



Highline Lake

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FISH SURVEY AND MANAGEMENT INFORMATION

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General Information: Highline Lake is an oasis in the desert that provides outstanding fishing opportunities for Largemouth Bass, Black Crappie, Bluegill, Channel Catfish, and Rainbow Trout. Highline Lake State Park is very popular with anglers, watersport enthusiasts, birders and bikers and provides a family friendly atmosphere with a swim beach, access to miles of trails, picnic areas, and several campgrounds.

Location: Highline Lake State Park, approximately 10 miles northwest of Fruita, Colorado.

Recreational Management: Colorado Parks and Wildlife.

Fishery Management: Combined warmwater and coldwater angling.

Purchase a Fishing License: <https://cpw.state.co.us/buyapply/Pages/Fishing.aspx>

Amenities

- One paved boat ramp is available on the west side of the lake
- Facilities at the park include restrooms, camping sites, picnic areas, playground, retail store, showers, duck blinds, dump station, and a visitor center (<https://cpw.state.co.us/placestogo/parks/HighlineLake/Pages/Facilities.aspx>)

Fish Stocking

- CPW regularly stocks Black Crappie, Bluegill, Largemouth Bass, Channel Catfish, and Rainbow Trout
- 2020 stocking from CPW hatcheries:
 - 12,000 Bluegill (1.5” average length)
 - 7,500 Largemouth Bass (1.5” average length)
 - 2,012 Channel Catfish (2.7” average length)
 - 7,743 Rainbow Trout (range in length from 9.3” to 11.1”)

General Regulations

- A valid Parks Pass is required for each vehicle with additional fees for camping and group picnic area (<https://cpw.state.co.us/placestogo/parks/HighlineLake/Pages/Fees.aspx>)
- Boating is closed seasonally from October 1 through February 28
- All boats launching must have current registration and an Aquatic Nuisance Species (ANS) stamp. All motorized watercraft will be inspected for ANS and are subject to decontamination (<https://cpw.state.co.us/placestogo/parks/HighlineLake/Pages/Activities.aspx>)

Fishing Regulations

- Bag, possession and minimum size for Largemouth Bass is 2, 15 inches long
- Unlimited bag and possession limit for Smallmouth Bass and Yellow Perch
- Statewide regulations apply for all other species (<https://cpw.state.co.us/Documents/RulesRegs/Brochure/fishing.pdf>)

Reservoir Operation Notes

- Reservoir water level remains fairly constant throughout the year
- Reservoir receives water from the Government Highline Canal
- A net near the spillway minimizes fish escapement out of the reservoir. Net is maintained by CPW.

Fishery Management Notes

- Highline Lake is a destination fishery and is very popular with both warmwater and trout anglers
- Although often tricky to catch, Highline Lake is home to some very big Largemouth Bass (including some over 5 pounds!)
- CPW is working to enhance the fishery through habitat improvements and fish stocking
- Gizzard Shad were first found in the reservoir in 2015 (likely illegally introduced as a live bait fish)

Highline Lake Map and Access Information



 = Boat Ramp  = Swimming Area  = Visitor's Center  = Campground

Figure 1. Map of Highline Lake showing locations of boat ramp, campground, swimming area, and Visitor Center. Numerous bathrooms, parking areas, and picnic areas (not shown on this map) can be found throughout the Park.

Highline Lake Fishery Improvement Projects



Figure 2. Habitat structures awaiting deployment in Highline Lake. A total of 48 habitat structures were deployed in 2019 and 2020.



Figure 3. Deployment of habitat structures and stocking of Largemouth Bass in 2019 during a local news segment. Courtesy of KREX/KFQX. Used with permission.

Habitat Improvement

In 2019 and 2020, CPW partnered with local anglers to install a total of 48 habitat structures in Highline Lake. These structures were built by using elm trees in 5-gallon buckets full of concrete. The habitat structures were strategically deployed throughout the lake in shallow coves. The purpose of this project was to improve habitat quality and to improve Largemouth Bass fishing in the lake. This project is expected to increase survival and growth potential of Largemouth Bass and will also provide cover for smaller-bodied fish species such as Bluegill and Black Crappie. CPW is planning additional habitat improvement projects in 2021, which will further benefit the fishery.

Fish Stocking

CPW regularly stocks Largemouth Bass, Bluegill, Channel Catfish, Black Crappie (last stocked in 2005), and Rainbow Trout from CPW's hatcheries. Warmwater fish (i.e. Largemouth Bass, Channel Catfish, Black Crappie, and Bluegill) are typically stocked at a length of 1" to 3", although larger broodfish are periodically stocked as well. Catchable-sized Rainbow Trout are stocked in the spring and fall at an average length of approximately 10". To further supplement the Largemouth Bass population in Highline Lake, CPW partnered with local anglers and local landowners to move 510 Largemouth Bass (average length of 9") from Connected Lakes (managed by CPW) and a nearby private pond in 2019. Connected Lakes have an overabundance of relatively small Largemouth Bass so the relocations of these fish are expected to benefit both fisheries by increasing Largemouth Bass abundance in Highline Lake and decreasing abundance of small Largemouth Bass in Connected Lakes, which will increase growth potential and body condition.

Fish Population Surveys

CPW conducts annual fish population surveys to monitor the Highline Lake fishery. These surveys consist of a variety of fish sampling methods including nighttime boat electrofishing, gill netting, trap netting, and seining. The data gathered during these surveys, which are summarized in this document, are used to inform the fishery management at Highline Lake by assessing the effectiveness of current regulations, fish stocking rates and frequencies, and habitat improvement projects.

Highline Lake Management Notes

Spillway Net

CPW maintains and evaluates the effectiveness of a large block net near the Highline Lake spillway which minimizes the escapement of non-native fish from Highline Lake. If they escaped, these non-native fish could negatively affect downstream native fish populations through predation and/or competition. An effective spillway net and approved Lake Management Plan are what allow CPW to stock and manage for desirable warmwater sportfish such as Largemouth Bass, Black Crappie, Channel Catfish, and Bluegill. Maintenance of the spillway net includes regular inspections, cleanings, and repairs which are funded or administered by CPW. Monitoring the effectiveness of the spillway net includes annual electrofishing efforts between the spillway net and the spillway and also electrofishing on Mack Wash, which Highline Lake flows into, to monitor the effectiveness of the net at preventing escapement of non-native fish. The data gathered show that the net is extremely effective at preventing non-native fish from escaping, although periodic increases in flows through Highline Lake and debris on the net can temporarily reduce its effectiveness. CPW will continue to maintain and monitor the effectiveness of the spillway net to ensure management of the sport fishery at Highline Lake does not negatively affect downstream native fish populations. Replacement of the net is planned for sometime in the next few years. More information on these efforts to prevent the escapement of non-native fish from Highline Lake can be found at https://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2020/naa/C20_FY20AR-ReservoirScreenO&M_CPW_508.pdf.

Historical Trends and Species-Specific Management Recommendations

Trends in catch per unit effort (number of fish captured per hour of electrofishing, representative of abundance) and population size structure were evaluated based on historical fall fishery surveys in Highline Lake. Additionally, historical Proportional Stock Density (PSD) was evaluated for desirable sportfish species. PSD is a metric used to evaluate size structure of fish populations by determining the proportion of fish in a sample that are at least a “quality” size or greater (defined as greater than 36% of world record length for that species, this is typically the minimum size that provides recreational value) relative to the number of fish that are at least a “stock” size (defined as fish that are at least 20% of world record length for that species, this is typically the approximate length at maturity). The higher the PSD value, the higher the proportion of fish that are at least a quality length compared to fish that are stock length. Species-specific length cutoffs for stock and quality designations and ideal PSD ranges for a balanced population are shown in the following PSD figures.

Largemouth Bass

Largemouth Bass are a very popular sportfish in Highline Lake that are highly sought after by anglers. CPW manages the Largemouth Bass population in Highline Lake through stocking (from CPW hatcheries and nearby ponds) and special regulations (bag and possession limit of 2 fish, minimum length of 15 inches). Largemouth Bass are a predatory fish which are highly dependent on the quality and quantity of forage fish available, including Black Crappie, Bluegill, Yellow Perch, Green Sunfish, and Gizzard Shad. Largemouth Bass densities increased between 2016 and 2019, which was followed by a decline in density in the 2020 survey. There was a corresponding decrease in PSD between 2017 and 2019, followed by a sharp increase in PSD in 2020 (Figure 4 and Figure 5). Higher PSD values in 2016, 2017, and 2020 are associated with relatively high Gizzard Shad densities. This suggests that Largemouth Bass utilize Gizzard Shad as a forage fish and that there was an increase in growth rates and/or survival of fish that were at least quality length while Gizzard Shad were more abundant. Declines in PSD between 2017 and 2019 correspond with declining Gizzard Shad abundance which further suggests that Gizzard Shad are an important component of the diet of Largemouth Bass; however, there are also some management concerns regarding Gizzard Shad (see Gizzard Shad section). Average relative weight of Largemouth Bass in the 2020 survey was 88 meaning these fish had a slightly below average body condition (relative weight of fish with average body condition is 93) (Figure 21).

