WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Fishery Survey Report for Lake Tomah Monroe County, WI 2017-2022

Waterbody Identification Code: 1342100

Photo Credit: DNR Staff

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Table of Contents

Executive Summary

The Wisconsin Department of Natural Resources conducted a comprehensive survey of Lake Tomah from 2017 to 2022. The primary focus of this survey was to estimate the abundance and size structure of the largemouth bass, northern pike and panfish populations to provide management recommendations going forward. Spring netting surveys estimated relative abundance of black crappie and northern pike are above the 75th percentile of similar Wisconsin waters. Spring electrofishing surveys estimated relative abundance of largemouth bass and bluegill are above the 75th percentile of similar Wisconsin waters. All previously stated fisheries provide targetable populations of quality fish or better to anglers. There is also a recently introduced yellow perch population increasing in abundance, but size structure is poor. The Lake Tomah fishery has experienced a tumultuous history of management intervention but continues to support a high abundance of desirable fishes. Management recommendations: support partners that work to improve water quality and lake habitat, halt stocking of fish due to natural reproduction sustaining current fisheries, continue surveying efforts on the existing three-year rotation and consider collecting angler use and harvest information to guide future management decisions.

Introduction

LAKE CHARACTERISTICS

Lake Tomah is a 245-acre impoundment on the South Fork of the Lemonweir River located in the city of Tomah (2021 population = 9,459), Monroe County (Table 1). The Little Lemonweir River watershed is 218 square miles composed of 33% forest, 28% agriculture, 17% wetland, 15% grassland and 7% other. A 2007 survey of Tomah residents found that 80% use the lake one or more times a year. Monroe County and adjacent counties have very few lakes, thus nearby population centers likely lead to additional usage on Lake Tomah. Higher populated cities within a 30-minute drive include Black River Falls (2021 population = 3,514), Sparta (2021 population = 9,955) and Mauston (2021 population = 4,317). Fort McCoy, a large military base, is also within 12 miles of Lake Tomah. There are four boat landings and two public parks along the shoreline, which is entirely owned by the city of Tomah, to accommodate public use.

The Wisconsin Department of Natural Resources (DNR) lake classification system developed by Rypel et al. (2019) designates Lake Tomah as simple-warm-dark. Lake Tomah average depth is 4 feet and max depth is 10 feet, except for a small 19-foot hole in the eastern arm (Fig. 1). The bottom substrate is 50% sand and 50% muck. Gamefish species include the following: panfish (primarily black crappie *Pomoxis nigromaculatus*, bluegill *Lepomis macrochirus* and yellow perch *Perca flavescens*, largemouth bass *Micropterus salmoides* and northern pike *Esox lucius*. Lake Tomah weakly stratifies from June through August (summer). In the summers of 2017 through 2019 dissolved Oxygen and water temperature fluctuated between 9 to 15 milligrams per liter and 66 to 82 degrees Fahrenheit (Table 2). Secchi disk, chlorophyll a and total phosphorus summer averages from 2017 through 2022 ranged between 1.5 to 2.6 feet, 54 to 86 and 136 to 434 respectively.

MANAGEMENT HISTORY

Lake Tomah has experienced a tumultuous history of management intervention and subsequential ecosystem shifts.

SEDIMENTATION & NON-POINT POLLUTION

Since Lake Tomah’s impoundment in 1936, there have been numerous efforts to limit siltation and nonpoint source pollution. The first large-scale dredging project in 1966 removed 40,000 yards of material. Concern over runoff siltation quickly became synchronous with concern over water quality. The Lake Tomah Protection and Rehabilitation District (PRD) was created in 1974. By 1990, a watershed-centered solution approach had gained traction leading to the development of the Lake Tomah Nonpoint Source Control Plan. Evaluations estimated that 80% (2,200 tons) of total sediment influx was due to agricultural practices (Peterson et al. 1997). It has since been calculated the Nonpoint Source Control Plan has reduced erosion by 3,373 tons (Tomah Lake Committee, 2008 Lake Tomah Management Plan). The PRD’s work with Monroe County Land Conservation Department encouraging surrounding landowners to utilize better agricultural practices has also significantly reduced erosion and improved water quality. In 1993 the city of Tomah planned a five-million-dollar lake rehabilitation effort. The lake was drawdown to repair the dam from previous flood damage, and to limit future dredging costs a sediment trap was built. Concerted collaborative efforts of resource agencies and local stakeholders have improved siltation and non-point pollution, but WisCALMs phosphorus impairment thresholds for recreation and aquatic life were exceeded during testing in 1998 and again in the recent test of 2018, demonstrating these issues continue to be a detriment to Lake Tomah.

EUTROPHICATION & CARP

Lake Tomah water clarity has fluctuated over the years due to changes in nutrient loading through nonpoint pollution and the suspension of sediments via common carp *Cyprinus carpio*. Initially, Lake Tomah water clarity was dictated by nutrient loading, which led to expansive aquatic plant growth, found as both filamentous algae and rooted aquatic macrophytes (Tomah Lake Committee, unpublished). Chemical treatments were utilized to limit lake vegetation and improve water clarity for recreational enjoyment from 1966 to 1984. Chemical treatments have since been limited to the lower portion of the reservoir to minimize deleterious effects on key areas of fish and wildlife habitat. When common carp became present in Lake Tomah, aquatic plant growth experienced a dramatic decline. Common carp uproot aquatic macrophytes suspending sediment, which raises lake turbidity and decreases light penetration. Aquatic rooted plant growth serves many necessary roles for an aquatic ecosystem, and thus the disappearance after the introduction of common carp can negatively impact a fishery. A lake-wide rotenone treatment to eradicate common carp occurred in conjunction with the 1993 drawdown. This treatment was unsuccessful in eradicating common carp. By 2009, Lake Tomah was almost entirely devoid of aquatic rooted plants. Attempts to remove common carp using electrofishing after the 1993 treatment were unsuccessful, thus another rotenone treatment was prescribed in 2009. After the successful eradication of common carp in the 2009 rotenone treatment, the most recent aquatic plant surveys from 2011 to 2014 indicate aquatic plant growth has returned (DNR, 2014 Aquatic Plant Report). The return of aquatic vegetation is considered an improvement in fish habitat within Lake Tomah.

FISHERIES MANAGEMENT

A large amount of fish habitat (cribs and riprap), both natural and artificial, was added during the 2009 drawdown with the hope of facilitating strong recruitment of stockings and congregate fish for future angling opportunities (Sass et al. 2022). This was supplementary to the abundance of habitat previously added by anglers and government agencies over the years. Fishing regulations have been another tool used to manipulate Lake Tomah's fishery. Panfish regulations have always followed the statewide fishing regulation of a mixed daily bag of 25 fish in total. The largemouth bass minimum length limit was changed in 2015 from the state-wide regulation of 14 inches with a daily bag of five fish during harvest season to 18 inches with a daily bag of one fish during harvest season (Table 3). Lake Tomah has historically been deemed a trophy northern pike fishery and this continues to be a focal point for fisheries management (Fig. 2). The Lake Tomah northern pike minimum length limit initially changed in 2015 from the southern zone statewide regulation of 26 inches with a daily bag of two fish during harvest season to 32 inches with a daily bag of one fish during harvest season and was again raised in 2022 to 40 inches with a daily bag of one fish. After the 2009 rotenone treatment, which resulted in the complete removal of fish from Lake Tomah, panfish, largemouth bass and northern pike were stocked (Table 4). The following fish species are now present in Lake Tomah: black bullhead *Ameiurus melas*, brown bullhead *Ameiurus nebulosus*, channel catfish *Ictalurus punctatus*, creek chub *Semotilus atromaculatus*, golden shiner *Notemigonus crysoleucas*, pumpkinseed *Lepomis gibbosus*, walleye *Sander vitreus*, white crappie *Pomoxis annularis*, white sucker *Catostomus commersonii* and yellow bullhead *Amerius natalis* (Table 5). High recreational usage is likely the cause for the unintentional introduction of invasive species as well: Chinese mystery snail *Bellamya chinensis*, curly-leaf pondweed *Potamogeton crispus*, Eurasian water milfoil *Myriophyllum spicatum* and rusty crayfish *Faxonius rusticus*.

SURVEY EFFORT

LATE SPRING NETTING SURVEYS (SNII)

On 3/20/2017 six nets were set and checked over three nights. On the second day, one net was pulled and reset on the third day for a total of 17 net nights of effort.

On 4/23/2018 six nets were set and checked over three nights for a total of 18 net nights of effort.

On 4/13/2022 six nets were set and checked over five nights. On the 5th day, one net was pulled for a total of 29 net nights of effort.

LATE SPRING ELECTROFISHING SURVEYS (SEII)

On 05/09/2017 electrofished using Direct Current Pulse at 260 volts, 10 Amps, 80 pulses and a 20% duty cycle for 97 minutes over 2.75 miles targeting gamefish (largemouth bass, northern pike) then 26 minutes for 0.5 miles targeting all species.

On 05/10/2022 electrofished using Direct Current Pulse at 210 volts, 10 Amps, 80 pulses and a 20% duty cycle for 96 minutes over 2.91 miles targeting gamefish then 11 minutes for 0.25 miles targeting all species.

Methods

SURVEY & AGING METHODS

Fisheries surveys were conducted consistent with statewide fisheries sampling protocol unless stated otherwise. SNII surveys utilized fyke nets (3/4 in. mesh, 4 ft. width, 6 ft. height, 75 ft. lead)y, set perpendicular to the shore, checked after approximately 24 hours of soak time. Surveys were intended to target yellow perch, black crappie, white crappie and northern pike. SEII surveys utilized night-electrofishing, completed with a mini-boom boat carrying one dipper using 3/8 mesh dip netting. SEII surveys were split into two runs: a majority of lake shoreline targeting gamefish and a smaller portion of shoreline targeting all species. The distance in the 2022 all-species run was mistakenly cut short of the typical protocol. Gamefish and panfish species were measured to the nearest 0.1 inch, weighed to the nearest gram then released. All non-gamefish species were counted. Both scales and anal fin ray aging structures were collected from northern pike captured in the 2022 survey. Structures were aged separately by two readers based on the first or second anal fin ray. If there was a reading disagreement, agers would take a second look together and decide on a consensus age. Scales were used to verify the ages of younger fish when necessary.

STATISTICAL METHODS

All analyses were performed and graphically displayed using R Statistical Software (v.2023.06.2+561, R Core Team 2023).

The SNII catch data was used to develop size structure length frequency graphs with annual length medians for yellow perch, black crappie, white crappie and northern pike in the 2017, 2018 and 2022 survey years. Proportional stock densities were calculated for preferred sizes of fish from the Gablehouse (1984) equation

$$\boldsymbol{PSD - P = \left(\frac{\#\ of\ fish\ \geq Preferred\ size}{Number\ of\ fish\ \geq Stock\ size}\right)\ x\ 100}$$

The average catch per net night was compared amongst years and to Wisconsin standards for simple-warm-dark waters established by Rypel et al. (2019). Relative weights (Neumann et al. 2012) of species were calculated by sex from a random portion of fish captured during the 2017 and 2018 surveys following the equation

$$\boldsymbol{Relative\ Weight = \frac{Observed\ weight}{Standard\ weight}\ x\ 100}$$

Northern pike display female-biased sexual size dimorphism thus size structure and relative weight data were separated by sex. Northern pike aging data from 2022 was used to create an age frequency graph stacked by sex with median northern pike age. The same data was used to create Von Bertalanffy growth equations following (Isely and Grabowski 2007)

$$\boldsymbol{l_t = L_\infty\left(1 - e^{-K(t-t_0)}\right)}$$

where l_t is the fish length at age, L_∞ is the theoretical maximum fish length, K is the growth rate, t is fish age and t_0 is the curve intercept. Parameters of the model were estimated by sex for northern pike and compared to Wisconsin standards for simple-warm-dark waters established by Rypel et al. (2019). The 95% confidence bands were developed using a bootstrapping method (Efron and Tibshirami 1998). Values outside the sampled age range were extrapolated, however a lack of older female northern pike in the sample prevented the model from converging and estimating a reasonable value for mean theoretical maximum fish length (i.e. L_∞).

The SEII catch data was used to develop size structure length frequency graphs with annual length medians for largemouth bass and bluegill in 2017 and 2022. Proportional stock densities were calculated for preferred sizes of fish (Gablehouse 1984). The average catch per mile was compared among years and to Wisconsin standards for simple-warm-dark waters established by Rypel et al. (2019). Relative weights (Neumann et al. 2012) for species were calculated from a random portion of fish captured during the 2017 survey and the distribution was graphed with a median value.

