.4
28	7.3	52.9	4.3	58.5	0.2	63.8	0.2	72.1	0.2	72.7	0.3	70.9	0.2	71.4	2.3	61.3
30	6.8	51.2	4.1	57.8	0.1	63.1	0.2	71.6	0.1	71.7	0.2	69.6	0.2	70.5	2.3	61.3
35	6.5	50.3	4.0	57.1	0.1	62.3	0.1	70.3	0.1	69.6	0.2	68.8	0.2	68.4	2.3	61.3
40	6.0	49.7	2.6	55.9	0.1	61.6	0.1	66.4	0.1	66.9	0.2	67.4			2.3	60.7
45											0.2	65.1				

Table 21. Dissolved oxygen (ppm) and temperatures (°F) collected from the Van Buren/Chowning Lane area at Taylorsville Lake (upper lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	April 4		May 3		June 6		July 6		August 2		September 5		October 2		November 2	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	13.6	59.6	11.7	70.2	13.4	78.8	10.1	81.1	8.5	84.2	6.8	75.4	7.4	76.4	6.9	60.6
2	13.4	59.6	12.1	68.6	13.5	78.8	10.2	81.2	8.3	84.2	6.7	75.4	7.9	75.8	6.8	60.4
4	13.2	59.6	11.3	67.9	13.3	78.7.	9.9	81.2	8.2	84.2	6.7	75.4	7.3	74.8	6.8	60.2
6	12.6	59.3	7.9	67.1	9.2	78.0	9.7	81.2	7.3	84.3	6.9	75.4	4.6	73.1	6.7	60.0
8	11.8	59.0	6.7	66.9	3.1	77.2	8.5	81.2	3.0	82.3	6.4	75.4	4.8	72.9	6.6	59.8
10	11.4	58.8	6.9	66.7	1.1	76.1	5.9	80.7	3.8	82.4	6.8	74.4	4.8	72.8	6.2	59.4
12	11.2	58.7	7.3	66.6	0.3	75.4	1.6	79.9	3.9	82.4	7.0	74.1	3.2	72.7	6.2	59.1
14	10.6	58.3	7.4	66.6	0.3	75.1	0.5	79.3	3.6	82.4	7.2	73.6	1.2	72.5	6.4	58.8
16	10.0	57.8	7.3	66.5	0.3	75.1	0.3	78.3	2.8	82.3	7.1	73.5	0.2	72.2	7.4	57.5
18	9.6	57.6	6.6	66.4	0.2	74.3	0.3	77.3	0.9	81.8	6.5	72.9	0.2	71.6	8.6	55.7
20	6.8	55.8	6.5	66.3	0.1	73.6	0.2	76.1	0.4	80.7	5.3	70.3	0.2	71.3	7.3	54.3
22							0.2	74.9			5.2	69.9	0.2	71.1	9.6	53.5
24							0.2	74.4			4.9	59.6	0.1	70.9	9.5	53.4
26							0.2	73.7			4.8	59.2	0.1	70.6	9.4	53.1
28											4.3	57.9			9.3	52.8
30															9.3	52.7

Table 22. Dissolved oxygen (ppm) and temperatures (°F) collected from the mouth of Ashes and Jack's Creek at Taylorsville Lake (lower lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 14		June 12		July 15		August 13		September 18		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	10.3	67.1	10.9	76.2	10.0	87.3	6.8	83.8	12.2	80.7	5.5	68.1
2	10.3	67.1	10.9	76.4	10.1	87.6	6.8	83.8	12.3	81.2	5.5	68.6
4	10.3	66.7	10.2	76.4	10.2	87.5	6.8	83.9	12.4	81.2	5.5	68.7
6	10.3	66.6	9.9	76.4	10.1	87.3	6.0	83.5	12.2	81.3	5.5	68.8
8	9.9	66.5	8.6	76.4	7.4	86.5	5.5	83.3	12.0	81.3	5.5	68.8
10	9.2	66.2	7.4	76.4	0.7	85.2	5.8	83.3	11.7	81.3	5.7	68.9
12	9.0	66.0	7.6	76.4	0.3	81.8	5.2	83.2	11.6	81.3	5.7	69.0
14	4.3	65.5	8.9	76.3	0.1	80.6	0.5	82.4	10.4	81.2	5.6	69.0
16	4.6	64.0	6.7	75.6	0.1	78.4	0.3	81.5	2.8	80.5	5.5	69.1
18	4.7	63.5	5.7	74.0	0.1	76.6	0.3	80.0	1.0	80.2	5.4	69.1
20	5.1	62.7	4.6	71.8	0.1	75.2	0.3	78.1	0.3	79.3	5.3	69.1
22	5.6	62.2	3.9	70.8	0.1	73.7	0.2	76.0	0.2	78.4	5.2	69.1
24	5.8	61.6	1.5	69.0	0.1	72.8	0.2	73.7	0.1	77.1	5.2	69.2
26	5.8	61.0	0.5	67.8	0.0	71.9	0.2	72.1	0.1	75.6	5.2	69.2
28	5.8	60.3	0.3	66.7	0.0	71.1	0.2	71.0	0.1	73.0	5.1	69.2
30	5.3	60.1	0.3	64.6	0.0	71.4	0.2	70.1	0.0	70.8	5.1	69.2
35	4.5	58.9	0.2	62.3	0.0	69.7	0.2	68.2	0.0	68.8	3.6	69.1
40	3.9	57.1	0.2	59.5	0.0	69.0	0.2	66.0	0.0	66.0	0.3	66.2
45	3.3	55.7	0.2	57.2	0.0	65.9	0.2	62.8			0.1	63.0
50	0.8	53.7	0.2	56.2							0.1	61.8
55	0.2	53.4	0.2	56.0							0.1	61.7
60	0.1	52.7	0.2	55.9							0.1	61.6