Stocking rates of Largemouth Bass and further relocations into Highline Lake from other waters should continue to be evaluated on a regular basis by evaluating abundance of forage fish, as well as monitoring trends in Largemouth Bass PSD, abundance, and body condition.

Highline Lake Management Notes

Black Crappie

Historically, Black Crappie PSD has been quite low. Electrofishing catch rates of Black Crappie were highest in 2006 and 2007, likely due to stocking events in 2005 (Figure 8 and Figure 9). Black Crappie have not been stocked since 2005 due to low PSD values and high abundances of relatively small fish. However, data gathered in 2018 and 2019 showed moderate gains in PSD, moderate electrofishing catch rates, and good body condition (average relative weight of 111). No Black Crappie were surveyed in 2020 (Figure 20). It is likely that Black Crappie (especially larger fish) are under-represented in the surveys due to the sampling methods used; trap nets will be used during the 2021 survey to further evaluate the Black Crappie population. Anglers have reported catching increased numbers of larger Black Crappie (up to 10") in recent years.

If PSD continues to increase and electrofishing catch rates remain low to moderate, CPW will consider resuming the stocking of Black Crappie at low densities as early as 2022. Stocking rates and stocking frequency will be evaluated regularly based on electrofishing catch rates, PSD, and body condition observed during fall fishery surveys. Furthermore, CPW is planning additional habitat improvement projects in deeper water beginning in 2021 to improve habitat for Black Crappie.

Bluegill

Bluegill are stocked regularly in Highline Lake at an average length of 2.1". Historically, Bluegill PSD has been quite low. Bluegill catch rates declined sharply in the 2019 and 2020 surveys.

CPW will continue to monitor these trends and will use fishery survey data to assess and adjust stocking rates and stocking frequency. Similar to Black Crappie, it is likely that large Bluegill are under-represented in CPW's surveys due to sampling methods used; trap nets will likely be used during the 2021 survey to further evaluate the Bluegill population.

Channel Catfish

Channel Catfish are regularly stocked in Highline Lake at an average length of 3.5". Channel Catfish are not captured at sufficient rates during CPW's standardized surveys to allow for detailed analysis of trends in electrofishing catch rates or PSD. However, large Channel Catfish are reported by anglers and are periodically caught during fishery surveys (Figure 12 and Figure 13). Channel Catfish are an important component of the sport fishery in Highline Lake and CPW plans to continue to stock these fish.

Gizzard Shad

Gizzard Shad were first documented in Highline Lake during the fall fishery survey in 2015. It is likely that Gizzard Shad were illegally stocked into Highline Lake through bait bucket introductions. Gizzard Shad electrofishing catch rates peaked in 2016 and then declined significantly from 2017 to 2019, followed by an increase in 2020 (Figure 14 and Figure 15). The long-term effects of Gizzard Shad establishment in Highline Lake remain to be seen. It is likely that they provide some benefit from a sportfish perspective due to their value as a forage fish. As discussed previously, there is a strong correlation between Largemouth Bass PSD and Gizzard Shad abundance. Gizzard Shad feed on plankton and organic material from sediment on the bottom of lakes, such as plant debris. Gizzard Shad have shown value in bass fisheries elsewhere as a forage fish but also potentially present a threat due to competition with sportfish such as Largemouth Bass, Black Crappie, and Bluegill, particularly at early life stages when these fish also rely upon zooplankton as a food source. There is also concern that Gizzard Shad may present challenges with the management of the sport fishery due to their large maximum size which makes it impossible for the larger Gizzard Shad to be consumed by any predatory fish in Highline Lake. An additional concern from a sportfish perspective is the extreme and often rapid changes in densities of Gizzard Shad populations. It is possible that short-term increases in abundance result in an abundance of forage for predatory fish (including Largemouth Bass) which then may decline rapidly and cause reductions in growth or survival of predatory fish; these rapid decreases in Gizzard Shad abundance may also result in predatory fish seeking alternative sources of prey, including sportfish such as Black Crappie, Bluegill, Yellow Perch or Rainbow Trout.

Highline Lake Management Notes

Gizzard Shad are not compatible with downstream native fish recovery efforts and CPW does not condone the presence of this species in Highline Lake or the illegal stocking of fish in any waters.

Rainbow Trout

Highline Lake is managed as a put-and-take Rainbow Trout fishery. “Catchable” (meaning fish are stocked at a size at which anglers can catch immediately) Rainbow Trout are stocked in the spring or fall when water temperatures are cool. Rainbow Trout are a very popular sportfish at Highline Lake. While larger Rainbow Trout are occasionally surveyed (likely fish that have overwintered following the previous year’s stocking), the vast majority of Rainbow Trout surveyed are fish that have been stocked that same year. This put-and-take management strategy results in low PSD and a population size structure that is dominated by 10” - 12” fish which is the approximate size at which they are stocked (Figure 6 and Figure 7). Electrofishing catch rates of Rainbow Trout are also highly dependent on how recently they were last stocked. Timing of stocking relative to fishery surveys drives catch rates because Rainbow Trout numbers decline following stocking due to harvest and other sources of mortality.

CPW plans to continue the annual stocking of Rainbow Trout using a put-and-take strategy. Stocking rates will depend on availability from CPW’s hatcheries..

Yellow Perch

The Yellow Perch fishery in Highline Lake is limited to a low to moderate abundance of small individuals (Figure 16 and Figure 17). Yellow Perch likely provide some value as a forage fish, but they are not present in sufficient numbers or size to provide a significant angling opportunity. CPW does not stock Yellow Perch in Highline Lake and the bag and possession limit is unlimited.

Smallmouth Bass

The Smallmouth Bass fishery in Highline Lake is limited to a low abundance of fish that are mostly too small to provide angling opportunities (Figure 18 and Figure 19). Bass anglers report catching these fish from time to time, including some larger fish. CPW does not stock Smallmouth Bass in Highline Lake and the bag and possession limit is unlimited. Smallmouth Bass are not compatible with downstream native fish recovery efforts and anglers are encouraged to harvest Smallmouth Bass.

Other species

Other species present in Highline Lake, not summarized in this report, include Green Sunfish, Common Carp, White Sucker, and Red Shiner. These fish provide minimal angling opportunities but do likely serve as forage for predatory fish in the lake. CPW does not stock these species in the lake and it is likely that these species entered the lake from the Government Highline Canal.

Future Management

CPW will continue to monitor the Highline Lake fishery through standardized surveys in the fall using a combination of boat electrofishing, gill netting, trap netting, and seining. Although there are no immediate plans for regulation changes, a public meeting planned for the winter of 2021-2022 will allow anglers to discuss any concerns regarding current regulations or management of the fishery with CPW personnel. CPW continues to look for opportunities to work with private landowners to move warmwater fish from private waters into Highline Lake, especially Largemouth Bass and/or adult Black Crappie. CPW plans to continue the stocking of Largemouth Bass, Bluegill, Rainbow Trout, and Channel Catfish from CPW’s hatchery system. Stocking rates and stocking frequency will be adjusted, as needed, based on data gathered during fishery surveys. CPW plans to continue to work with anglers in 2021 to deploy additional habitat structures.

Highline Lake Historical Fishery Survey Information (Largemouth Bass)