Results & Discussion

PANFISH

BLUEGILL

In the 2017 SEII survey 151, bluegill were caught with a median length of 6.1 inches, a PSD-P of 0 and a relative abundance of 302 fish per mile (Fig. 3, Fig. 4). The 2022 SEII survey captured 370 bluegill with a median length of 5.9 inches, a PSD-P of 3.6 and a relative abundance of 1480 fish per mile. A total of 50 fish were weighed with a median relative weight of 0.97 (Fig. 5).

The relative abundance of bluegill in Lake Tomah was above the 75th percentile of similar Wisconsin waters throughout the duration of the study. Relative weights from 2017 fish were excellent, suggesting intraspecific competition was not leading to poor growth. Even after the abundance quadrupled, the 2022 size structure did not change; over 50 percent of bluegill were above quality size showing Lake Tomah could still support the high abundance without evidence of stunting. SEII surveys recorded fish of all size classes and bluegill have not been stocked since 2011. Bluegill are being supported exclusively by natural reproduction. If anglers desire to increase the amount of preferred length (8 inches) or larger fish through a potential regulation change, it would be advised to collect aging structures and develop a growth curve first. Given the highly productive bluegill population present we do not recommend regulation changes at this time, but rather maintain the current regulation, which is not limiting the productive quality fishery that is available.

BLACK CRAPPIE

In the 2017 SNII survey, 73 black crappie were caught with a median length of 8.3 inches, a PSD-P of 2.8 and a relative abundance of four fish per net night (Fig. 6, Fig. 7). The 2018 SNII survey captured 269 black crappie with a median length of 9.0 inches, a PSD-P of 3.7 and a relative abundance of 15 fish per net night. The 2022 SNII survey captured 180 black crappie with a median length of 6.4 inches, a PSD-P of 15.6

and a relative abundance of six fish per net night. A total of 25 fish were weighed with a median relative weight of 0.88 (Fig. 8).

Black crappie were likely introduced through unauthorized stockings; the population is supported by natural reproduction. Highly variable black crappie recruitment, strongly influenced by environmental conditions, is a widely accepted expectation and should not draw concern (Pope and Willis 1998, Dockendorf and Allen 2005). Overall relative abundance was above the 75th percentile of similar Wisconsin waters throughout the duration of the study. Relative weights of 2017 fish indicated slightly above-average condition; however, the sample size is limited and therefore assumptions based on the results should be limited. The proportion of preferred length (≥10 inches) fish has increased over time, but black crappie population volatility and length frequency graphs imply size structure is likely being driven by the strong year classes. Black crappie in Lake Tomah have shown to reach memorable sizes (≥12 inches) and managing for more fish of this length may be desirable. Crappie regulations, especially to develop a trophy fishery, are more commonly accepted by angling communities than other panfish species (Boxrucker and Irwin 2002). Before considering a potential regulation change, aging structures should be collected to develop a growth curve and creel information should be collected to estimate angling mortality.

WHITE CRAPPIE

In the 2017 SNII survey, 221 white crappie were caught with a median length of 8.6 inches, a PSD-P of 0.5 and a relative abundance of 13 fish per net night (Fig. 9, Fig. 10). The 2018 SNII survey captured 131 white crappie with a median length of 9.5 inches, a PSD-P of 22.9 and a relative abundance of seven fish per net night. The 2022 SNII survey captured 4 white crappie with a median length of 11.5 inches, a PSD-P of 50 and a relative abundance of 0.1 fish per net night. A total of 50 fish were weighed with a median relative weight of 1.04 (Fig. 11).

As with black crappie, white crappie were likely introduced through unauthorized stockings. It is unclear why the white crappie population appears to have declined in recent SNII surveys. One explanation could be the stocked year classes did not successfully natural reproduce. Another explanation is the decline of white crappie abundance mirrored the establishment of a yellow perch fishery. Excellent relative weights from 2017 do not indicate interspecific competition was pushing white crappie mortality, but yellow perch did not reach abundant numbers until the 2018 and 2022 survey years. Unkenholz (1971) showed yellow perch and white crappie share overlapping diet items, but little research exists demonstrating the negative effects of direct competition between the two species. As white crappie density decreased their size structure improved, but the current abundance is too low to support a targetable fishery. We do not recommend any future management actions (e.g., stocking) to support the illegally introduced white crappie population.

YELLOW PERCH

In the 2017 SNII survey, one yellow perch was caught for a relative abundance of 0.1 fish per net night (Fig. 12, Fig. 13). The 2018 SNII survey captured 70 yellow perch with a median length of 7.8 inches, a PSD-P of 1.4 and a relative abundance of 4 fish per net night. The 2022 SNII survey captured 181 yellow perch with a median length of 7.3 inches, a PSD-P of 2.2 and a relative abundance of 6 fish per net night.

Yellow perch are another species introduced by unauthorized stockings. The relative abundance of yellow perch has increased substantially over the study duration, climbing to above the 75^{th} percentile of similar Wisconsin waters in 2022. The introduction year of yellow perch is not known. Population abundance increase could be attributed to the traditional expansion of a new species. The yellow perch population is comprised of primarily small fish, possibly the result of a young population, or signifying intraspecific density dependence effects may be occurring. There is no recorded date of introduction, or condition and growth metrics to base these speculations on. Yellow perch are displaying abundance over many size classes throughout the study demonstrating successful natural reproduction. Convincing anglers to harvest enough small yellow perch to limit density-dependent effects may be difficult (Lyons et al. 2017). Regulation changes are not currently recommended to attempt improvement of size structure. Yellow perch are also a preferred food for northern pike. Considering Lake Tomah is currently managed for northern pike, the establishment of a yellow perch population should aid the trophy northern pike fishery.

GAMEFISH

LARGEMOUTH BASS

In the 2017 SEII survey, 168 largemouth bass were caught with a median length of 14.9 inches, a PSD-P of 47 and a relative abundance of 61 fish per mile (Fig. 14 and 15). The 2022 SEII survey captured 325 largemouth bass with a median length of 12.3 inches, a PSD-P of 8 and a relative abundance of 112 fish per mile. A total of 54 fish were weighed with a median relative weight of 1.07 (Fig. 16).

The relative abundance of largemouth bass surveys are above the 75^{th} percentile of similar Wisconsin waters. In 2017, exceptional relative weights and a high PSD-P indicated condition was good, and not limited by the highly abundant population. The drop in PSD-P in the 2022 survey is driven by an increased abundance of smaller fish in the system. SEII surveys collected a high abundance of mature larger-sized fish likely capable of spawning. Stocking efforts may be having negligible effects. It is recommended to cease stocking to accurately monitor the largemouth bass fishery for self-sustaining natural reproduction. The 18-inch minimum length limit introduced in 2015 may have improved the abundance of 18-inch or greater largemouth bass in Lake Tomah catching four more fish than the previous zero from the 2017 survey. Another explanation is the largemouth bass population was still young at the time of the 2017 survey and had time to grow older and larger by the

2022 survey. More fishing seasons followed by future fisheries surveys are needed to confidently assess the effects the regulation is having on the population. Density-dependent effects are common under the use of minimum length limits (Wilde 1997, Hill et al. 2022). If stunting becomes a concern, weight and aging structures should be collected before a regulation change is considered to see if growth curves and conditions support the decision. Largemouth bass are becoming a catch-and-release fishery (Arlinghaus 2007, Gaeta 2013, Sass and Shaw 2020) often minimizing regulatory effects regardless of change. It is also important to note before a regulatory change of predatory species, shifts can have negative effects on panfish population size structures (Carlson and Hoyer 2023).

NORTHERN PIKE

In the 2017 SNII survey, 193 northern pike were caught with a median length of 27.5 inches, a PSD-P of 44 and a relative abundance of 11 fish per net night (Fig. 17, Fig. 18). The 2018 SNII survey captured 132 northern pike with a median length of 25.8 inches, a PSD-P of 22.7 and a relative abundance of seven fish per net night. The 2022 SNII survey captured 240 northern pike with a median length of 22.7 inches, a PSD-P of 10.4 and a relative abundance of eight fish per net night. A total of 256 fish were weighed with a median relative weight of male and female northern pike of 0.88 (N= 168) and 1.01 (N= 62), respectively (Fig. 19). A total of 115 northern pike were aged with a median of age 3. Of the 115 aged fish 95 were male and 13 were female (Fig. 20). Von Bertalanffy growth curves for both sexes were greater than the median of northern pike found in similar Wisconsin waters (Rypel et al. 2019). Male growth equation estimates were L inf = 26.93, K = 0.63, t0 = -0.28, (95% confidence intervals presented in Table 6). The female growth equation parameters did not converge on realistic values due to few older fish being sampled (i.e., L inf = 99.86, K = 0.07, t0 = -1.55, Fig. 21) .

The relative abundance of northern pike was above the 75th percentile of similar Wisconsin waters throughout the survey. SNII surveys recorded fish of all size classes and northern pike have not been stocked since 2012. Northern pike are being supported exclusively by natural reproduction. Overall size structure has decreased, also evident by a drop in PSD-P and the disappearance of large (>32 inches) fish. The population has shifted even heavier towards male-dominated than the original 2017 and 2018 surveys showed. The Von Bertalanffy growth equation demonstrates that only older larger female northern pike reached the previous minimum length limit of 32 inches. The age frequency graph supports the disappearance of these older larger females from the fishery. The decrease in overall size structure is likely a response to the overharvest of the larger female northern pike during the 32-inch minimum length limit. Relative weights from 2017 fish, when abundance was highest, were slightly above average for males and excellent for females indicating that density dependence effects were not a factor in the size structure decrease. Growth curves further demonstrate a lack of density-dependent effects because northern pike are growing on par or above the state median for waters with similar conditions (Fig. 25). The new 40-inch minimum length limit will begin to give the large female fish time to reach trophy lengths. Stockpiling under minimum length limits is a common problem for northern pike and may negatively affect the overall size structure of the fishery (Pierce 2010). The current regulation should be monitored closely to evaluate whether population goals are being met and whether alternative regulation changes would be appropriate (e.g. a harvest slot or maximum length limit).

SUMMARY

Lake Tomah is a shallow man-made lake in a highly agricultural watershed, therefore combatting sedimentation and eutrophication is an expectation. The city of Tomah and involved stakeholders have spent substantial amounts of time and money protecting Lake Tomah. As a result, significant improvements in water quality and fisheries have occurred. Common carp have not re-colonized Lake Tomah since the rotenone treatment was completed in 2009. This has allowed aquatic rooted vegetation to reestablish, greatly increasing littoral fish habitat, and resulting in the redistribution of fish biomass to centrarchid species (e.g., largemouth bass and bluegill). Additional habitat structures such as fish sticks, fish cribs and rock piles could increase fish productivity as well as congregate fish to improve angler opportunities (Sass et al. 2022). Fish stocking and unauthorized transfers of fish have established naturally reproducing populations of desirable gamefish and panfish species as well as less desirable non-gamefish species. Panfish and gamefish surveys indicate that abundances are above 75% of state waters with similar conditions. There is a targetable population of quality harvestable-sized panfish, especially bluegill and black crappie. There is also a highly dense fishery for quality largemouth bass and northern pike. The trophy northern pike fishery is likely to rebound with the new regulation protecting older female fish reaching larger sizes. Overall, compared to similar lakes, the Lake Tomah fishery is performing excellent, especially considering the difficult challenges it faces from potential high recreational usage and its watershed impacts.

Recommendations

1. Continue to support internal and external partners that are working to improve water quality and lake habitat.

    a. Consider adding lake habitat structure (tree drops, fish cribs, rock piles) and work with partners to promote vegetated riparian buffers. If lake basin habitat structure additions are completed natural materials should be used (Cooke et al. 2003).

2. Future stocking of fish is not recommended due to the natural reproduction sustaining current fisheries.

    a. Halt stocking of largemouth bass and monitor recruitment with an SEII survey the following year to determine if future stocking is necessary.

b. Conduct angler outreach to prevent additional fish translocations and invasive species introduction using signage at major lake access areas.

c. Lake Tomah is a shallow, warm eutrophic reservoir not suited for the survival and success of walleye (Raabe et al. 2020). Further evidence can be taken from the unsuccessful stocking of walleye into Lake Neshonoc, which has produced no targetable fishery for anglers despite extensive stocking. Walleye stocking in lakes highly abundant with largemouth bass has also been shown to not be cost-effective (Fayram et al. 2005).

3. Continue SNII and SEII surveys on the existing three-year rotation. Consider collecting angler use and harvest information to better understand the potential impact of current or proposed angling regulations.
    a. During planned rotation surveys collect black crappie, largemouth bass and northern pike aging structures in addition to normal data collection to develop growth curves that aid angling regulation management decisions.

4. Future consideration to alter harvest regulations for black crappie, largemouth bass and northern pike. A change in harvest regulation should be supported by age and growth data, harvest mortality estimates and public support for potential changes.