Table 23. Dissolved oxygen (ppm) and temperatures (°F) collected from Big Beech Creek, near Settler's Marina, at Taylorsville Lake (mid lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 14		June 12		July 15		August 13		September 18		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	8.5	66.5	15.8	76.2	9.6	87.0	9.2	84.1	10.0	80.5	5.3	68.6
2	8.6	66.5	15.1	76.3	9.6	87.2	9.2	84.2	10.1	80.7	5.3	68.8
4	8.6	66.5	14.4	76.4	7.9	87.2	9.2	84.3	10.0	80.8	5.3	68.9
6	8.6	66.4	13.2	76.4	7.9	87.1	9.2	83.9	10.1	80.9	5.3	69.1
8	8.2	66.3	12.1	76.3	7.6	86.9	9.0	83.8	10.1	80.9	5.3	69.1
10	8.2	66.3	12.1	76.2	7.4	86.8	8.6	83.7	9.9	80.9	5.3	69.2
12	7.5	66.2	12.1	76.2	2.4	85.4	6.8	83.6	5.4	80.6	5.3	69.2
14	7.3	66.1	4.4	75.2	0.6	82.4	4.6	83.5	2.9	80.2	5.3	69.2
16	6.1	65.8	2.7	74.6	0.4	78.1	0.4	82.5	0.8	79.8	5.2	69.3
18	4.3	64.8	1.9	73.6	0.3	76.5	0.3	80.8	0.3	79.4	5.1	69.3
20	4.4	63.6	1.6	73.1	0.3	75.4	0.3	78.8	0.1	78.9	5.0	69.3
22	4.6	62.8	1.2	72.4	0.2	74.3	0.2	76.1	0.1	78.5	5.1	69.3
24	4.7	62.5	0.3	70.7	0.2	73.3	0.2	74.4	0.1	78.0	5.1	69.4
26	5.0	61.7	0.2	69.0	0.2	72.3	0.2	72.7	0.1	77.2	5.1	69.4
28	5.1	61.4	0.2	66.7	0.2	71.7	0.2	71.4	0.1	74.4	5.1	69.4
30	4.9	60.9	0.2	64.4	0.2	70.8	0.2	70.5	0.1	71.5	5.0	69.4
35	2.9	58.9	0.2	61.6	0.2	69.6	0.2	68.3	0.1	68.1	0.4	68.2
40			0.2	59.1	0.2	67.8	0.2	65.0			0.1	63.1
45			0.2	56.4							0.1	62.9
50			0.2	55.7							0.1	62.9

Table 24. Dissolved oxygen (ppm) and temperatures (°F) collected from the Van Buren/Chowning Lane area at Taylorsville Lake (upper lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and/or dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 14		June 12		July 15		August 13		September 18		October 16	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	10.2	69.8	9.7	74.5	17.2	89.6	8.5	83.5	7.1	81.3	11.3	65.9
2	10.1	69.3	9.2	74.6	16.5	88.6	8.4	83.6	6.4	81.0	11.4	66.5
4	7.5	68.6	8.9	74.8	10.7	88.0	7.3	83.4	5.9	80.9	11.3	66.7
6	6.3	67.2	8.1	74.8	8.7	87.6	6.6	83.4	5.8	80.9	11.3	66.8
8	6.2	66.9	7.6	74.8	6.6	87.3	6.0	83.4	5.4	80.9	11.1	66.8
10	6.0	66.8	7.2	74.8	3.8	87.0	5.8	83.4	4.8	80.9	11.1	66.8
12	6.0	66.7	5.8	74.7	1.5	86.6	5.5	83.3	4.3	80.8	11.0	66.7
14	5.7	66.6	4.2	74.2	0.4	85.6	4.8	83.3	2.8	80.7	11.4	66.5
16	5.6	66.5	4.1	73.8			0.5	82.8	0.9	80.5	11.5	66.5
18	5.6	66.5	3.6	73.5			0.2	81.4	0.2	80.2	11.4	66.5
20	4.1	66.4	3.4	73.0			0.1	80.7			11.0	66.5
22	3.4	66.1	3.0	72.7			0.1	78.8				

Table 25. Dissolved oxygen (ppm) and temperatures (°F) collected from the North and South Fork split at Rough River Lake (lower lake section) during 2016. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 15		July 26		August 24	
Depth	DO	Temp	DO	Temp	DO	Temp
Surface	8.2	84.6	8.9	89.2	7.2	83.3
2	8.1	84.7	8.6	89.1	7.1	83.3
4	8.0	84.7	8.3	89.1	7.3	83.1
6	8.0	84.6	8.2	88.9	7.3	83.1
8	7.8	83.8	7.7	88.9	7.1	82.9
10	6.4	78.6	5.8	86.7	7.1	82.9
12	3.4	74.8	1.9	83.7	6.9	82.8
14	1.2	72.0	0.8	82.0	6.1	82.8
16	0.4	70.2	0.4	80.1	4.2	82.4
18			0.4	78.6	1.0	81.5
20	0.3	66.6	0.4	77.0	0.4	80.2
24	0.3	64.0	0.4	74.3	0.4	78.1