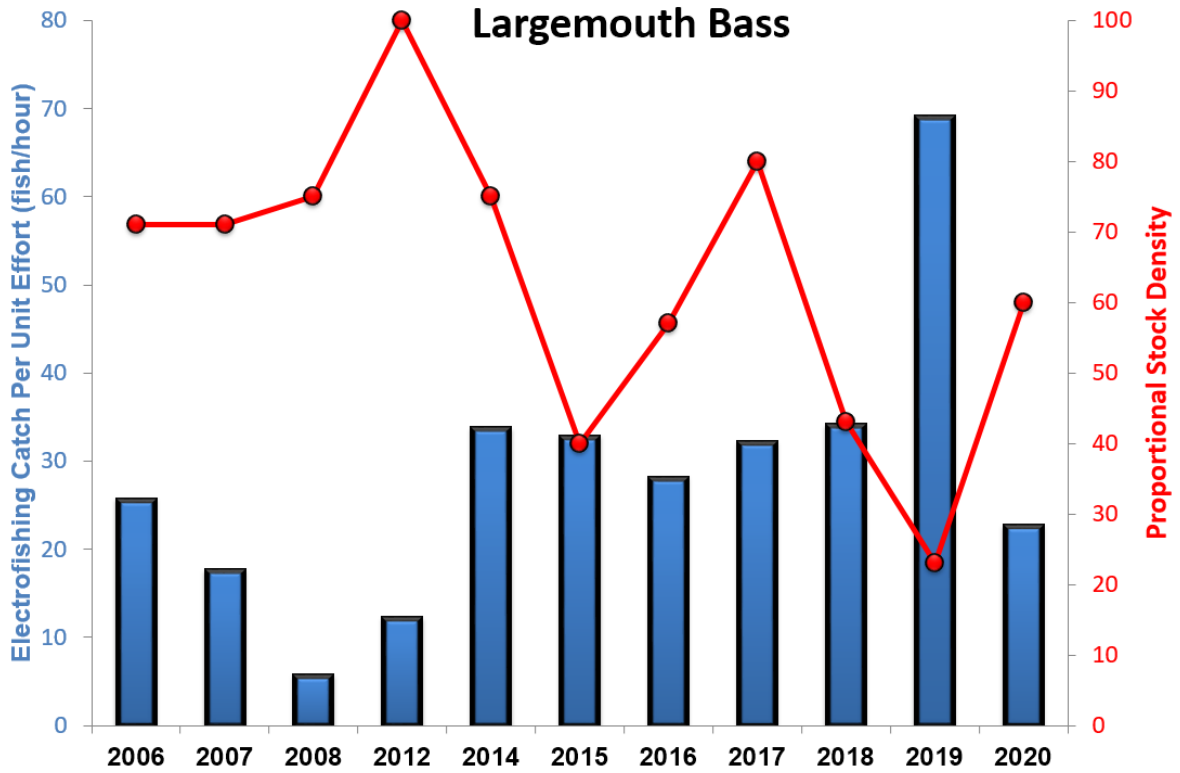


Figure 4. Catch rate per hour (primary y axis, blue data) and Proportional Stock Density (secondary y axis, red data) of Largemouth Bass captured during fall electrofishing surveys on Highline Lake. Proportional Stock Density represents the proportion of Largemouth Bass at least “stock” length (7.9 inches) that are also at least a “quality” length (11.8 inches). Ideal PSD values for a balanced Largemouth Bass population range from 40 to 70. Note that scale on catch rate axis varies between species.

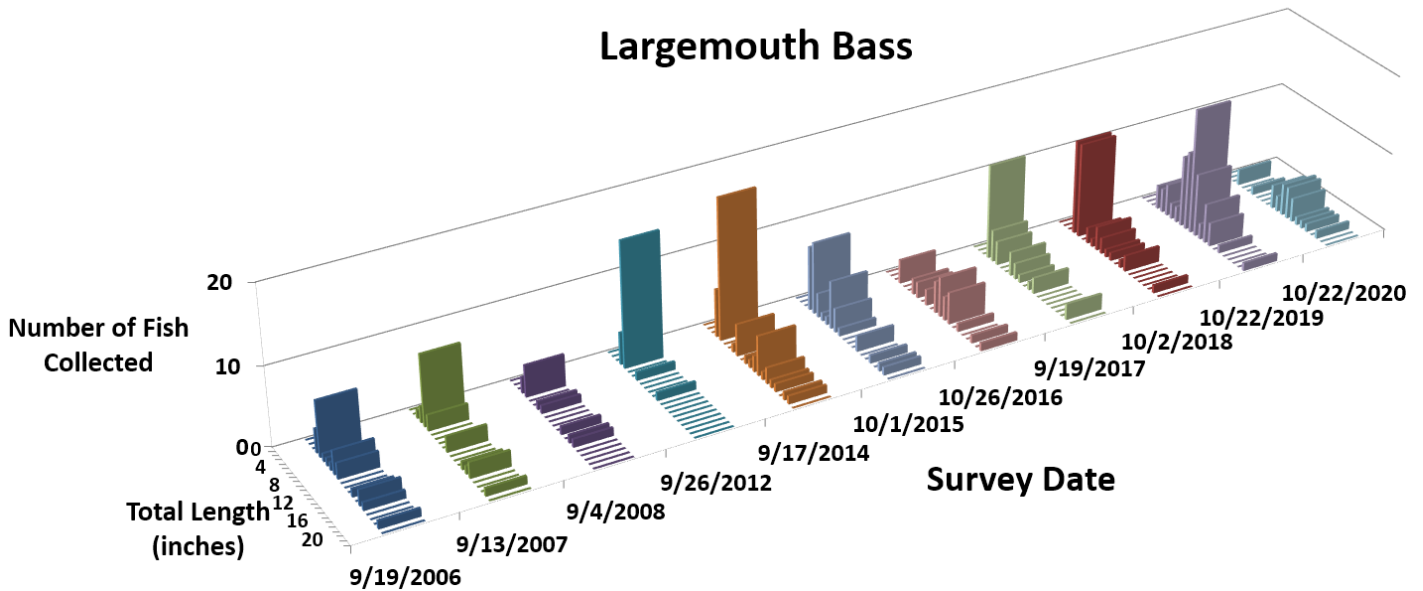


Figure 5. Size structure of the Largemouth Bass population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Rainbow Trout)

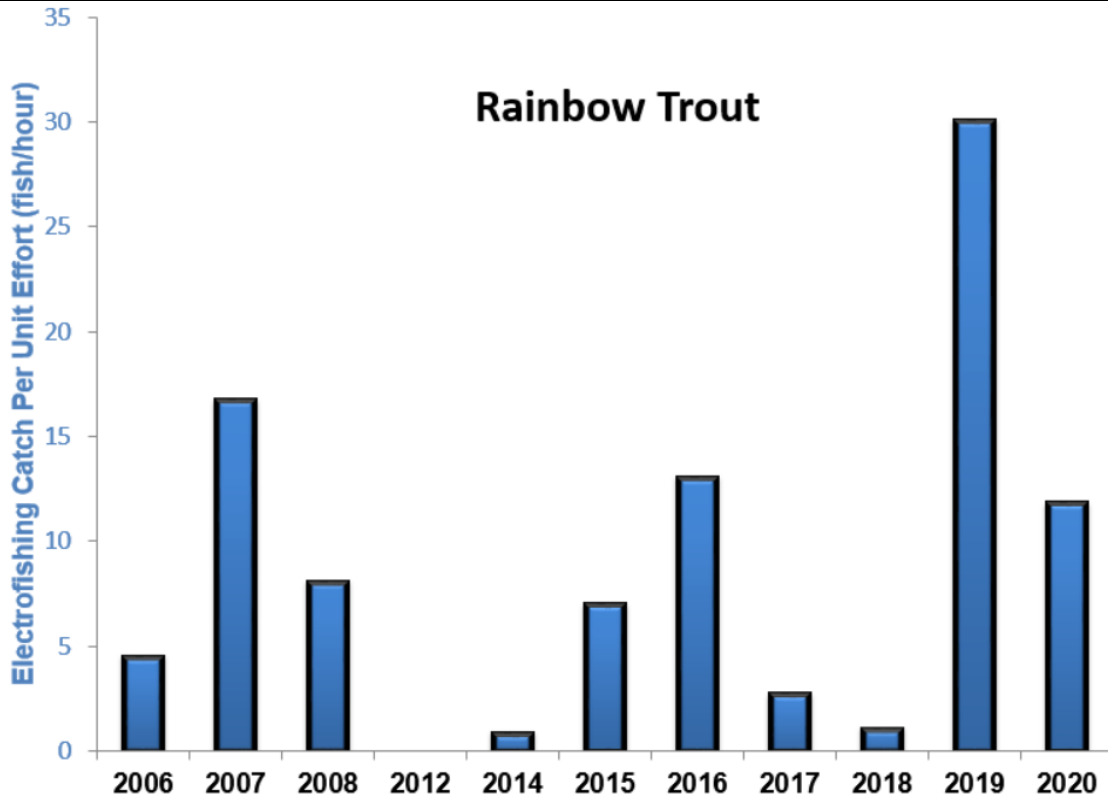


Figure 6. Catch rate per hour of Rainbow Trout captured during fall electrofishing surveys on Highline Lake. Note that scale on catch rate axis varies between species.