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Tables & Figures

Table 1. Lake Tomah waterbody characteristics.

County	Monroe
Acres	245
Watershed (sq. mi)	218
Watershed Land Usage	33% Forest, 28% Ag, 17% Wetland, 15% Grassland, 7% Other
Bottom Substrate	50% Sand, 50% Muck
Max Depth (ft)	19
Average Depth (ft)	4

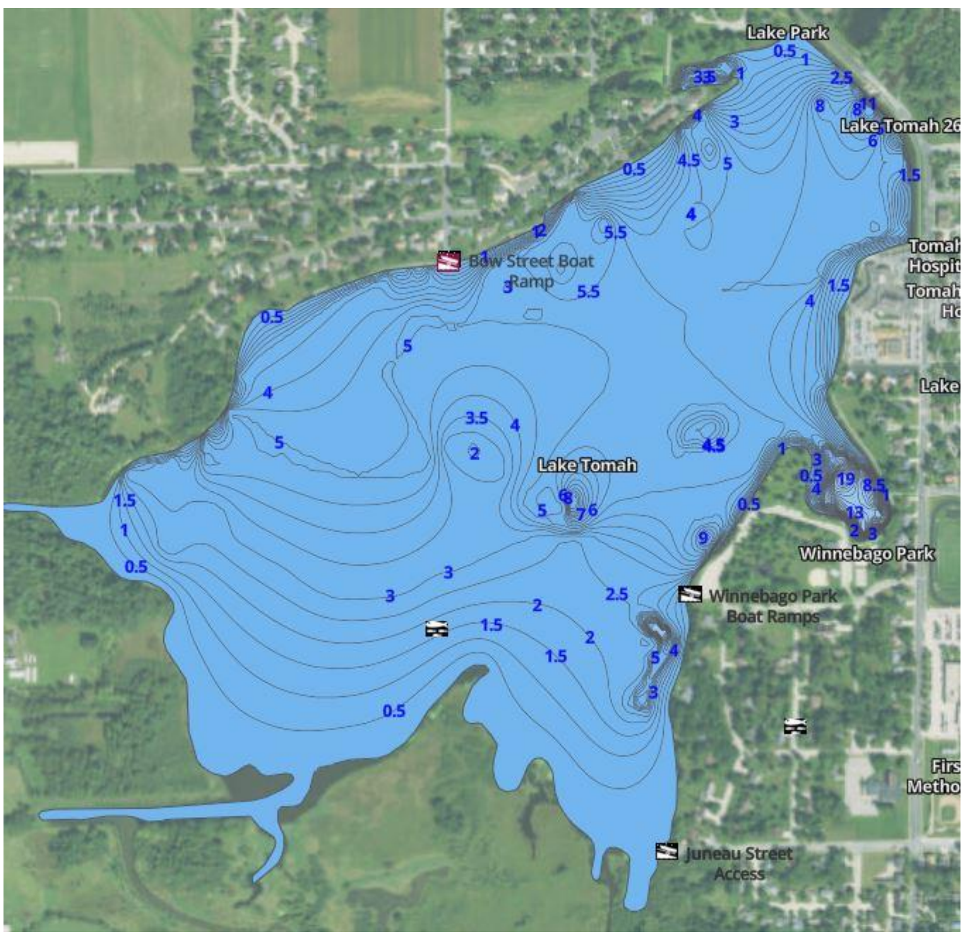


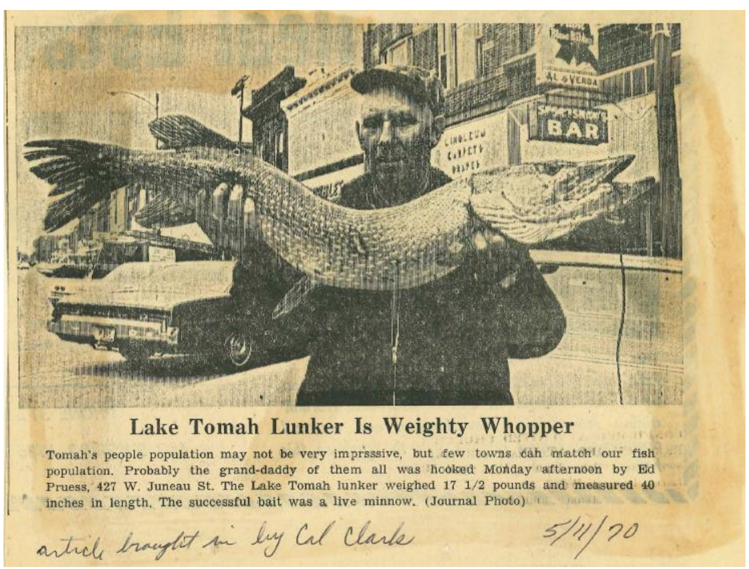
Figure 1. Lake Tomah bathymetric map.

Table 2. Lake Tomah summer (June-August) water quality sampling event averages or ranges.

RECORDING METRIC	2017	2018	2019	2021	2022
Secchi Disk Depth (ft)	1.8	2.6	1.5	-	-
Chlorophyll A	60	54	86	83	107
Total Phosphorus	181	210	136	152	434
DO Levels (mg/L)	10 to 15	9 to 11	11 to 13	-	-
Water Temperature (F)	66 to 76	68 to 82	70 to 80	-	-

Table 3. Lake Tomah fishing regulations between 2014 - 2024.

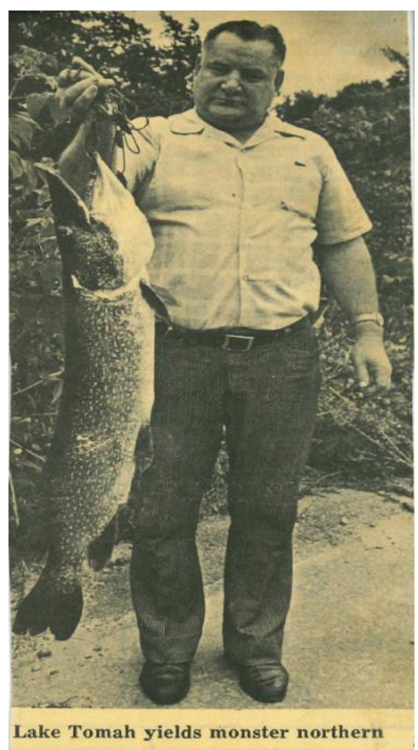
YEAR	SPECIES	REGULATION	HARVEST SEASON
Default	Panfish	25 in Total	Open Year Round
Default	Largemouth Bass	5 Fish ≥ 14 Inches	May 6th to March 3rd
2015	Largemouth Bass	1 Fish ≥ 18 Inches	May 6th to March 3rd
Default	Northern Pike	2 Fish ≥ 26 Inches	May 6th to March 3rd
2015	Northern Pike	1 Fish ≥ 32 Inches	May 6th to March 3rd
2022	Northern Pike	1 Fish ≥ 40 Inches	May 6th to March 3rd



Lake Tomah Lunker Is Weighty Whopper

Tomah's people population may not be very imprsssive, but few towns cah match our fish population. Probably the grand-daddy of them all was hcoked Monday afternoon by Ed Pruess, 427 W. Juneau St. The Lake Tomah lunker weighed 17 1/2 pounds and measured 40 inches in length. The successful bait was a live minnow. (Journal Photo)

article brought in by Cal Clark 5/11/70



Lake Tomah yields monster northern

Figure 2. Trophy northern pike from Lake Tomah newspaper clippings.

Table 4. Stocking events for Lake Tomah post the 2009 Rotenone treatment.

YEAR	SPECIES	SIZE	# STOCKED
2010	Bluegill	Adult	285
2010	Largemouth Bass	Adult	102
2010	Largemouth Bass	Large Fingerling	11,167
2011	Northern Pike	Small Fingerling	19,997
2011	Bluegill	Adult	44
2011	Bluegill	Small Fingerling	16,000
2011	Largemouth Bass	Adult	226
2011	Largemouth Bass	Large Fingerling	7,500
2012	Northern Pike	Small Fingerling	2,430
2012	Largemouth Bass	Large Fingerling	10,684
2015	Largemouth Bass	Large Fingerling	55,056
2018	Largemouth Bass	Large Fingerling	2,805

Table 5. Current fish species present in Lake Tomah.

Common Name	Scientific Name
Black Bullhead	*Ameiurus melas*
Black Crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis machrochirus*
Brown Bullhead	*Ameiurus nebulosus*
Channel Catfish	*Ictalurus punctatus*
Creek Chub	*Semotilus atromaculatus*
Golden Shiner	*Notemigonus crysoleucas*
Largemouth Bass	*Micropterus salmoides*
Northern Pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
Walleye	*Sander vitreus*
White Crappie	*Pomoxis annularis*
White Sucker	*Catostomus commersonii*
Yellow Bullhead	*Amerius natalis*
Yellow Perch	*Perca flavescens*

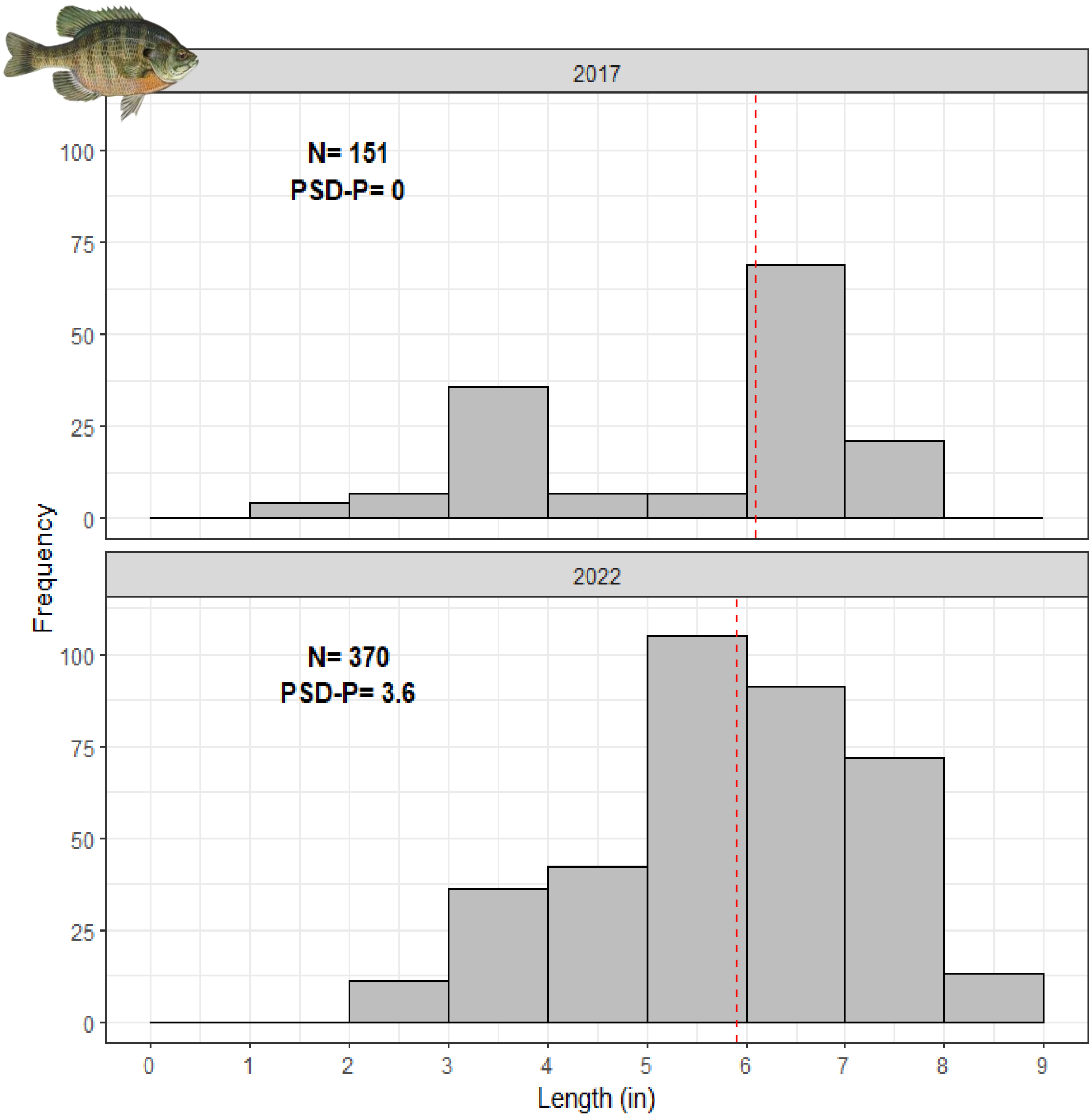


Figure 3. Bluegill length frequency from SEII (late spring) mini-boom electrofishing efforts targeting all species. The vertical line represents the median bluegill length.