Table 26. Dissolved oxygen (ppm) and temperatures (°F) collected from Indian Valley Ramp at Rough River Lake (mid lake section) during 2016. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 15		July 26		August 24	
Depth	DO	Temp	DO	Temp	DO	Temp
Surface	7.6	84.7	9.4	90.3	9.1	83.8
2	7.3	84.7	9.0	90.0	8.8	83.5
4	7.1	84.9	9.0	89.2	8.6	82.6
6	6.6	83.1	8.1	88.5	7.7	82.0
8	4.1	80.6	5.3	86.9	7.3	81.9
10	0.8	77.5	2.7	85.1	6.1	81.9
12	0.4	72.7	1.2	83.5	5.3	81.5
14	0.3	70.3	0.5	81.1	4.9	80.8
16	0.1	68.0	0.4	79.7	4.0	79.7
18			0.4	78.3	2.7	76.8
20	0.0	65.1	0.4	76.8	2.2	74.3
22					2.0	73.9
24	0.0	63.1	0.4	72.5	1.9	73.6
26					1.9	73.0
28					1.9	73.0
30					1.9	72.9
32					1.9	72.9
34					1.9	72.9

Table 27. Dissolved oxygen (ppm) and temperatures (°F) collected from Peter Cave Marina at Rough River Lake (upper lake section) during 2016. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 15		July 26		August 24	
Depth	DO	Temp	DO	Temp	DO	Temp
Surface	9.5	83.1	10.2	90.3	13.1	83.3
2	9.8	83.5	10.3	89.1	12.5	81.3
4	8.9	83.3	9.8	88.9	10.8	79.3
6	8.5	82.0	9.0	88.5	9.3	78.1
8	5.9	79.7	7.7	87.4	5.8	76.3
10	3.0	76.1	3.9	84.2	4.5	72.9
12	1.3	72.5	1.1	81.0	4.3	72.0
14	1.0	69.4	1.0	78.8	4.3	71.6
16	0.8	68.0	0.5	75.6	4.4	71.2
18			0.5	74.5	4.4	71.1
20	0.3	65.3	0.4	71.6	4.3	70.7
22					3.9	70.5
24	0.2	61.3	0.4	69.8	4.1	70.3
26					4.1	70.2
28					3.9	70.2
30					3.7	70.2

Table 28. Dissolved oxygen (ppm) and temperatures (°F) collected from the North and South Fork split at Rough River Lake (lower lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 31		June 14		July 18		September 8	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	12.9	78.8	7.9	84.4	7.0	86.7	4.6	75.7
2	12.8	78.4	7.8	84.2	6.6	86.9	4.6	75.4
4	13.6	77.9	7.8	84.2	6.8	86.5	4.6	75.4
6	13.6	77.4	7.8	84.2	6.7	86.4	4.4	75.2
8	13.7	76.3	7.8	82.4	6.8	86.2	4.4	75.2
10	8.8	74.1	6.9	79.2	6.5	85.5	4.5	75.2
12	4.2	72.5	4.0	76.8	3.9	84.2	4.6	75.2
14	2.2	71.1	1.0	74.7	1.4	81.3	4.6	75.2
16	1.4	70.3	0.4	73.0	0.7	79.5	4.6	75.2
18	1.0	69.6			0.6	78.1	4.5	75.2
20	0.7	68.9	0.4	69.4	0.6	77.0	4.6	75.2
25	0.7	67.3	0.4	67.5	0.6	74.8	4.4	75.2
30	0.7	64.4					4.2	75.2
35							0.4	73.8
40							0.2	72.1

Table 29. Dissolved oxygen (ppm) and temperatures (°F) collected from Indian Valley Ramp at Rough River Lake (mid lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 31		June 14		July 18		September 8	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	11.9	81.0	8.7	86.5	6.6	87.8	6.2	76.1
2	11.2	80.8	8.8	85.1	6.9	87.1	6.4	75.9
4	12.9	78.4	9.0	83.7	7.0	86.4	6.4	74.8
6	12.0	78.1	8.2	81.3	6.7	86.4	6.3	74.7
8	9.2	75.9	7.2	79.7	5.2	85.8	6.3	74.7
10	5.9	73.8	5.7	78.6	4.0	85.1	6.3	74.7
12	3.7	71.1	1.7	75.7	2.7	83.3	6.2	74.7
14	3.5	69.3	0.9	74.3	2.1	81.7	6.2	74.7
16	3.5	68.2	0.6	71.2	1.6	78.3	5.4	74.1
18	3.4	67.6			0.9	75.7	3.9	73.2
20	3.2	66.4	0.5	67.3	0.3	72.3	1.9	69.4
25	2.9	65.8	0.6	65.8	0.4	70.0	1.7	67.8
30							1.5	67.6

Table 30. Dissolved oxygen (ppm) and temperatures (°F) collected from Peter Cave Marina at Rough River Lake (upper lake section) during 2017. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	May 31		June 14		July 18		September 8	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	14.7	81.7	10.3	85.3	8.8	87.8	10.1	75.4
2	16.8	78.8	9.7	84.9	9.0	87.1	11.3	72.5
4	14.0	76.8	10.9	83.8	8.9	86.5	9.9	71.8
6	11.8	75.0	10.4	83.1	8.1	86.2	10.1	71.6
8	4.0	67.8	9.4	79.3	7.6	85.5	9.9	71.1
10	4.0	66.4	5.4	75.7	6.4	83.5	8.5	71.1
12	4.4	64.0	3.9	70.3	4.6	78.1	5.2	65.5
14	4.6	63.5	3.0	67.1	4.3	73.0	5.1	64.8
16	4.7	63.3	2.6	66.9	4.0	71.1	5.0	63.9
18	4.9	63.1	1.9	66.4	3.4	69.6	5.1	63.7
20	5.0	63.0	1.4	66.0	2.5	69.1	5.0	63.7
25	5.0	63.0	0.7	64.9	1.3	68.4	3.7	63.5