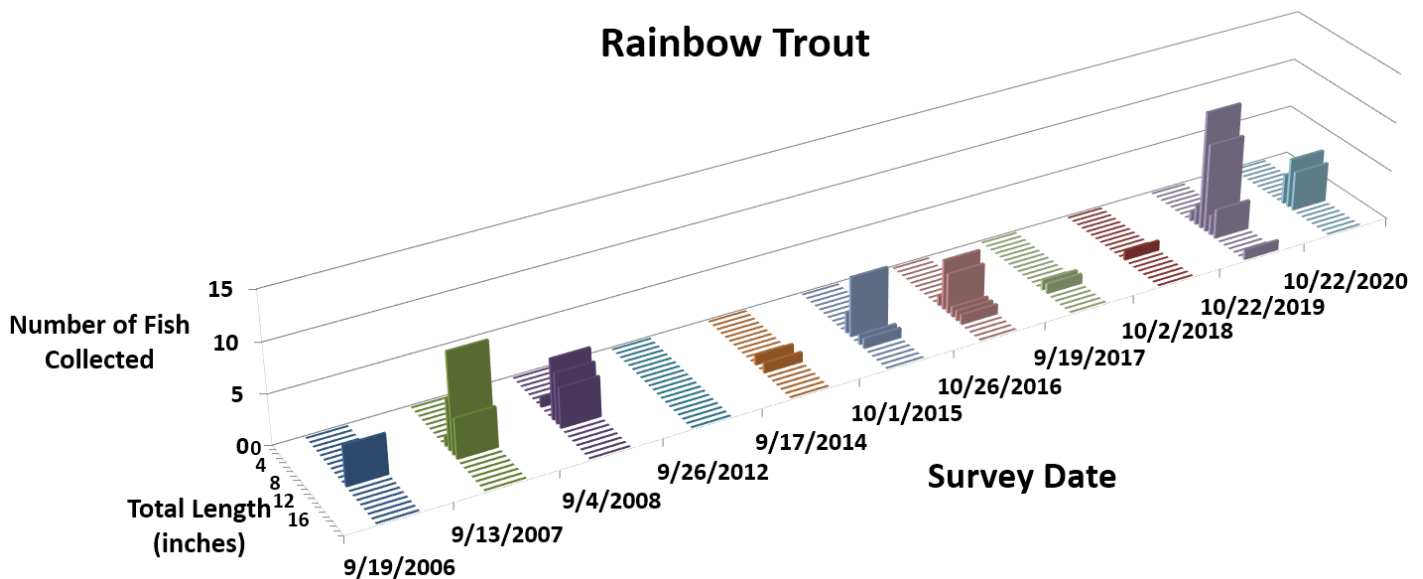


Figure 7. Size structure of the Rainbow Trout population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Black Crappie)

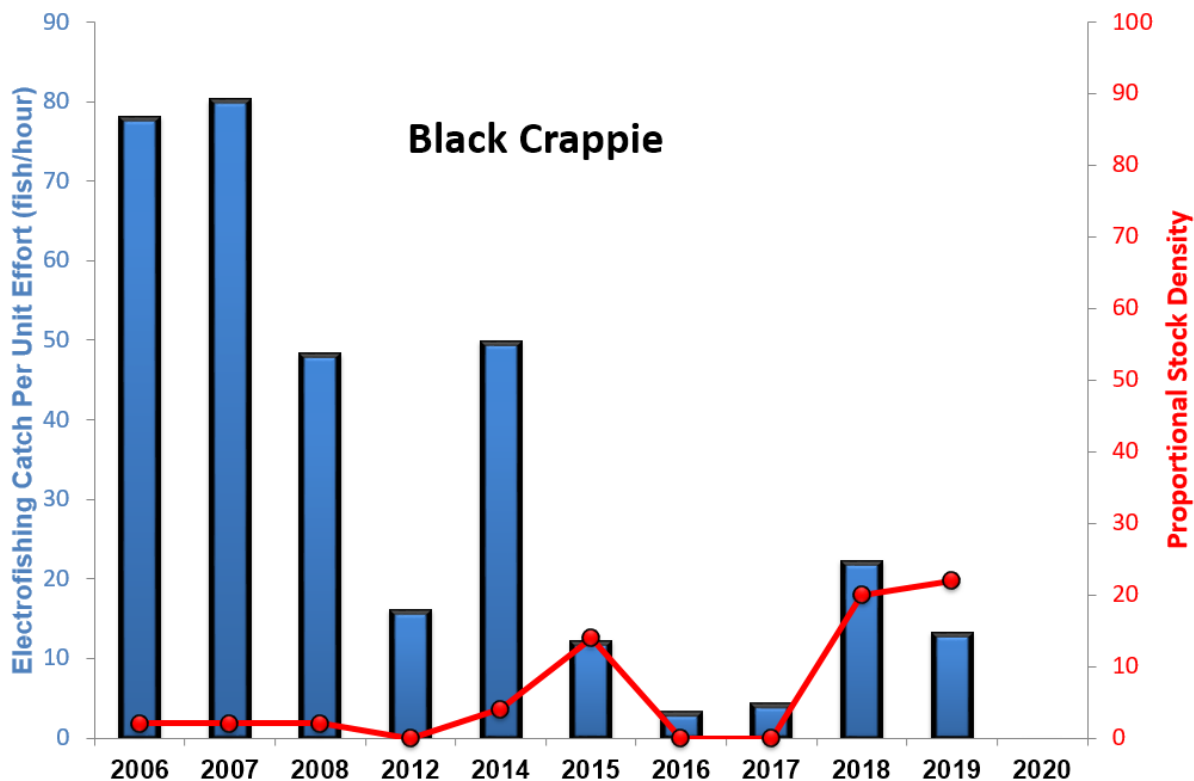


Figure 8. Catch rate per hour (primary y axis, blue data) and Proportional Stock Density (secondary y axis, red data) of Black Crappie captured during fall electrofishing surveys on Highline Lake. Proportional Stock Density represents the proportion of Black Crappie at least “stock” length (5.1”) that are also at least a “quality” length (7.9”). Ideal PSD values for a balanced Black Crappie population range from 30 to 60. No Black Crappie were captured in 2020. Note that scale on catch rate axis varies between species.

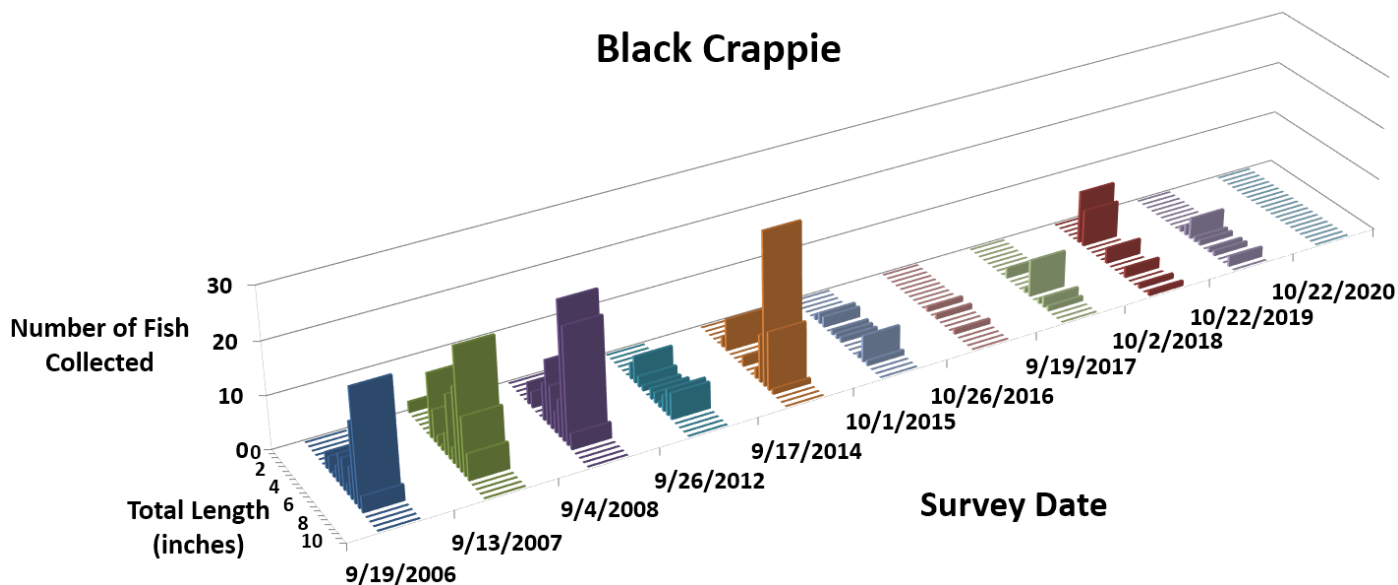


Figure 9. Size structure of the Black Crappie population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. No Black Crappie were captured in 2020. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Bluegill)