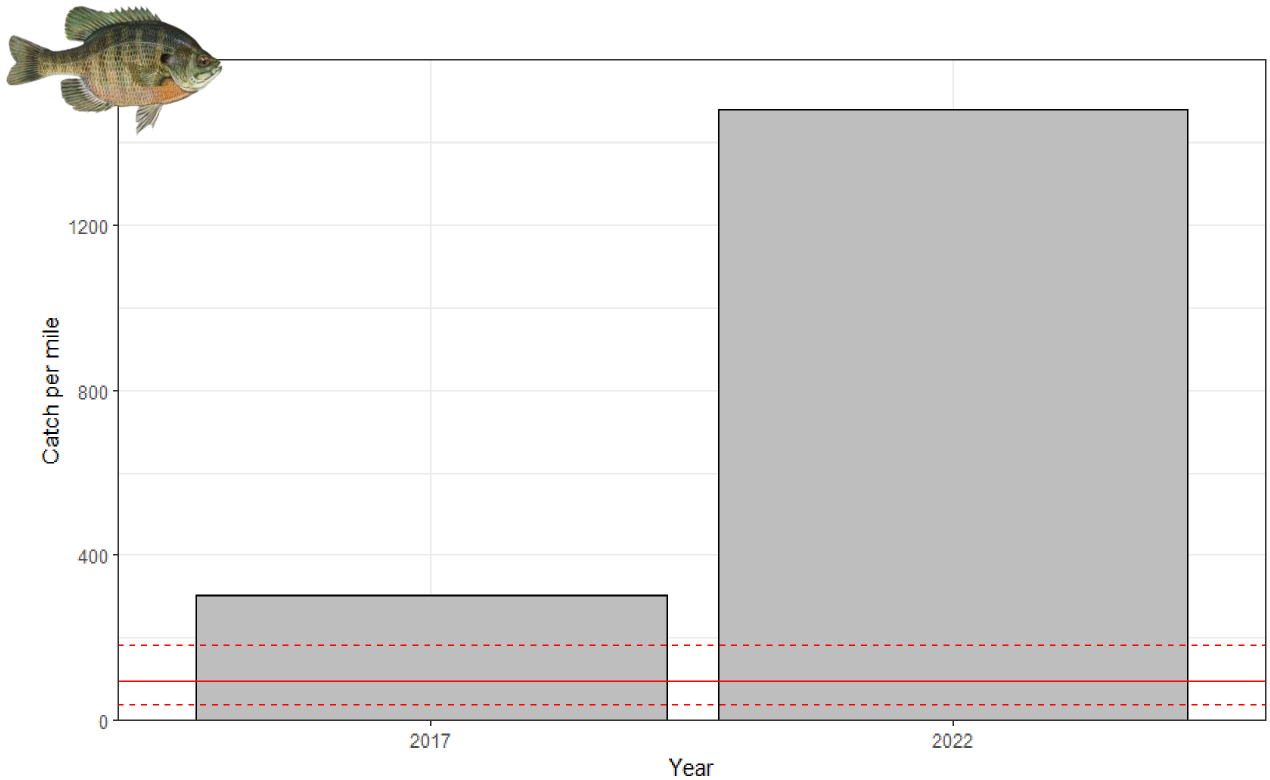


Figure 4. Bluegill relative abundance from SEII (late spring) mini-boom electrofishing efforts targeting all species. The horizontal lines represent the 25th percentile, median, and 75th percentile of bluegill catches per mile in lakes with similar conditions (see methods).

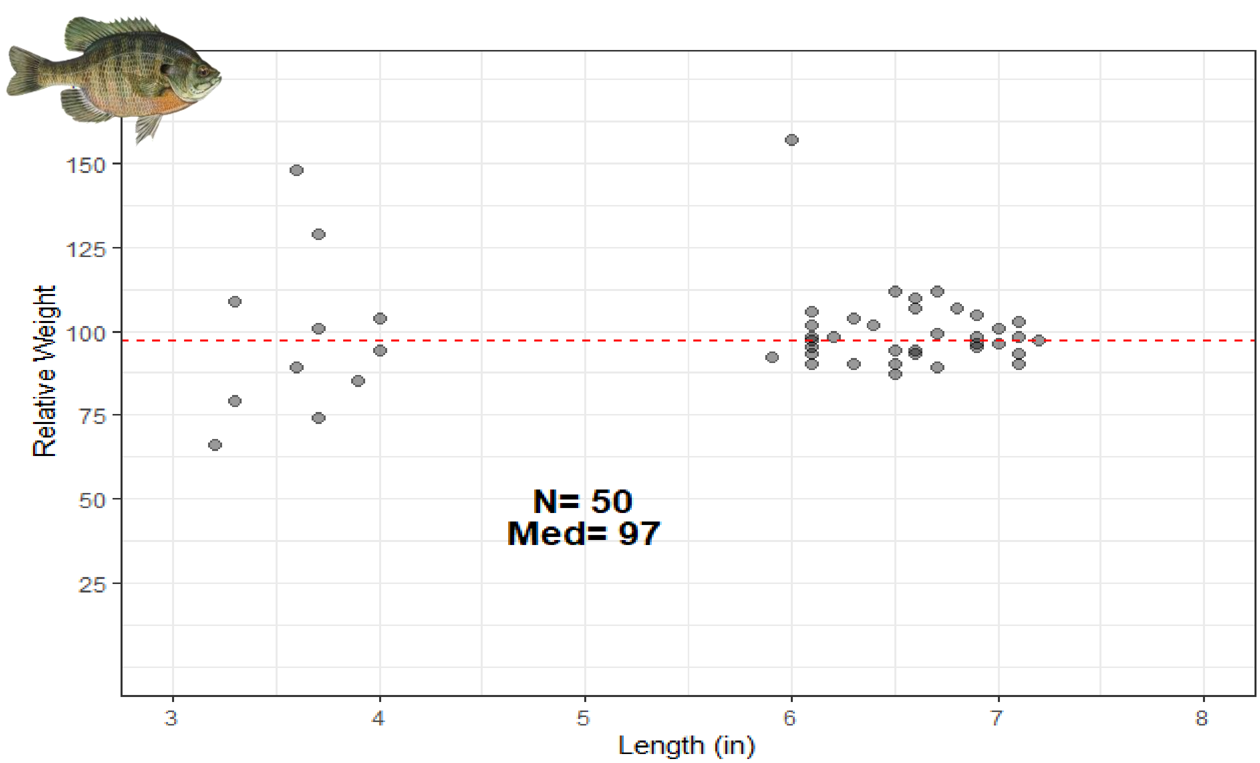


Figure 5. Bluegill relative weight from 2017 SEII (late spring) mini-boom electrofishing efforts targeting all species. The horizontal line represents the median bluegill relative weight.

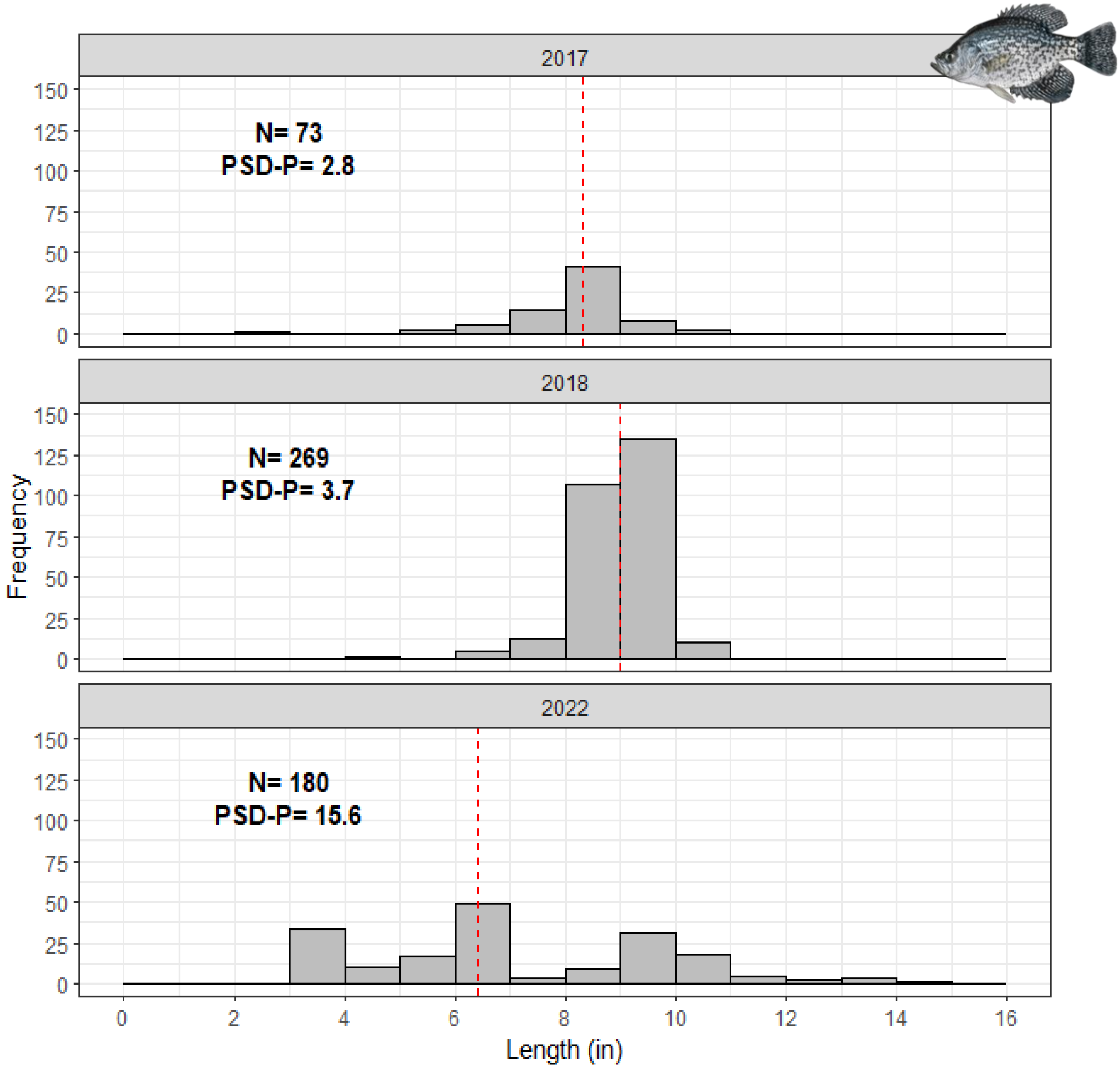


Figure 6. Black crappie length frequency from SNII (late spring) fyke netting efforts. The vertical line represents the median black crappie length.

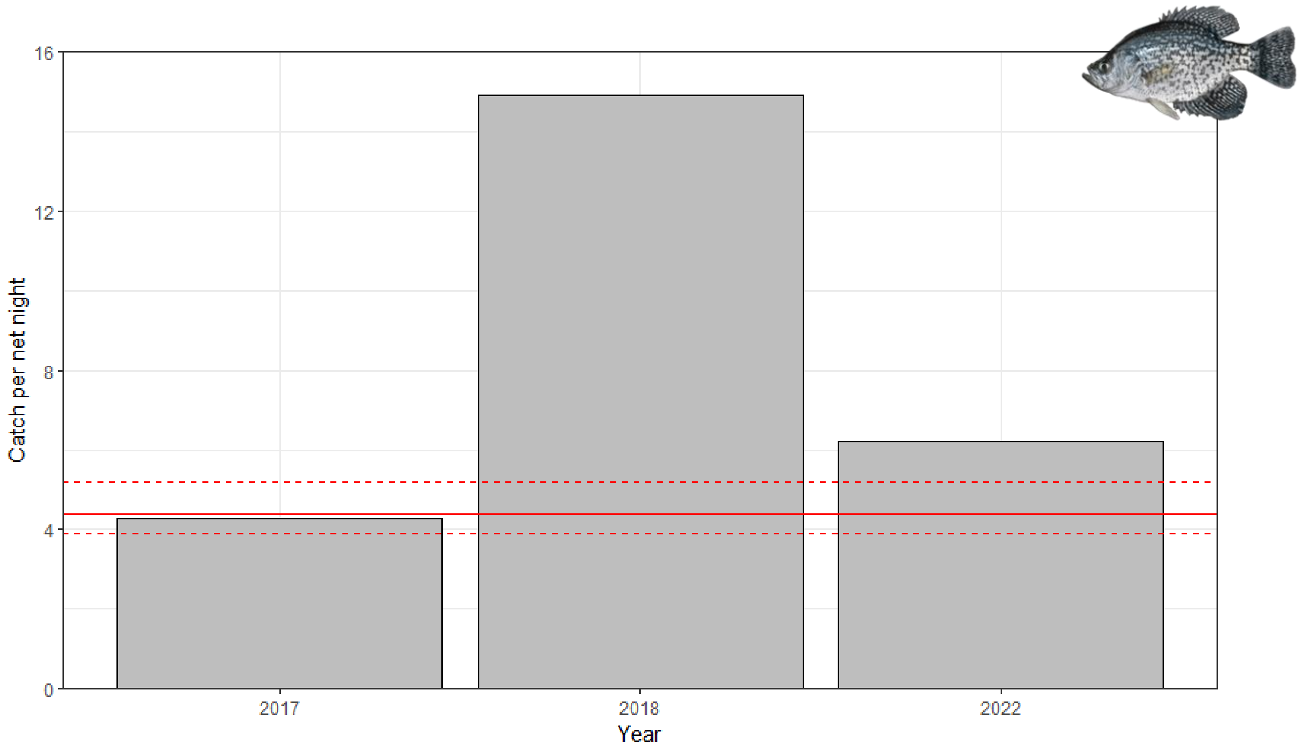


Figure 7. Black crappie relative abundance from SNII (late spring) fyke netting efforts. The horizontal lines represent the 25th percentile, median, and 75th percentile of black crappie catches per net night in lakes with similar conditions (see methods).