Table 31. Dissolved oxygen (ppm) and temperatures (°F) collected from the North and South Fork split at Rough River Lake (lower lake section) during 2018. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 7		July 18		August 23		October 5	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	8.8	82.6	6.9	85.2	6.3	82.7	8.9	78.5
2	8.8	82.4	6.9	85.5	6.3	82.5	9.0	78.2
4	8.9	82.1	6.9	85.8	6.1	82.0	7.8	78.0
6	8.9	81.7	6.9	85.8	5.9	81.6	8.6	77.7
8	8.8	81.5	6.8	85.8	5.7	81.5	8.3	77.5
10	8.4	81.1	6.7	85.7	5.5	81.5	6.0	76.7
12	5.6	79.4	6.6	85.6	5.5	81.4	4.6	76.2
14	2.4	77.1	1.8	83.3	5.6	81.4	2.4	75.6
16	1.2	75.5	0.3	80.9	5.7	81.2	2.1	75.2
18	0.7	74.2	0.2	78.9	4.3	80.9	2.0	75.1
20	0.3	72.8	0.2	76.8	0.7	79.8	2.0	75.0
25	0.1	67.5	0.1	74.0	0.3	77.2	1.1	74.7
30	0.1	60.3					0.2	74.4

Table 32. Dissolved oxygen (ppm) and temperatures (°F) collected from Indian Valley Ramp at Rough River Lake (mid lake section) during 2018. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 7		July 18		August 23		October 5	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	8.7	86.2	6.8	87.0	6.5	84.2	9.6	79.8
2	9.2	84.9	6.8	87.0	6.5	84.2	9.6	79.4
4	9.6	83.1	6.8	87.0	6.8	83.4	9.5	78.3
6	9.4	82.6	6.8	87.0	6.3	82.5	9.3	78.0
8	7.7	81.2	6.5	86.7	5.8	82.2	8.8	77.7
10	6.6	80.3	6.2	86.4	5.5	82.0	7.5	76.1
12	4.8	78.8	6.2	86.3	5.2	81.9	6.2	75.5
14	3.2	75.7	5.7	86.2	5.3	81.9	4.5	74.1
16	1.6	71.7	0.3	81.7	5.2	81.9	3.4	72.4
18	4.5	70.1	0.2	79.6	5.2	81.9	3.2	71.2
20	1.2	69.4	0.2	77.0	0.6	79.9	2.9	70.7
25			0.2	73.0	0.3	77.6	2.8	70.1
30							2.5	70.0

Table 33. Dissolved oxygen (ppm) and temperatures (°F) collected from Peter Cave Marina at Rough River Lake (upper lake section) during 2018. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 7		July 18		August 23		October 5	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	10.8	85.9	8.1	88.3	9.4	83.5	10.9	77.3
2	10.4	82.6	8.1	88.3	9.0	82.6	9.3	75.1
4	9.3	79.2	8.1	87.7	8.4	81.6	9.1	74.5
6	9.3	79.6	7.2	87.1	7.6	81.2	8.2	73.4
8	5.4	74.3	4.9	86.2	7.2	81.0	7.1	72.2
10	3.8	71.0	2.7	65.1	7.2	80.8	4.2	69.3
12	3.5	68.3	1.4	63.5	6.0	80.3	3.4	68.0
14	3.4	67.7	0.9	61.3	0.4	76.8	3.3	67.6
16	3.3	67.5	0.4	77.8	0.3	76.2	3.3	67.4
18	3.3	67.4	0.4	75.3	0.3	76.1	3.3	67.2
20	3.3	67.3	0.2	72.9	0.3	76.0	3.4	67.2

Table 34. Dissolved oxygen (ppm) and temperatures (°F) collected from the North and South Fork split at Rough River Lake (lower lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 4		July 9		August 30		September 24	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	8.8	79.5	7.7	86.5	6.3	80.0	4.9	79.6
2	8.8	79.4	7.7	86.0	6.3	80.2	4.8	79.7
4	8.8	79.2	7.6	85.6	6.3	80.2	4.7	79.6
6	8.8	79.1	7.6	85.1	6.2	80.2	4.7	79.5
8	8.9	79.0	7.4	85.0	6.2	80.1	4.8	79.4
10	8.5	78.4	3.1	81.8	6.1	80.1	4.7	79.4
12	6.7	77.6	0.5	78.9	6.0	80.1	4.6	79.4
14	2.6	75.8	0.3	77.2	6.0	80.1	4.6	79.4
16	0.4	74.4			5.9	80.1	4.6	79.3
18	0.3	71.9			4.3	79.8	4.6	79.3
20	0.2	70.6	0.2	71.9	3.7	79.7	4.5	79.3
25			0.2	70.6	0.3	77.5	0.3	77.4
30	0.2	64.5	0.2	69.6			0.3	75.2

Table 35. Dissolved oxygen (ppm) and temperatures (°F) collected from Indian Valley Ramp at Rough River Lake (mid lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 4		July 9		August 30		September 24	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	10.1	80.4	7.6	88.7	6.7	80.9	4.6	80.1
2	10.2	80.2	7.7	88.1	6.4	80.8	4.6	80.1
4	10.2	79.9	7.5	87.0	5.9	80.6	4.6	80.1
6	9.5	79.2	8.5	86.2	5.2	80.5	4.5	80.0
8	7.9	78.7	5.2	84.7	4.0	80.2	3.8	79.9
10	3.8	77.7	3.6	83.1	3.9	80.2	4.0	79.8
12	1.2	75.0	0.7	79.7	3.7	80.1	3.9	79.8
14	0.5	72.5	0.4	77.2	3.4	80.0	3.8	79.7
16	0.4	71.9			3.1	79.9	3.6	79.7
18	0.3	71.0			2.3	79.8	4.0	79.7
20	0.3	70.1	0.3	73.2	0.7	79.6	4.1	79.6
25	0.2	64.3	0.2	70.4	0.3	77.7	0.3	77.8
30							0.3	76.6