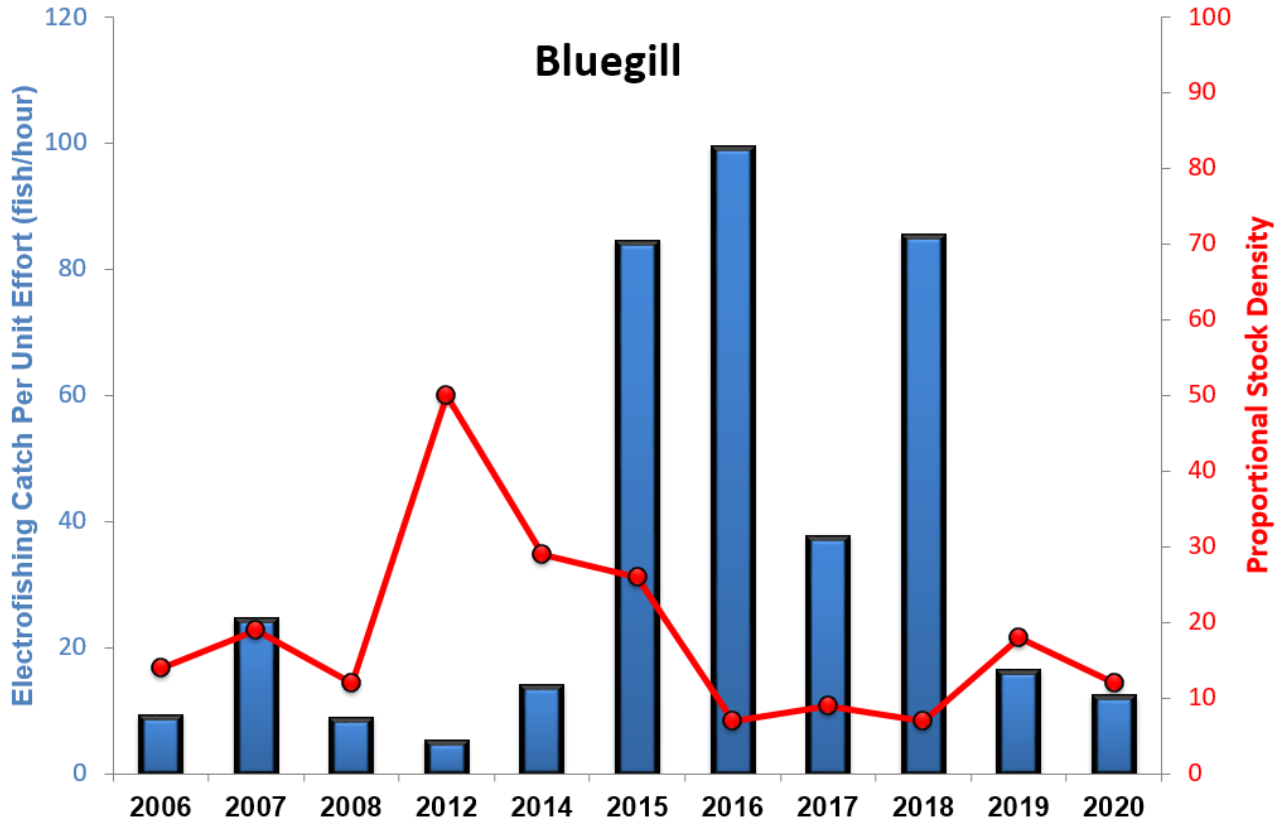


Figure 10. Catch rate per hour (primary y axis, blue data) and Proportional Stock Density (secondary y axis, red data) of Bluegill captured during fall electrofishing surveys on Highline Lake. Proportional Stock Density represents the proportion of Bluegill at least “stock” length (3.1”) that are also at least a “quality” length (5.9”). Ideal PSD values for a balanced Bluegill population range from 20 to 60. Note that scale on catch rate axis varies between species.

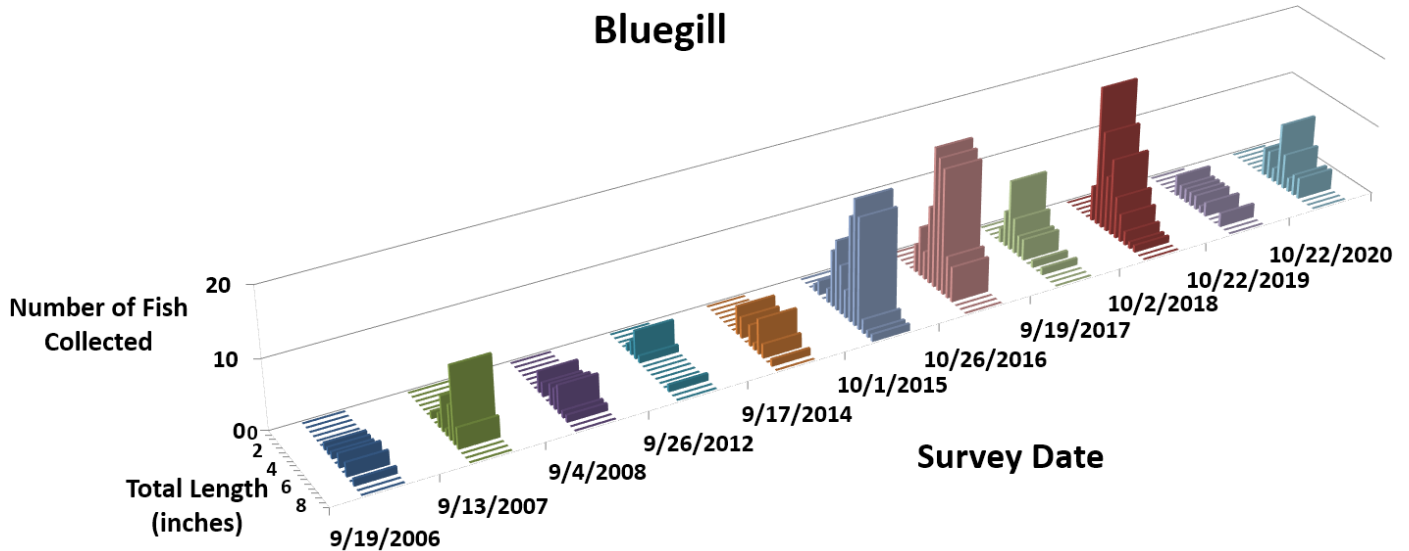


Figure 11. Size structure of the Bluegill population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Channel Catfish)

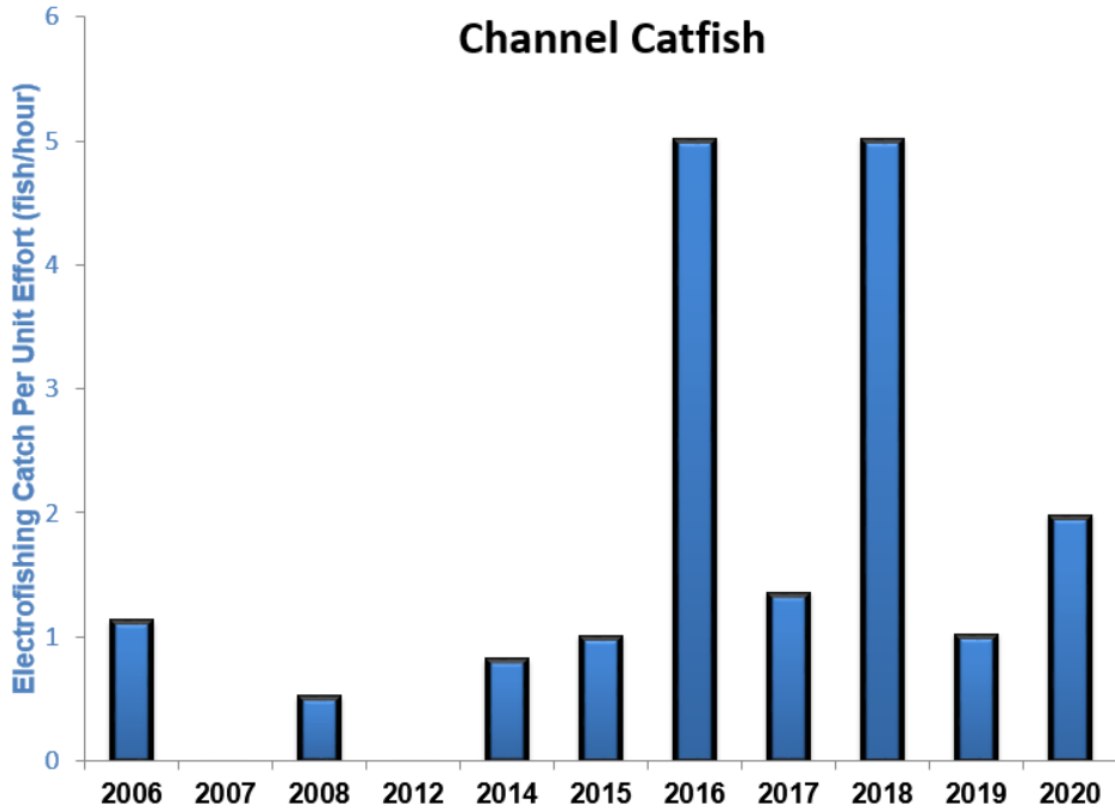


Figure 12. Catch rate per hour of Channel Catfish captured during fall electrofishing surveys on Highline Lake. Note that scale on catch rate axis varies between species.