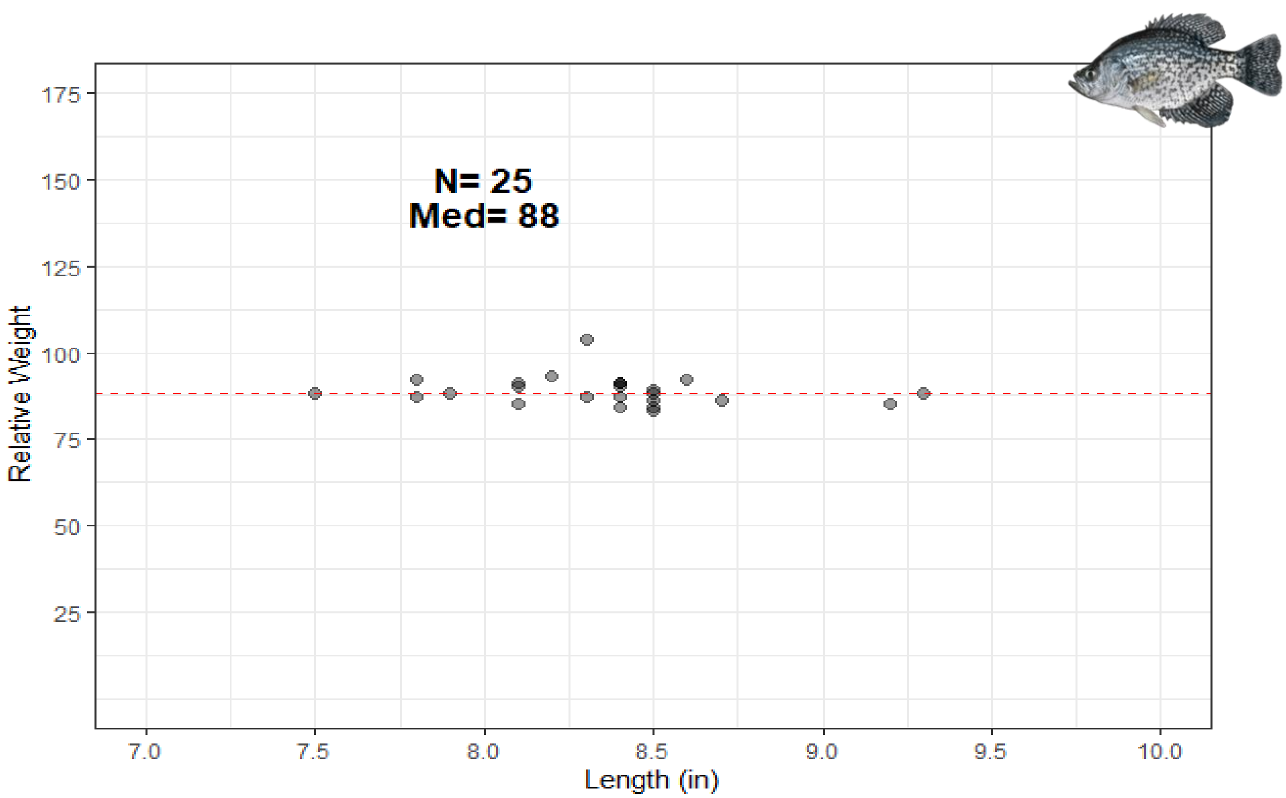


Figure 8. Black crappie relative weight from 2017 SNII (late spring) fyke netting efforts. The horizontal line represents the median black crappie relative weight.

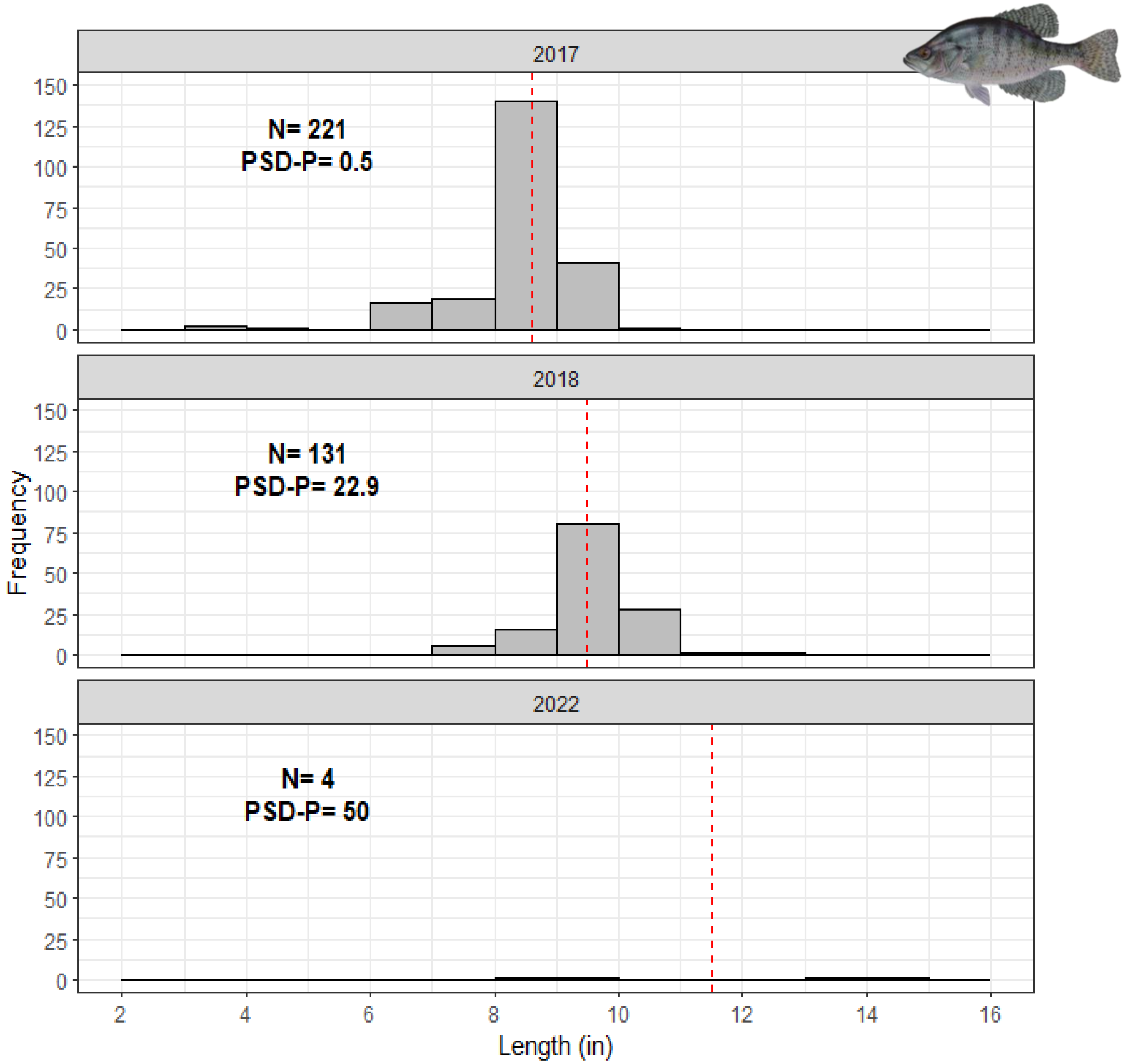


Figure 9. White crappie length frequency from SNII (late spring) fyke netting efforts. The vertical line represents the median white crappie length.

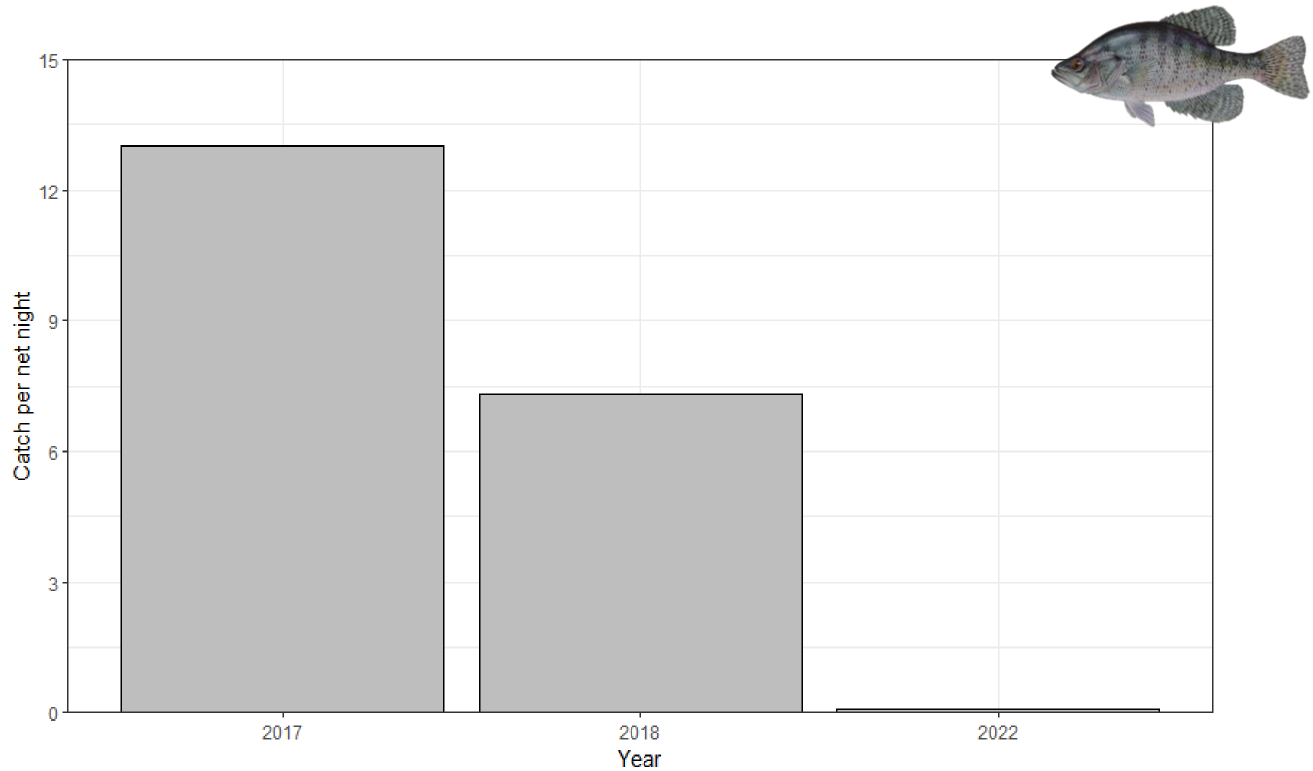


Figure 10. White crappie relative abundance from SNII (late spring) fyke netting efforts.