Table 36. Dissolved oxygen (ppm) and temperatures (°F) collected from Peter Cave Marina at Rough River Lake (upper lake section) during 2019. = optimal habitat (water temperature 70.7 – 77.9 °F and dissolved oxygen ≥ 4.5 ppm), = suboptimal habitat (water temperature < 70.7 or 78.0 – 80.6 °F and/or dissolved oxygen 2.0 – 4.4 ppm), = poor habitat (water temperature > 80.6 °F and/or dissolved oxygen < 2.0 ppm).

	June 4		July 9		August 30		September 24	
Depth	DO	Temp	DO	Temp	DO	Temp	DO	Temp
Surface	12.0	79.9	8.6	90.0	8.9	80.1	6.5	80.0
2	12.3	79.3	8.7	88.3	8.7	79.8	6.5	79.8
4	12.3	78.7	8.0	86.7	7.6	79.2	6.5	79.6
6	10.3	77.8	5.6	85.4	6.6	79.0	6.0	79.4
8	6.4	75.8	4.0	84.3	6.1	78.9	5.2	78.8
10	2.6	70.4	1.6	82.2	5.0	78.8	5.1	78.7
12	2.4	68.2	0.6	79.7	4.8	78.6	4.4	78.6
14	2.4	66.4	0.7	77.4	2.5	77.8	4.2	78.5
16	2.3	66.0			2.4	77.7	4.5	78.4
18	2.2	65.8			2.2	77.6	1.1	77.7
20	2.1	65.6	1.6	72.4	1.8	77.5	0.3	76.1
25	1.9	65.6	0.5	68.7	0.3	76.1	0.2	75.4

Table 37. Length frequency and CPUE (fish/net-night) of hybrid striped bass collected with experimental gill nets at Herrington Lake in October/November from 2016-20.

Sample	# net		Inch class																							Std.
year	nights		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total	CPUE	error
2016	20	Reciprocal	1	2	3	8					2	16	29	1	1	2		1	2						68	3.4	0.7
		Original				4	1		1		2	16	9	3											36	1.8	0.4
		Total	1	2	3	12	1		1		4	32	38	4	1	2		1	2						104	5.2	1.1
2017	30	Reciprocal	1		3	24	5	1					6	9		18	25	9	1	1					103	3.4	0.8
		Original		6	5	12	1	2					2	4	4	7	6		1						50	1.7	0.3
		Total	1	6	9	37	7	3					8	13	4	25	31	9	2	1					156	5.2	1.0
2018	14	Reciprocal	1	2	11	13				1		15	34	7		1	2	5	3						95	6.8	2.1
		Original		1	11	3					1	12	28	5		2	1	3							67	4.8	1.5
		Total	1	3	22	16				1	1	27	62	12		3	3	8	3						162	11.6	3.5
2019	24	Reciprocal	1	1		5	8	3			1	1	8	7	4	6	2		1						48	2.0	0.6
		Original			1	4	5	4				5	5	1	2	1		1	1					1	31	1.3	0.4
		Total	1	1	1	9	13	7			1	6	13	8	6	7	2	1	2					1	79	3.3	1.0
2020	14	Reciprocal	4	3	10						2	12	15	5	13	12	12	4	2	1	1				96	6.9	1.2
		Original									2	14	24	4	3	7	5	3							62	4.4	1.0
		Total	4	3	10						4	26	39	9	16	19	17	7	2	1	1				158	11.3	1.9

Table 38. Length frequency and CPUE (fish/net-night) of hybrid striped bass collected with experimental gill nets at Taylorsville Lake in October from 2016-20.

Sample year	# net nights		Inch class																							Total	CPUE	Std. error
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27				
2016	11	Reciprocal		1	6	8			3	8	9	9	8	6	7	12	17	21	10	9	2				136	12.4	5.4
		Original			3	13	2		2	6	2							2	1						31	2.8	1.2
		Total		1	9	21	2		5	14	11	9	8	6	7	12	17	23	11	9	2				167	15.2	6.7
2017	10	Reciprocal		3	8	4			2	6	5	2		1	3	1	5	11	12	13	10		1		87	8.7	2.6
		Original	1	1	4	4			4	6	7	3	2	2	4		1	2	2		2	1			46	4.6	1.1
		Total	1	4	12	8			6	12	12	5	2	3	7	1	6	13	14	13	12	1	1		133	13.3	3.6
2018	13	Reciprocal		4	6	16	8	5		5	8	8		3	1	1		3	6	2	1				77	5.9	2.5
		Original		2	5	21	1		4	16	13	9		1	1			1	1						75	5.8	2.9
		Total		6	11	37	9	5	4	21	21	17		4	2	1		4	7	2	1				152	11.7	5.3
2019	10	Reciprocal		1		6	8	2	1	3	4	3		2	1	1		1	3	4	6	3	3		52	5.2	1.9
		Original		1	2	1	1			1	4	2			2			2	2	1					19	1.9	0.8
		Total		2	2	7	9	2	1	4	8	5		2	3	1		3	5	5	6	3	3		71	7.1	2.6
2020	8	Reciprocal							1	1	16	6						1		1	1	1	3	1	32	4.0	1.2
		Original								2	11	10			1	2				1	1	2	1		31	3.9	1.4
		Total							1	3	27	16			1	2		1		2	2	3	4	1	63	7.9	2.5

Table 39. Length frequency and CPUE (fish/net-night) of hybrid striped bass collected with experimental gill nets at Rough River Lake in October/November from 2016-20.