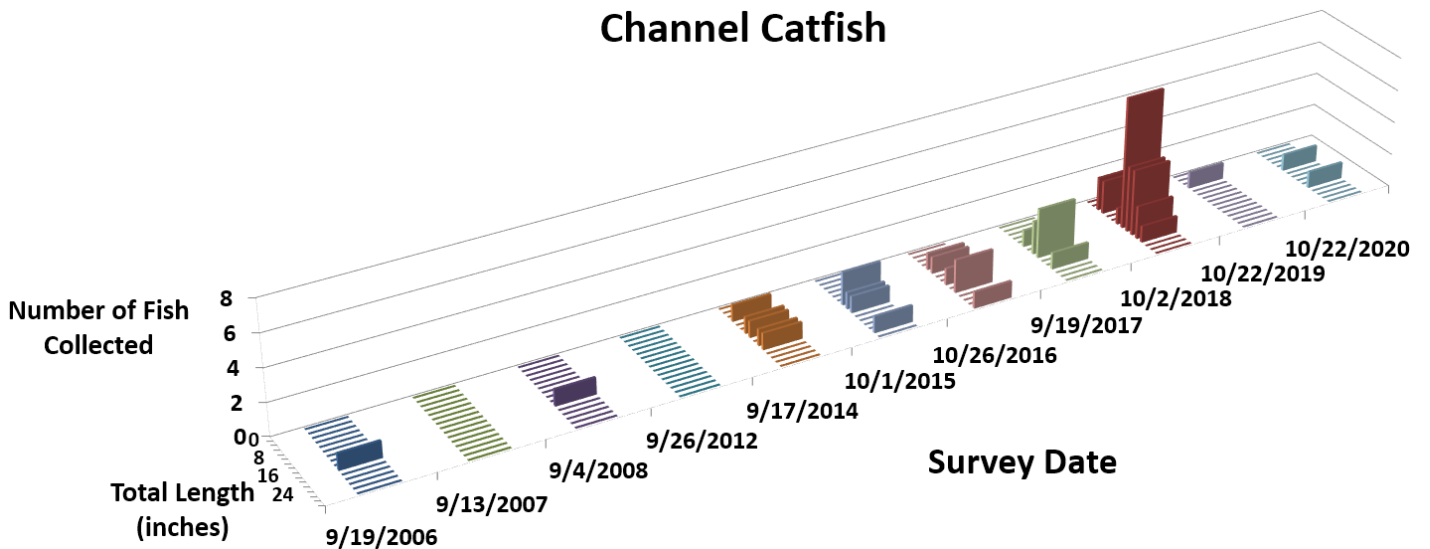


Figure 13. Size structure of the Channel Catfish population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Gizzard Shad)

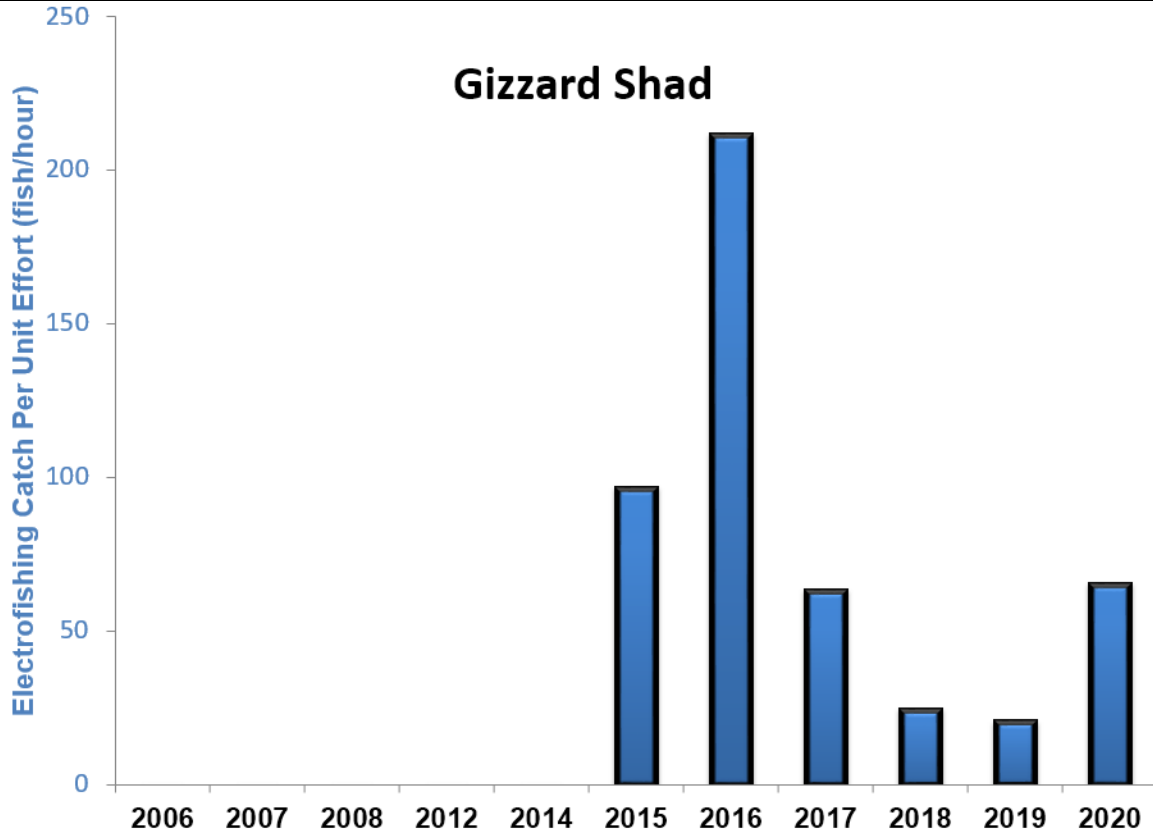


Figure 14. Catch rate per hour of Gizzard Shad captured during fall electrofishing surveys on Highline Lake. Proportional Stock Density was not calculated for Gizzard Shad because it a metric typically used for sportfish. Gizzard Shad were first documented in Highline Lake in 2015. Note that scale on catch rate axis varies between species.

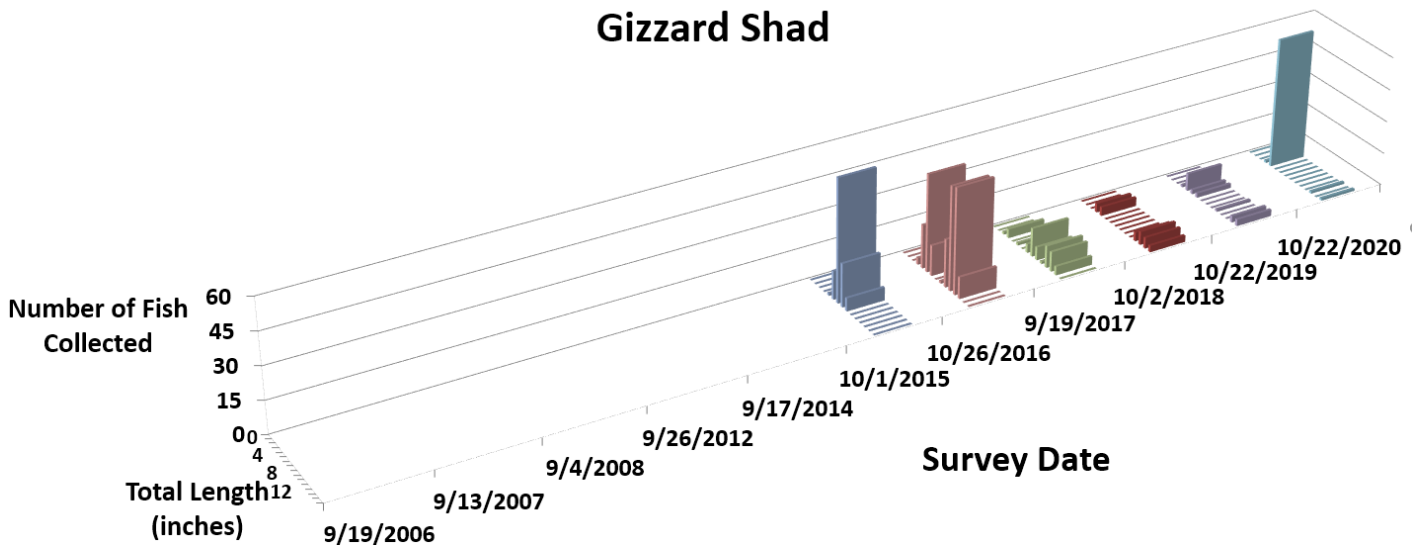


Figure 15. Size structure of the Gizzard Shad population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Gizzard shad were first documented in Highline Lake in 2015. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Yellow Perch)