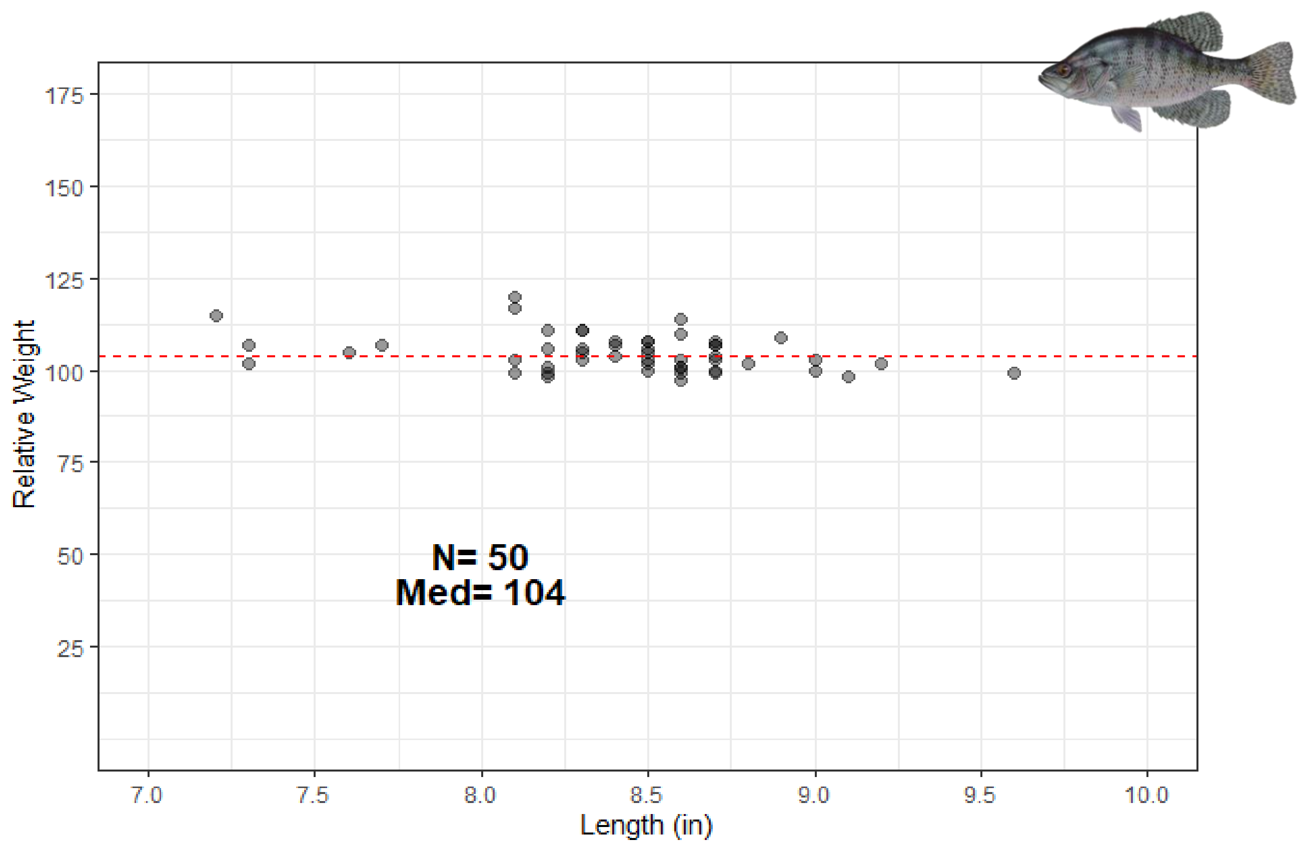


Figure 11. White crappie relative weight from 2017 SNII (late spring) fyke netting efforts. The horizontal line represents the median white crappie relative weight.

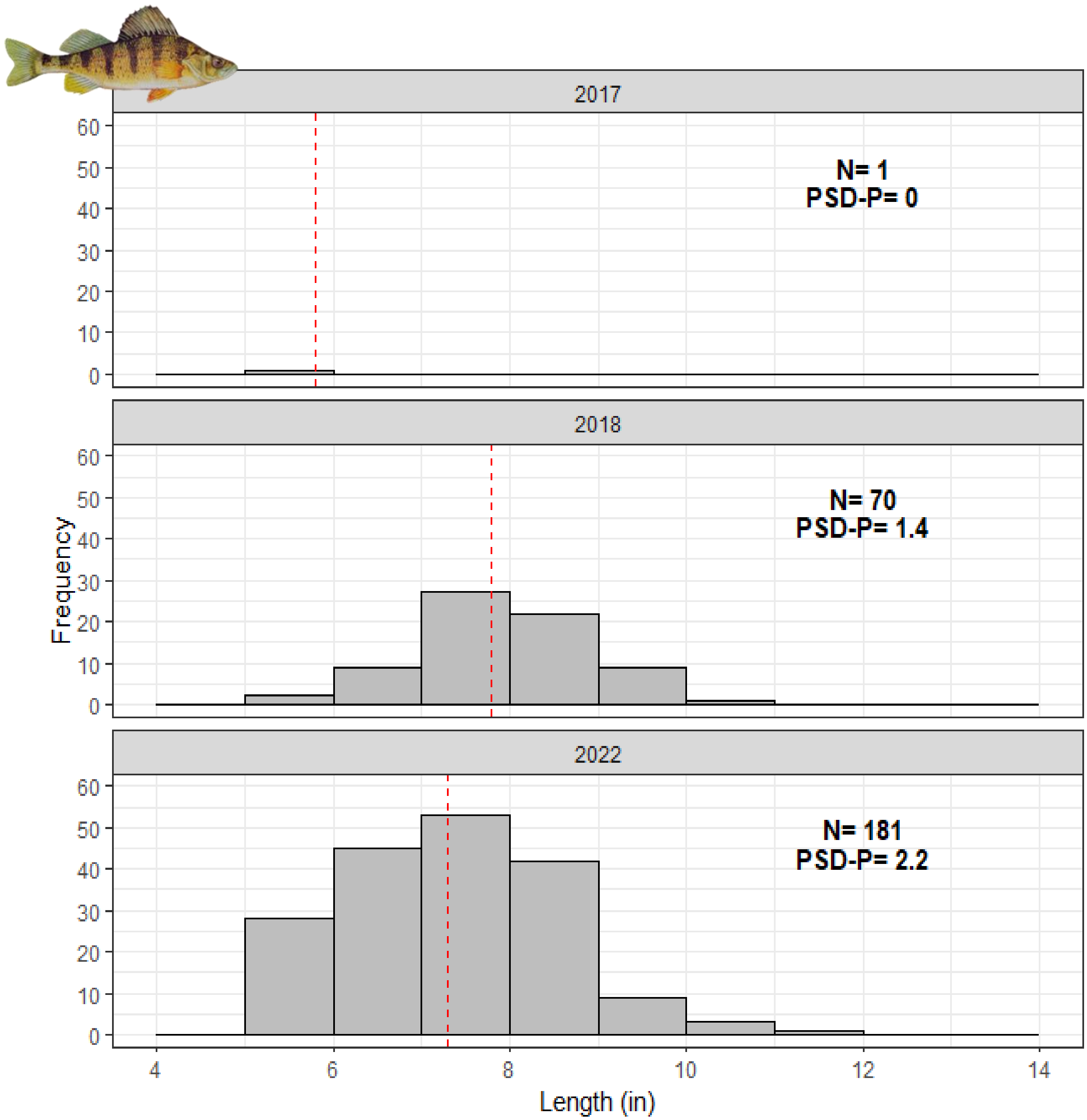


Figure 12. Yellow perch length frequency from SNII (late spring) fyke netting efforts. The vertical line represents the median yellow perch length.

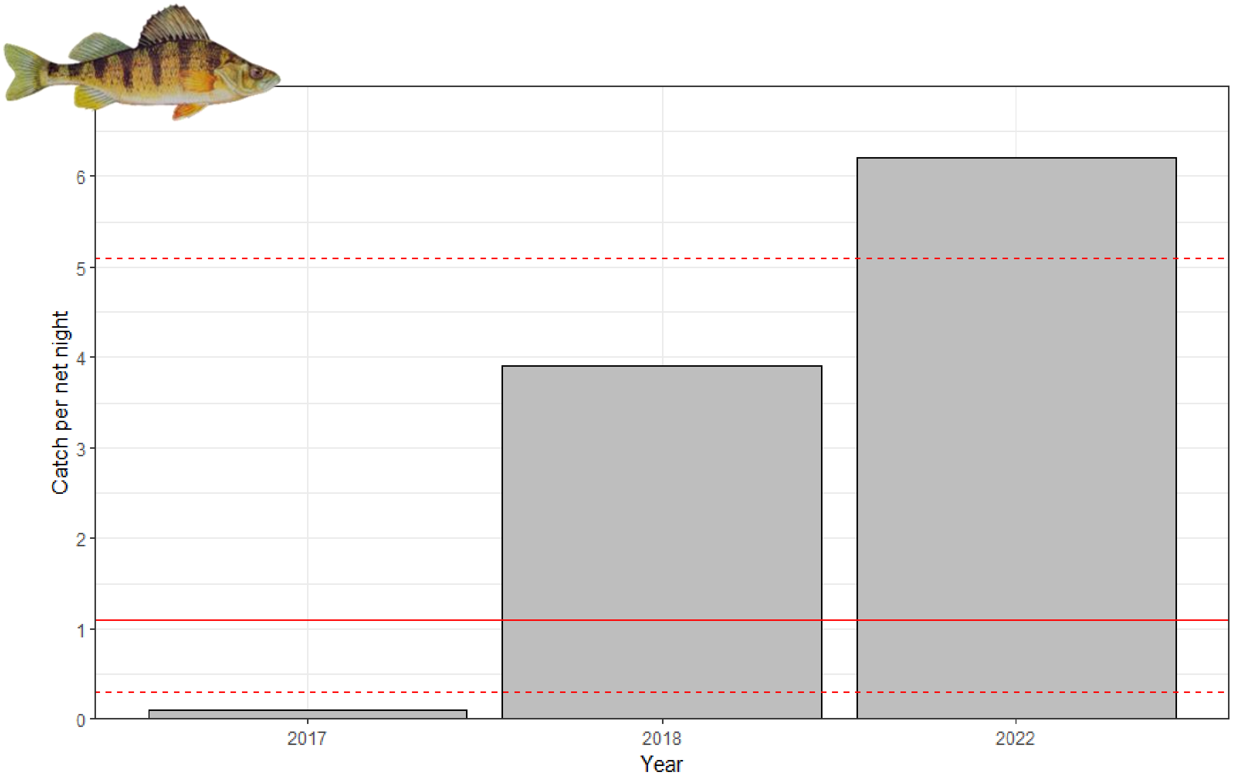


Figure 13. Yellow perch relative abundance from SNII (late spring) fyke netting efforts. The horizontal lines represent the 25th percentile, median, and 75th percentile of yellow perch catches per net night in lakes with similar conditions (see methods).

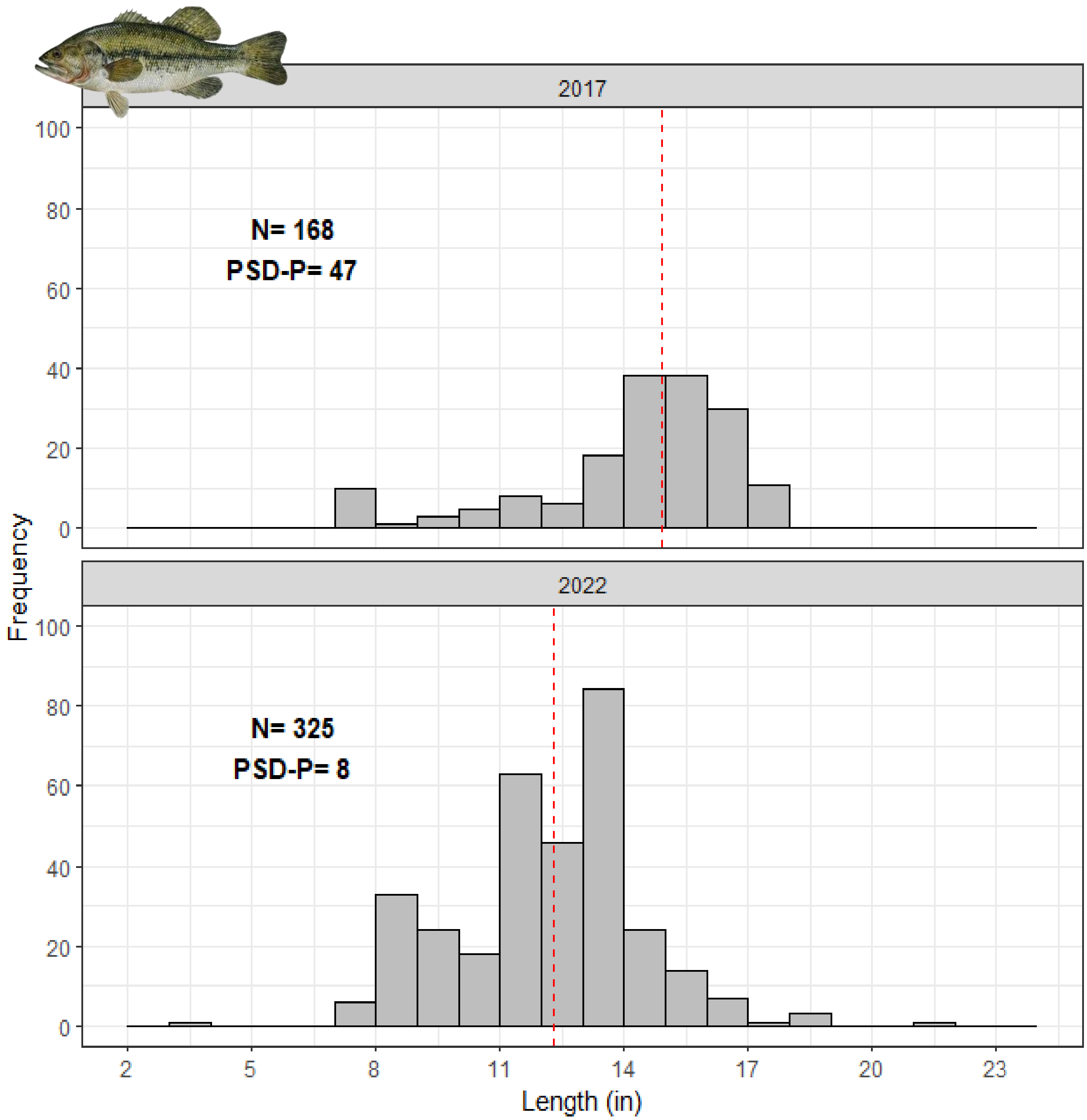


Figure 14. Largemouth bass length frequency from 2017 and 2022 SEII (late spring) mini-boom electrofishing efforts targeting gamefish. The vertical line represents the median largemouth bass length.