Sample	# net		Inch class																				Std.
year	nights		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total	CPUE	error
2016	6	Reciprocal		3	4				2	3	9			1	1	2						25	4.2	1.7
		Original		3	5	7	2	1		3	6	1		2	2	5						37	6.2	2.4
		Total		6	9	11	4	1	2	6	18	11	20	20	17	23	10	3	1	3		165	27.5	13.5
2017	12	Reciprocal	2	10	13	36	19				12	23	10	19	30	11	8	5	3			201	16.8	2.5
		Original	10	14	15	20				1	22	38	6	6	1	1	5					139	11.6	1.3
		Total	17	35	35	80	22			2	34	61	16	25	31	12	13	5	3			391	32.6	3.8
2018	10	Reciprocal		5	16	17	11		1	30	43	8	2	6	2	3	6				1	151	15.1	3.0
		Original	8	26	51	22		1	42	82	49	6	8	10	4			1				310	31.0	9.0
		Total	8	38	69	39	11	1	43	132	117	19	10	16	6	3	6	1			1	520	52.0	11.9
2019	14	Reciprocal	3	15	53	59	3		1	6	18	11	23	11	6	4	5		4	2		224	16.0	3.8
		Original	4	15	52	12			1	8	8	12	19	6	4		1			1		143	10.2	2.2
		Total	8	40	114	78	5		2	14	32	34	45	21	12	4	6		5	3		423	30.2	7.1
2020	11	Reciprocal	27	52	8				2	20	20	10	22	28	14	7	9	3	1			223	20.3	4.0
		Original							8	16	21	9	32	26	13	2			1			128	11.6	2.1
		Total	27	52	8				10	45	56	20	67	63	33	10	9	3	2			405	36.8	4.7

*Not all fish were sacrificed for OTC mark verification. Total includes fish that were released.

Table 40. Length frequency, CPUE (fish/net-night), and relative weight (Wr) of age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Herrington Lake from 2016-20. Standard errors are in parentheses.

		Inch class															
Sample year		13	14	15	16	17	18	19	20	21	22	23	Total	CPUE	Mean length (in)	Range (in)	Wr
2016	Age-1																
	Reciprocal			2	16	29	1						50	2.5 (0.5)	17.0	15.2 – 18.1	84 (1)
	Original	1		2	16	9	3						31	1.6 (0.4)	16.7	13.1 – 18.5	90 (1)
2017	Age-1																
	Reciprocal					6	9						15	0.5 (0.1)	18.1	17.5 – 18.7	94 (1)
	Original					2	4	1					7	0.2 (0.1)	18.3	17.7 – 19.0	97 (2)
	Age-2																
	Reciprocal								18	23	7	1	49	1.6 (0.5)	21.2	20.0 – 23.1	93 (1)
	Original							3	7	6			16	0.5 (0.1)	20.5	19.2 – 21.8	97 (1)
2018	Age-1																
	Reciprocal		1		15	34	7						57	4.1 (1.5)	17.2	14.0 – 18.8	99 (1)
	Original			1	12	28	5						46	3.3 (1.0)	17.3	15.9 – 18.6	95 (1)
	Age-2																
	Reciprocal										1		1	0.1 (0.1)	22.0	22.0	78
	Original								1	1			2	0.1 (0.1)	21.2	20.7 – 21.6	101 (1)
	Age-3																
	Reciprocal								1	2	4	3	10	0.7 (0.3)	22.3	20.4 – 23.6	92 (1)
	Original								1		3		4	0.3 (0.1)	22.0	20.5 – 22.8	88 (7)
2019	Age-2																
	Reciprocal						3	4	6	2			15	0.6 (0.4)	20.0	18.4 – 21.6	93 (1)
	Original							2	1				3	0.1 (0.1)	19.9	19.2 – 20.8	90 (2)
	Age-3																
	Reciprocal																
	Original										1	1	2	0.1 (0.1)	23.2	22.8 – 23.6	87 (0)
2020	Age-3																
	Reciprocal							3	6	5	3		17	1.2 (0.3)	20.8	19.8 – 22.6	96 (1)
	Original								2	3	3		8	0.6 (0.2)	21.6	20.3 – 22.7	90 (2)

Table 41. Length frequency, CPUE (fish/net-night), and relative weight (Wr) of age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Taylorsville Lake from 2016-20. Standard errors are in parentheses.