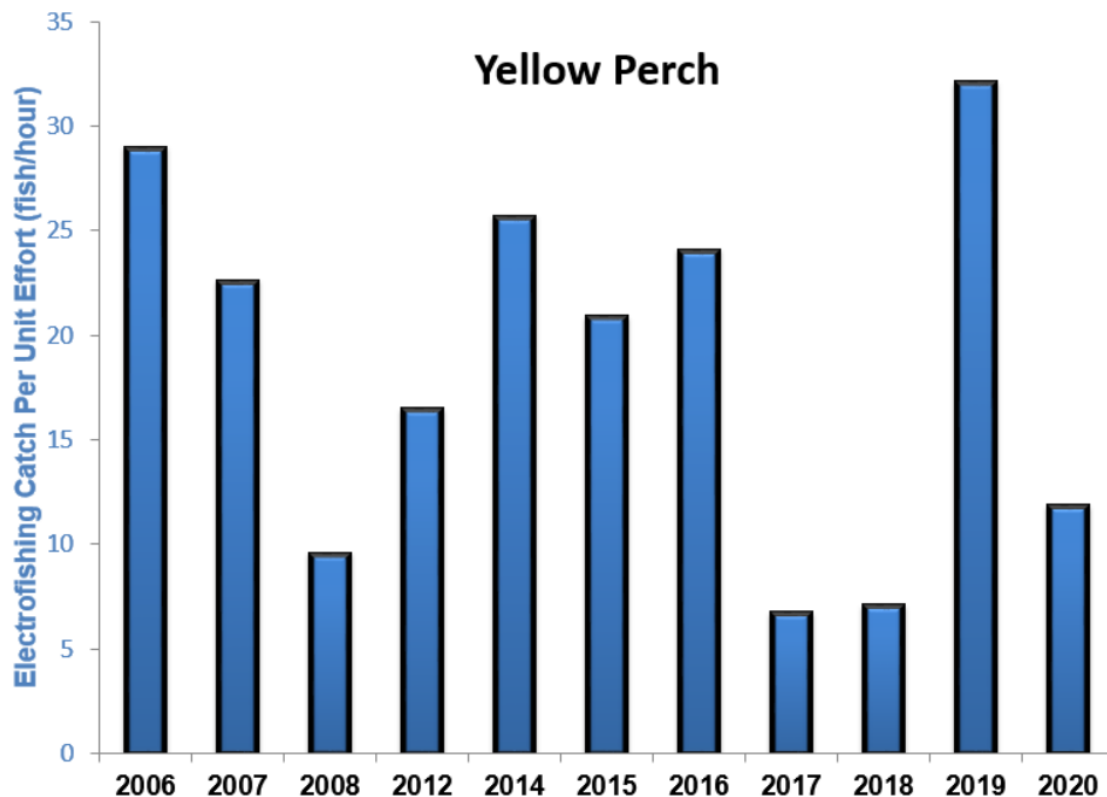


Figure 16. Catch rate per hour of Yellow Perch captured during fall electrofishing surveys on Highline Lake. Note that scale on catch rate axis varies between species.

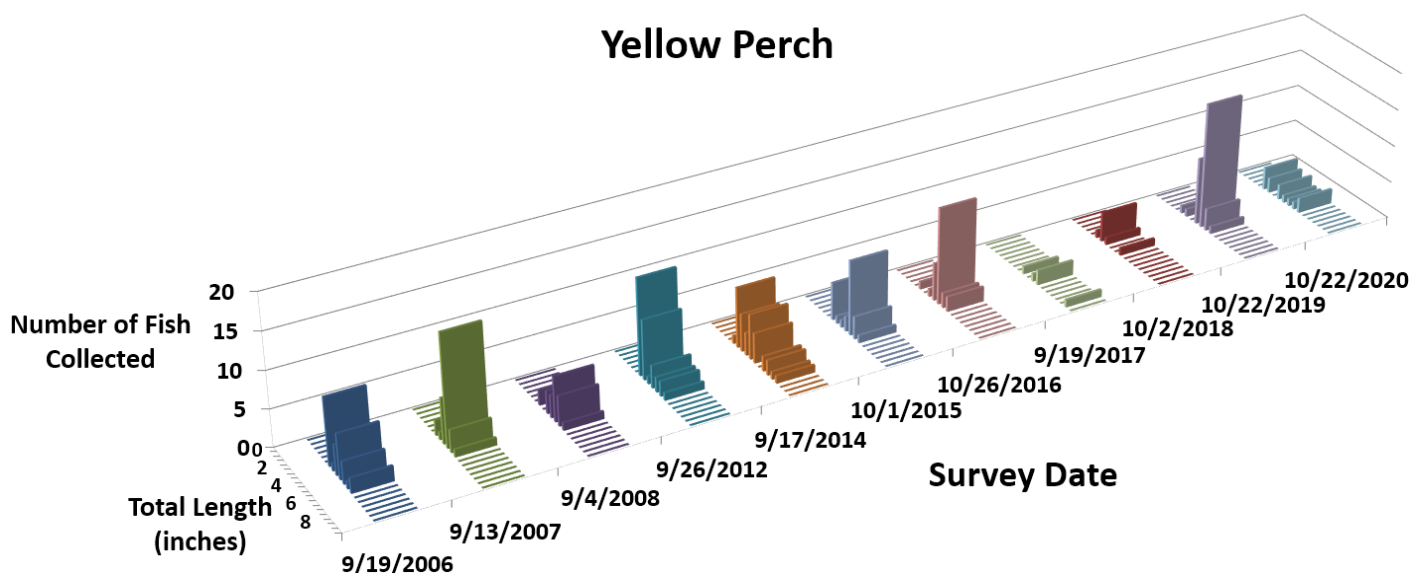


Figure 17. Size structure of the Yellow Perch population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake Historical Fishery Survey Information (Smallmouth Bass)

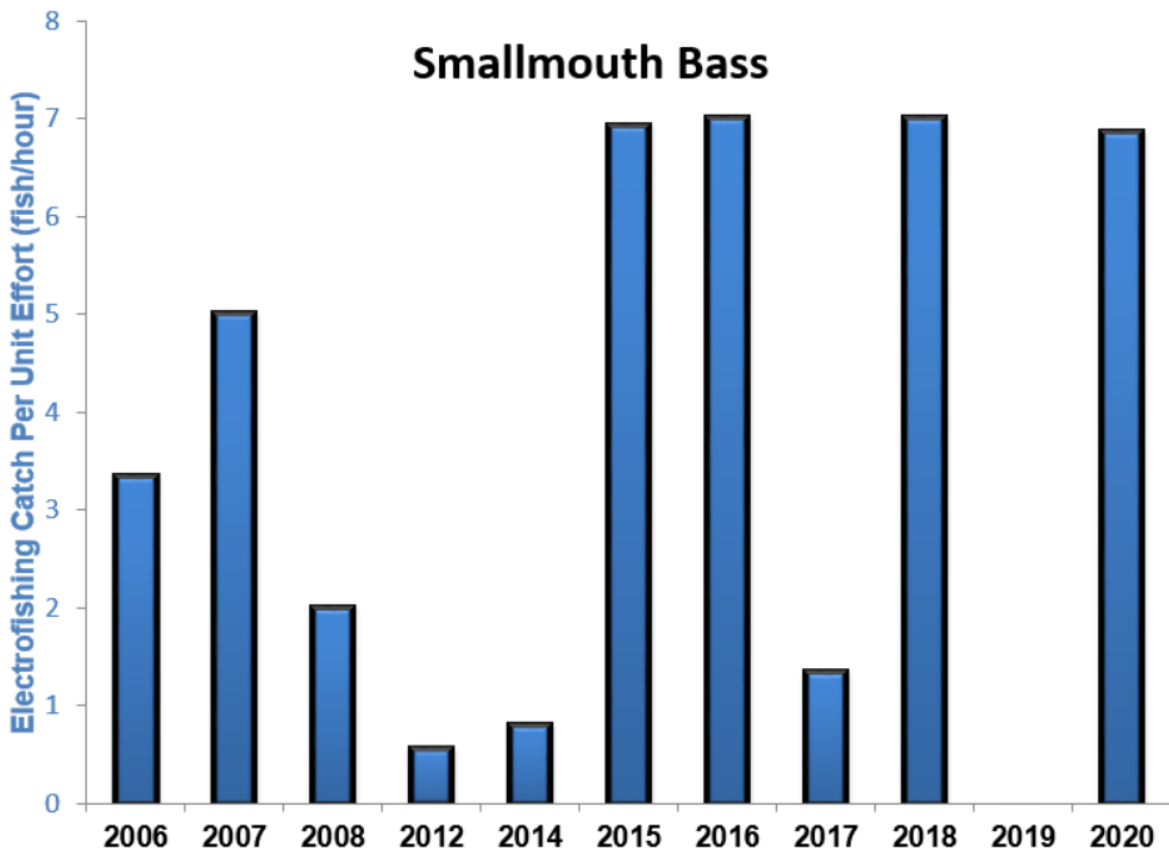


Figure 18. Catch rate per hour of Smallmouth Bass captured during fall electrofishing surveys on Highline Lake. Note that scale on catch rate axis varies between species.