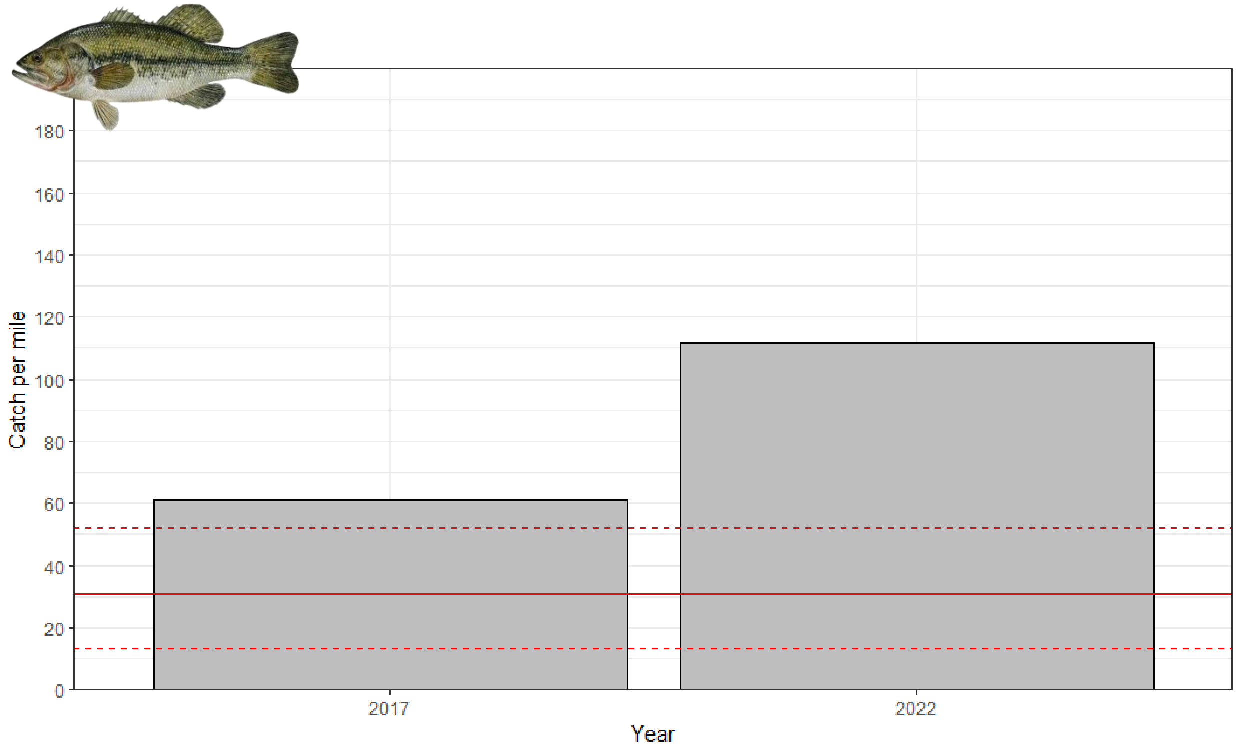


Figure 15. Largemouth bass relative abundance from SEII (late spring) mini-boom electrofishing efforts targeting gamefish. The horizontal lines represent the 25th percentile, median, and 75th percentile of largemouth bass catches per mile in lakes with similar conditions (see methods).

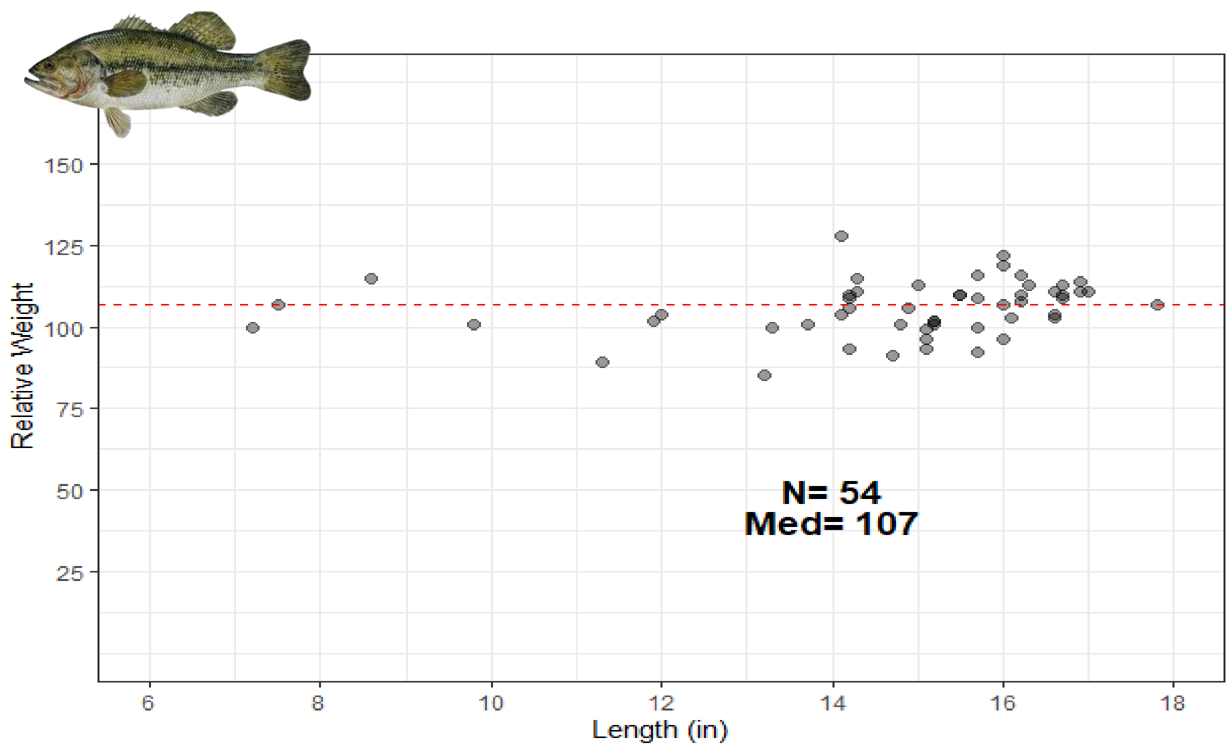


Figure 16. Largemouth bass relative weight from 2017 SEII (late spring) mini-boom electrofishing efforts targeting gamefish. The horizontal line represents the median largemouth bass relative weight.

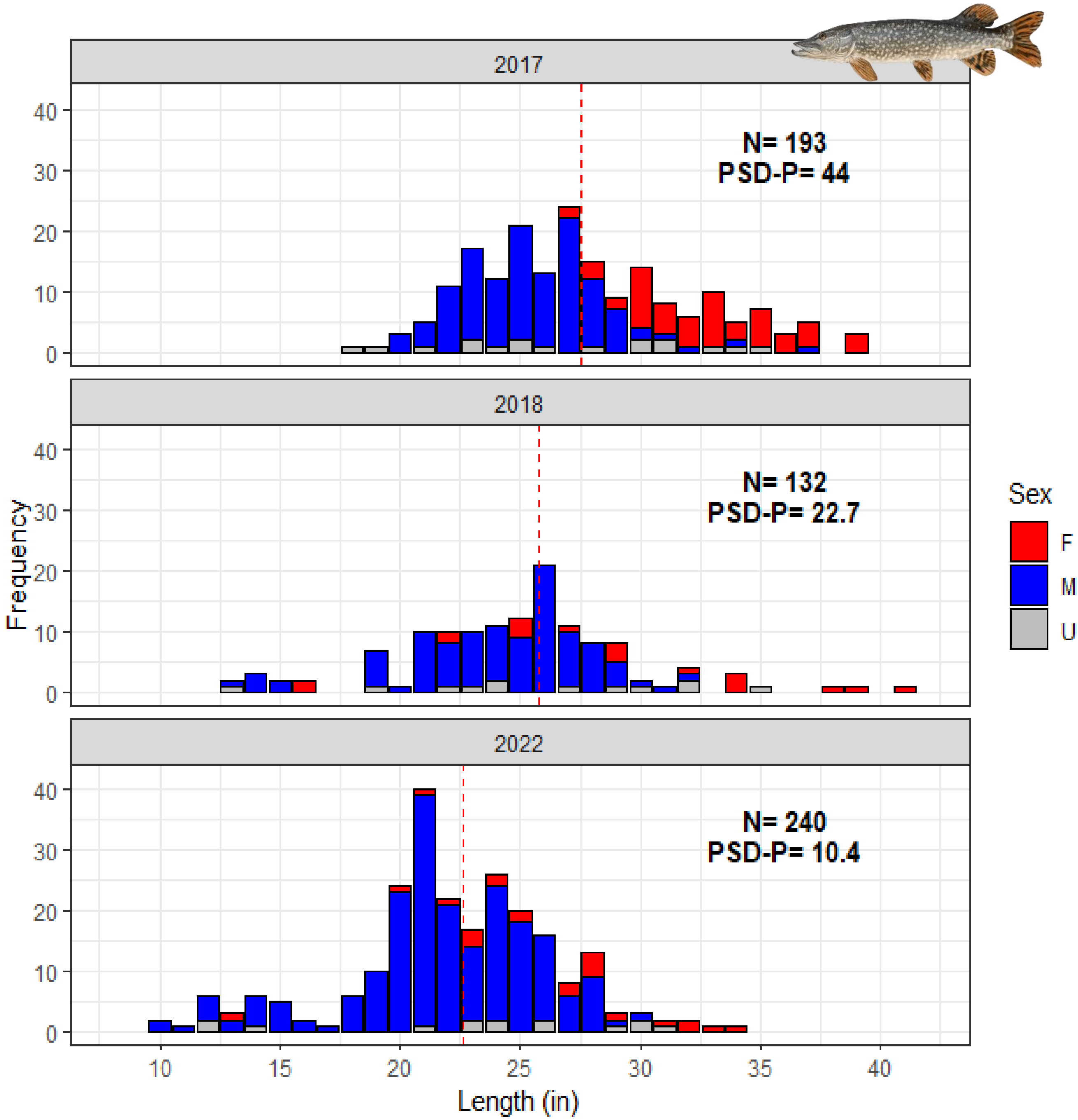


Figure 17. Northern pike length frequency by sex from SNII (late spring) fyke netting efforts. The vertical line represents the median northern pike length.