		Inch class																
Sample year		11	12	13	14	15	16	17	18	19	20	21	22	23	Total	CPUE	Mean length (in)	Range (in)	Wr
2016	Age-1																		
	Reciprocal	1	3	9	10	6									29	2.6 (0.6)	14.1	11.4 – 15.9	79 (1)
	Original		3	6	2										11	1.0 (0.6)	13.4	12.0 – 14.5	86 (2)
2017	Age-1																		
	Reciprocal		2	6	5	1									14	1.4 (0.6)	13.9	12.6 – 15.6	82 (2)
	Original		4	6	7	3	2								22	2.2 (0.8)	14.1	12.0 – 16.6	84 (2)
	Age-2																		
	Reciprocal					1		1	3						5	0.5 (0.3)	18.0	15.6 – 18.8	80 (4)
	Original							2	4						6	0.6 (0.3)	18.0	17.4 – 18.5	80 (4)
2018	Age-1																		
	Reciprocal	2		5	8	8									23	1.8 (0.7)	14.4	11.2 – 15.6	89 (1)
	Original		4	16	13	9									42	3.2 (1.7)	14.1	12.1 – 15.9	84 (1)
	Age-2																		
	Reciprocal							2	1						3	0.2 (0.2)	17.8	17.0 – 18.5	77 (2)
	Original							1	1						2	0.2 (0.2)	18.1	17.5 – 18.7	75 (2)
	Age-3																		
	Reciprocal							1		1		1	4		7	0.6 (0.4)	21.2	17.7 – 22.9	90 (3)
	Original											1			1	0.1 (0.1)	21.6	21.6	89
2019	Age-2																		
	Reciprocal							2	1	1					4	0.4 (0.3)	18.2	17.4 – 19.1	84 (3)
	Original								2						2	0.2 (0.1)	18.8	18.8	80 (3)
	Age-3																		
	Reciprocal											1	1		2	0.2 (0.1)	21.7	21.3 – 22.0	73 (2)
	Original											2	1	1	4	0.4 (0.2)	21.9	21.2 – 23.1	85 (3)
2020	Age-3																		
	Reciprocal											1			1	0.1 (0.1)	19.2	18.9 – 19.5	81 (10)
	Original								1	1					2	0.3 (0.2)	21.4	21.4	91

Table 42. Length frequency, CPUE (fish/net-night), and relative weight (Wr) of age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Rough River Lake from 2016-20. Standard errors are in parentheses.

		Inch class														
Sample year		12	13	14	15	16	17	18	19	20	21	Total	CPUE	Mean length (in)	Range (in)	Wr
2016	Age-1															
	Reciprocal		2	3	9							14	2.3 (0.9)	14.9	13.3 – 15.8	84 (4)
	Original	1		3	6	1						11	1.8 (0.7)	14.8	12.0 – 16.2	83 (3)
2017	Age-1															
	Reciprocal				12	22						34	2.9 (0.9)	16.1	15.3 – 16.9	85 (1)
	Original			1	22	38	2					63	5.3 (0.5)	16.1	14.7 – 17.2	88 (1)
	Age-2															
	Reciprocal					1	6	11	17			35	2.9 (0.4)	18.6	16.3 – 19.8	87 (2)
	Original						4	6				10	0.8 (0.2)	18.0	17.0 – 18.9	87 (1)
2018	Age-1															
	Reciprocal		1	30	43	8						82	8.2 (1.3)	15.1	13.6 – 16.4	92 (1)
	Original	1	42	82	49	5						179	17.9 (6.1)	14.5	12.8 – 16.6	85 (0)
	Age-2															
	Reciprocal						2	3	1			6	0.6 (0.3)	18.2	17.0 – 19.3	80 (1)
	Original					1	8	9	4			22	2.2 (0.6)	18.1	16.8 – 19.1	86 (1)
	Age-3															
	Reciprocal							3	1		1	5	0.5 (0.3)	19.2	18.4 – 21.1	78 (1)
	Original							1				1	0.1 (0.1)	18.2	18.2	77
2019	Age-2															
	Reciprocal					10	22	7				39	2.8 (1.3)	17.4	16.3 – 18.8	88 (1)
	Original				3	12	19	3				37	2.6 (1.0)	17.0	15.0 – 18.3	81 (1)
	Age-3															
	Reciprocal						1	3	2			6	0.4 (0.4)	18.5	17.9 – 19.8	77 (2)
	Original							3	4			7	0.5 (0.4)	19.0	18.5 – 19.5	80 (3)
2020	Age-3															
	Reciprocal						5	10	11	2	1	29	2.6 (0.7)	18.9	17.2 – 21.1	84 (1)
	Original					1	10	16	10	1		38	3.5 (1.2)	18.5	16.5 – 20.5	81 (1)

Table 43. Comparison of mean lengths (in) of reciprocal and original cross age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets from Herrington Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	17.0	16.7	1, 77	2.25	0.14
2017	1	18.1	18.3	1, 20	1.29	0.27
	2*	21.2	20.5	1, 63	9.98	< 0.01
2018	1	17.2	17.3	1, 101	0.08	0.77
	2	22.0	21.2	1, 1	1.19	0.47
	3	22.3	22.0	1, 12	0.34	0.57
2019	2	20.0	19.9	1, 16	0.01	0.93
	3	–	23.2	–	–	–
2020	3	20.8	21.6	1, 23	3.69	0.07

Table 44. Comparison of mean lengths (in) of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets from Herrington Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	16.8	17.0	1, 75	1.63	0.21
2017	1	18.1	18.2	1, 20	0.38	0.55
	2*	20.6	21.5	1, 61	32.50	< 0.01
2018	1*	17.0	17.5	1, 101	17.19	< 0.01
	2	–	21.4	–	–	–
	3	21.8	22.4	1, 12	1.06	0.32
2019	2*	19.1	20.3	1, 16	11.40	< 0.01
	3	–	23.2	–	–	–
2020	3*	20.4	21.8	1, 22	19.04	< 0.01

Table 45. Comparison of mean lengths (in) of reciprocal and original cross age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Taylorsville Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	14.1	13.4	1, 38	3.78	0.06
2017	1	13.9	14.1	1, 34	0.21	0.65
	2	18.0	18.0	1, 9	0.01	0.93
2018	1	14.4	14.1	1, 63	1.38	0.25
	2	17.8	18.1	1, 3	0.22	0.67
	3	21.2	21.6	1, 6	0.03	0.87
2019	2	18.2	18.8	1, 4	0.83	0.41
	3	21.7	21.9	1, 4	0.16	0.71
2020	3	21.4	19.2	1, 1	17.93	0.15