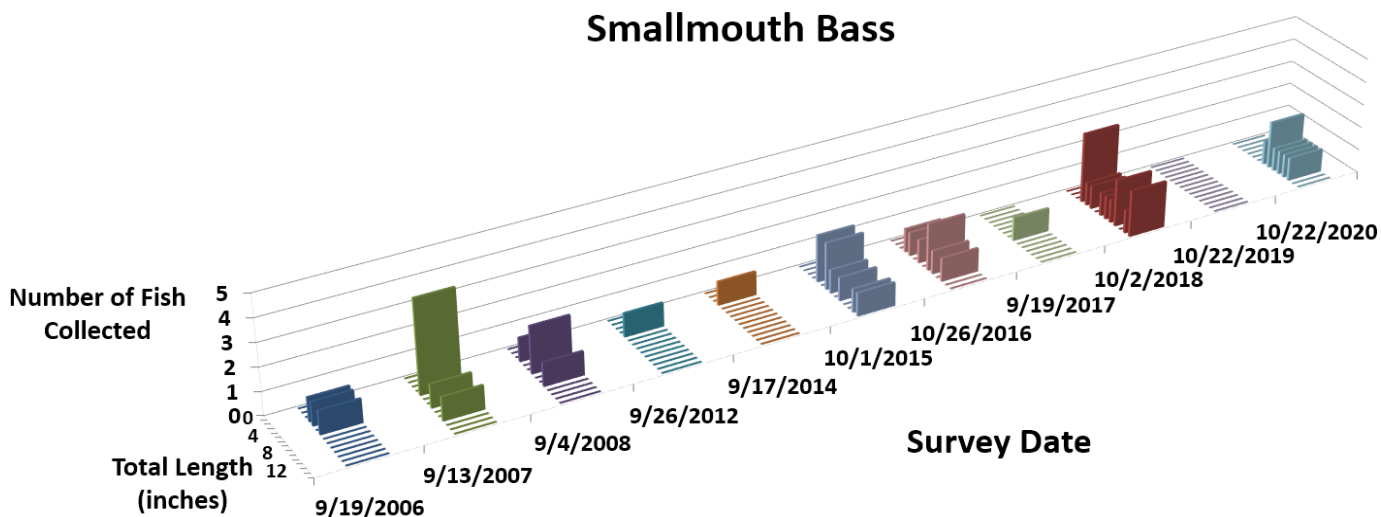


Figure 19. Size structure of the Smallmouth Bass population in Highline Lake during fall fishery surveys conducted by Colorado Parks and Wildlife between 2006 and 2020. Survey methods included electrofishing and/or gill netting. Note that scale on “Number of Fish Collected” axis varies between species.

Highline Lake 2020 Fishery Survey Information

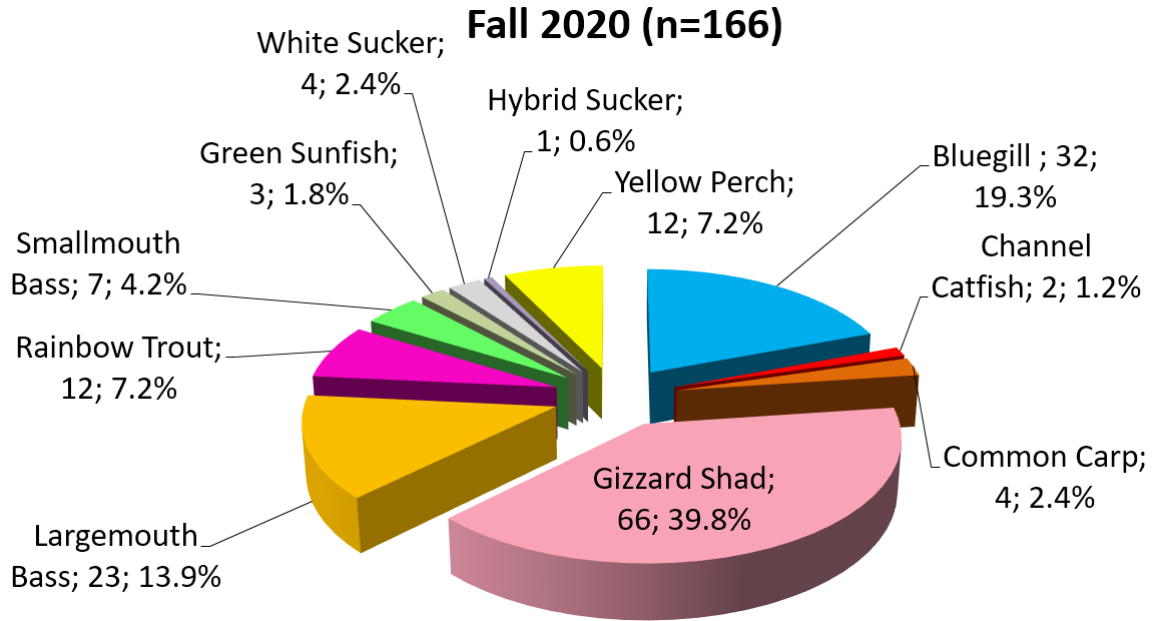


Figure 20. Species composition of Highline Lake during electrofishing survey conducted on 10/22/2020. Figure includes species, number of individuals by species, and percentage of overall catch that each species accounted for.

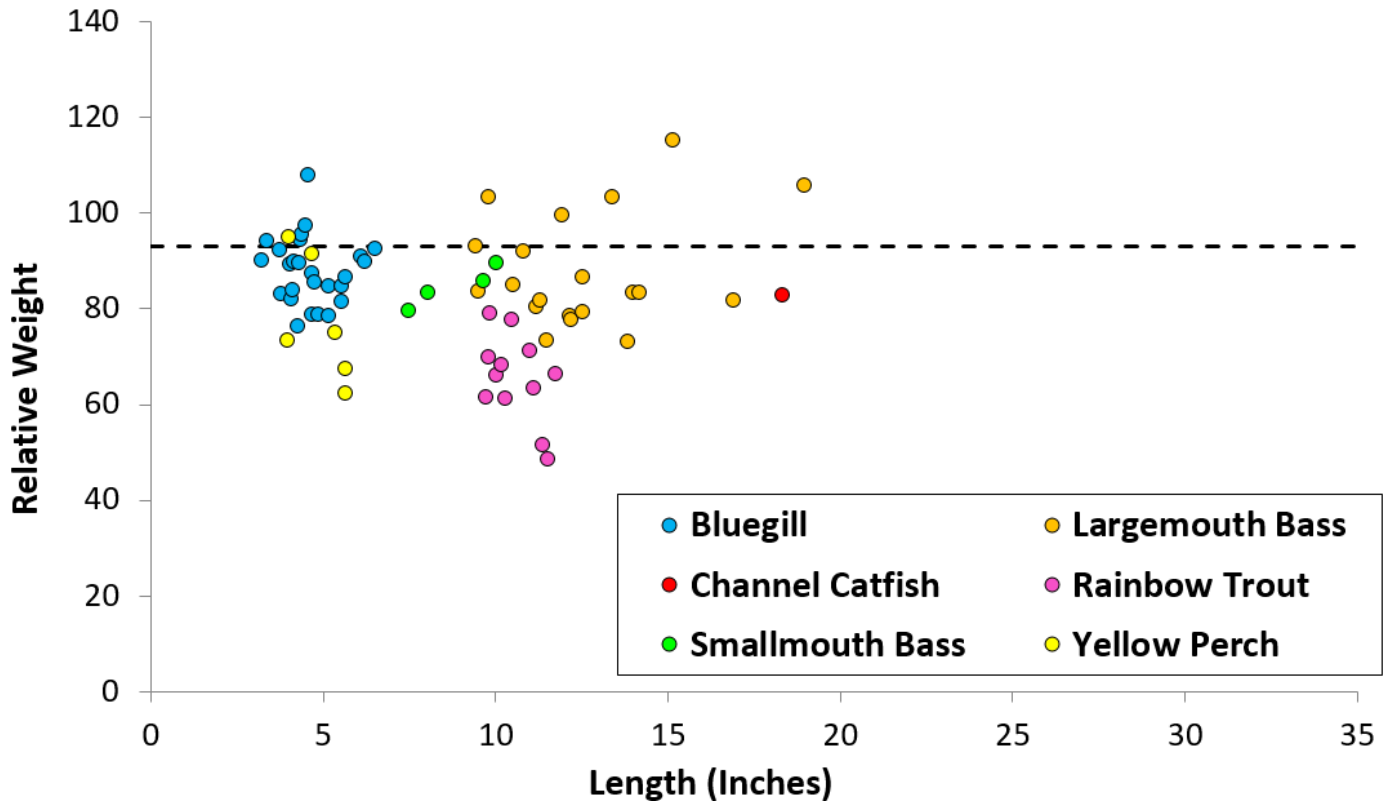


Figure 21. Relative weights of Largemouth Bass, Black Crappie, Bluegill, Rainbow Trout, and Yellow Perch captured during fishery surveys on Highline Lake conducted by CPW on 10/22/2020. The relative weight of 93, which represents an average body condition, is shown by the dashed line. Fish which did not meet the species-specific minimum length requirement for relative weight analysis were excluded.