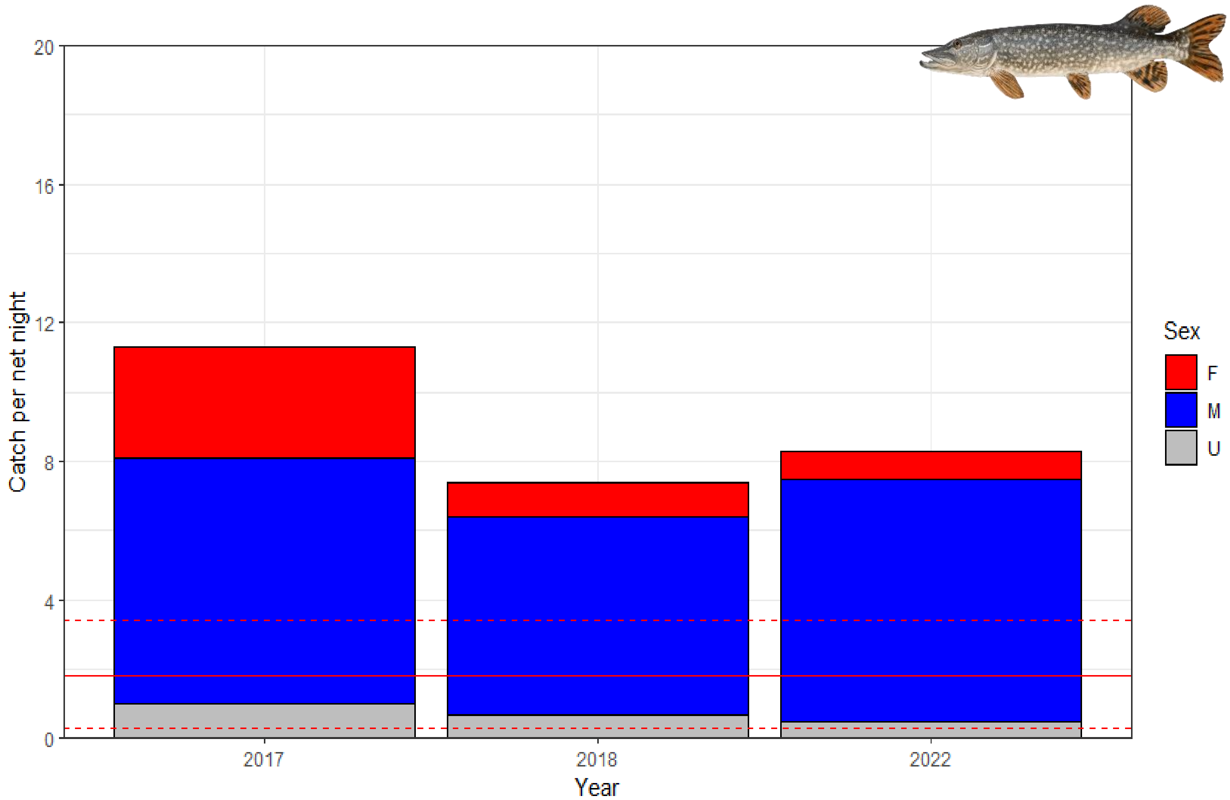


Figure 18. Northern pike relative abundance by sex from SNII (late spring) fyke netting efforts. The horizontal lines represent the 25th percentile, median, and 75th percentile of northern pike catches per net night in lakes with similar conditions (see methods).

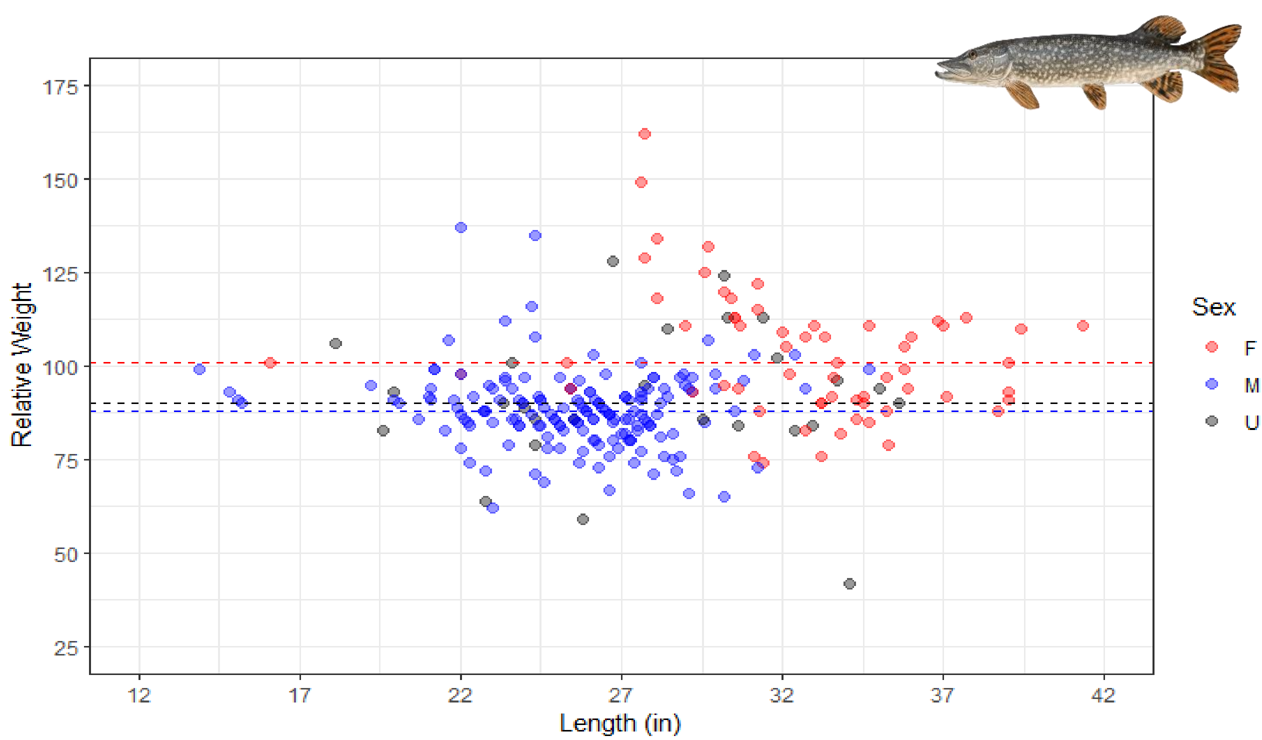


Figure 19. Northern pike relative weight by sex from 2017-2018 SNII (late spring) fyke netting efforts. The horizontal lines represent the median northern pike relative weight by sex.

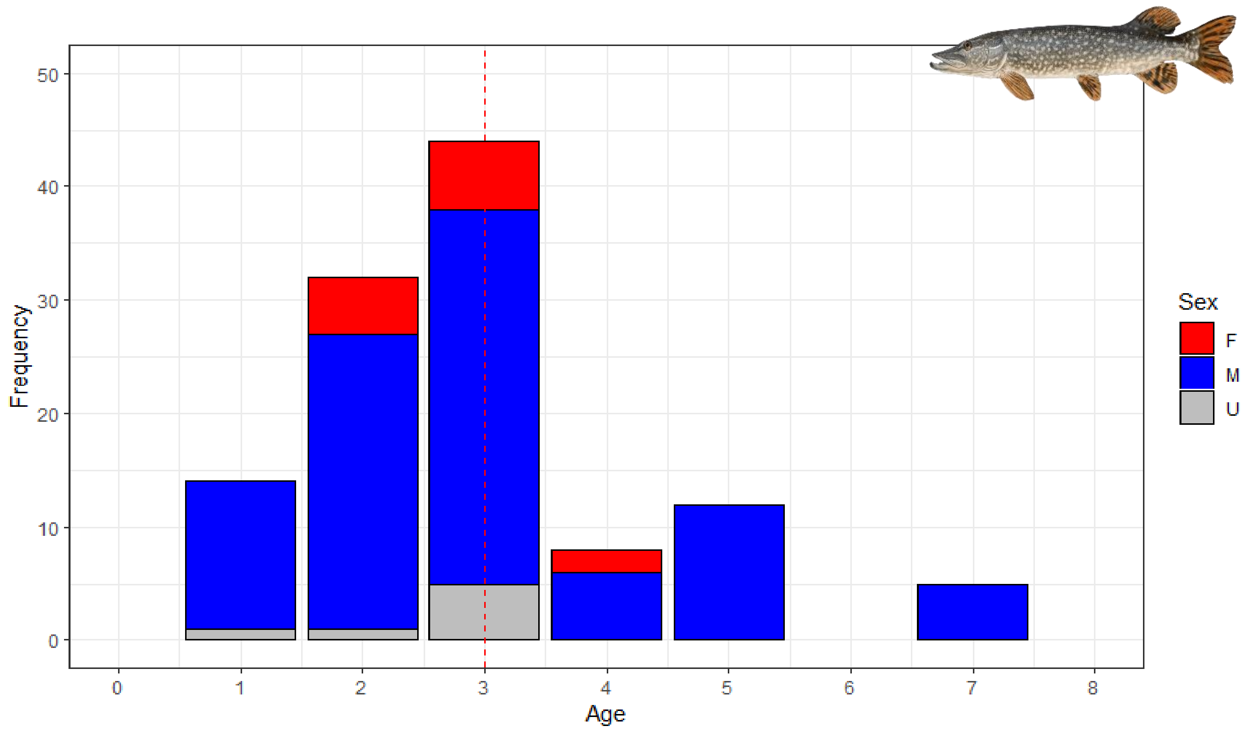


Figure 20. Northern pike age frequency by sex from 2022 SNII (late spring) fyke netting efforts. The vertical line represents the median northern pike age.

Table 6. Lake Tomah northern pike male growth equation confidence intervals.

YEAR	LOWER 95% CI	UPPER 95% CI
1	13.8	14.8
2	19.9	20.5
3	23.0	23.5
4	24.5	25.1
5	25.1	25.9
6	25.5	26.6

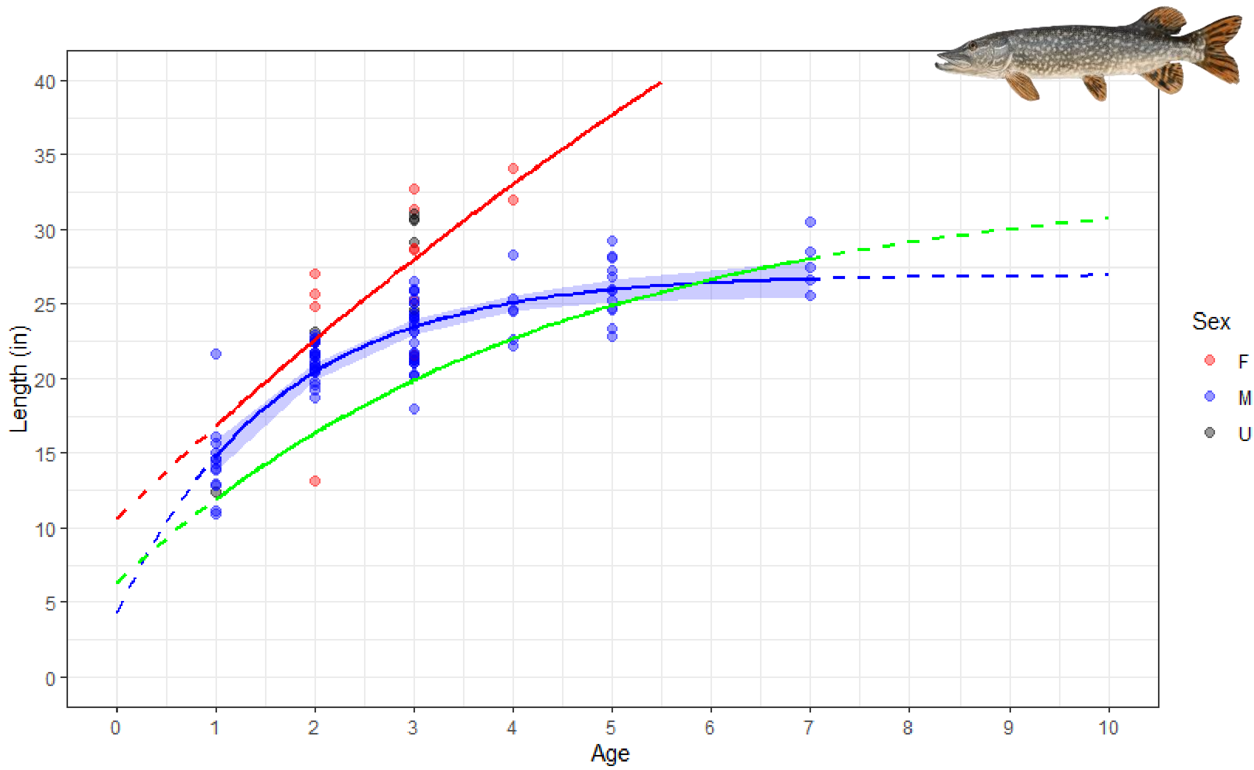


Figure 21. Von Bertalanffy growth curves for northern pike by sex from 2022 SNII (late spring) fyke netting efforts. Dashed lines represent extrapolated portions of the curve. The shaded ribbon represents a bootstrapped 95% confidence interval. The green line represents the median of northern pike growth curves in lakes with similar conditions (see methods).