Table 46. Comparison of mean lengths (in) of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Taylorsville Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	13.7	14.2	1, 38	2.50	0.12
2017	1	13.9	14.2	1, 33	0.37	0.55
	2	18.0	18.0	1, 9	< 0.01	0.95
2018	1	14.3	14.1	1, 61	0.97	0.33
	2	18.1	17.8	1, 3	0.22	0.67
	3	19.6	21.8	1, 6	2.61	0.16
2019	2	17.4	18.6	1, 4	3.04	0.16
	3	–	21.8	–	–	–
2020	3	–	19.9	–	–	–

Table 47. Comparison of mean lengths (in) of reciprocal and original age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Rough River Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	14.9	14.8	1, 23	0.03	0.86
2017	1	16.1	16.1	1, 95	0.33	0.57
	2*	18.6	18.0	1, 43	5.14	0.03
2018	1*	15.1	14.5	1, 259	41.90	< 0.01
	2	18.2	18.1	1, 26	0.08	0.77
	3	19.2	18.2	1, 4	0.73	0.44
2019	2*	17.4	17.0	1, 74	5.78	0.02
	3	18.5	19.0	1, 11	2.20	0.17
2020	3	18.9	18.5	1, 65	3.69	0.06

Table 48. Comparison of mean lengths (in) of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Rough River Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Mean length (in)		df	*F*-statistic	*P*-value
2016	1	15.0	14.7	1, 23	0.64	0.43
2017	1	16.1	16.2	1, 95	0.66	0.42
	2*	17.8	19.0	1, 43	39.14	< 0.01
2018	1*	14.6	14.9	1, 258	9.16	< 0.01
	2*	17.6	18.7	1, 26	48.52	< 0.01
	3*	18.6	21.1	1, 4	35.27	< 0.01
2019	2*	16.8	17.5	1, 71	22.03	< 0.01
	3*	18.3	19.3	1, 11	19.86	< 0.01
2020	3*	17.8	18.9	1, 65	31.13	< 0.01

Table 49. Comparison of relative weights of reciprocal and original cross age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets from Herrington Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1*	84	91	1, 77	24.99	< 0.01
2017	1	94	97	1, 20	0.84	0.37
	2*	93	97	1, 63	5.60	0.02
2018	1*	99	95	1, 101	13.98	< 0.01
	2*	78	101	1, 1	145.06	0.05
	3	92	88	1, 12	0.73	0.41
2019	2	93	90	1, 16	1.79	0.20
	3	–	87	–	–	–
2020	3*	96	90	1, 23	7.96	0.01

Table 50. Comparison of relative weights of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets from Herrington Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1	86	87	1, 75	0.63	0.43
2017	1	96	95	1, 20	0.24	0.63
	2	95	94	1, 61	0.64	0.43
2018	1	98	97	1, 101	1.79	0.18
	2	–	93	–	–	–
	3	91	90	1, 12	0.05	0.83
2019	2*	90	94	1, 16	4.93	0.04
	3	–	87	–	–	–
2020	3	95	95	1, 22	0.02	0.88

Table 51. Comparison of relative weights of reciprocal and original cross age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Taylorsville Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1*	79	86	1, 38	13.55	< 0.01
2017	1	82	84	1, 34	0.66	0.42
	2	80	80	1, 9	0.02	0.90
2018	1*	89	84	1, 61	14.10	< 0.01
	2	77	75	1, 3	0.39	0.58
	3	90	89	1, 6	0.02	0.88
2019	2	84	80	1, 4	0.58	0.49
	3*	73	85	1, 4	8.53	0.04
2020	3	91	81	1, 1	0.40	0.64

Table 52. Comparison of relative weights of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Taylorsville Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1	82	80	1, 38	1.26	0.27
2017	1	82	83	1, 33	0.05	0.82
	2	78	87	1, 9	1.74	0.22
2018	1*	87	84	1, 61	4.69	0.03
	2	75	77	1, 3	0.39	0.58
	3	92	89	1, 6	0.41	0.55
2019	2	83	83	1, 4	0.02	0.90
	3	–	81	–	–	–
2020	3	–	84	–	–	–

Table 53. Comparison of relative weights of reciprocal and original cross age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Rough River Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Reciprocal	Original			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1	82	83	1, 23	< 0.01	0.95
2017	1*	85	88	1, 95	8.94	< 0.01
	2	87	87	1, 43	< 0.01	0.95
2018	1*	92	85	1, 258	64.97	< 0.01
	2*	80	86	1, 26	10.81	< 0.01
	3	78	77	1, 4	0.26	0.63
2019	2*	88	81	1, 74	40.56	< 0.01
	3	77	80	1, 11	0.93	0.36
2020	3*	84	81	1, 65	7.17	0.01

Table 54. Comparison of relative weights of male and female age-1, age-2 and age-3 hybrid striped bass collected with experimental gill nets at Rough River Lake from 2016-20. Comparisons with significant differences are marked with an asterisk.

		Male	Female			
Sample year	Age	Relative weight (Wr)		df	*F*-statistic	*P*-value
2016	1	79	87	1, 23	2.76	0.11
2017	1*	89	85	1, 95	20.04	< 0.01
	2*	90	85	1, 43	4.87	0.03
2018	1*	88	86	1, 258	7.13	< 0.01
	2	85	84	1, 26	0.31	0.58
	3	78	82	1, 4	5.48	0.08
2019	2	84	85	1, 71	< 0.01	0.94
	3	81	76	1, 11	2.22	0.16
2020	3	82	82	1, 65	0.04	0.83