

PROGRESS REPORT

State: NEW HAMPSHIRE **Grant:** F-61-R-24/F21AF00591

Grant Title: NEW HAMPSHIRE'S MARINE FISHERIES INVESTIGATIONS

Project II: **MARINE RECREATIONAL FISHERIES MONITORING**

Job 2: **VOLUNTEER ANGLER CREEL SURVEY FOR STRIPED BASS ANGLERS**

Objective: To annually monitor the recreational fishery for Striped Bass *Morone saxatilis* in New Hampshire waters in order to identify trends and evaluate the effect of management measures.

Period Covered: January 1, 2021 - December 31, 2021

ABSTRACT

Between January 1, 2021 and December 31, 2021, the New Hampshire Fish and Game Department conducted one investigation to monitor the recreational fishery for Striped Bass *Morone saxatilis* in NH waters. Fifty-six anglers participated in New Hampshire's Volunteer Angler Creel Survey to collect catch, effort, and size information for Striped Bass in 2021, just short of the goal of at least 60 anglers. Anglers reported a total of 1,691 angler hours directed at Striped Bass. A reported 2,080 Striped Bass were caught during the sampling period and volunteers provided length data on 1,911 (92%) of those caught. Lengths ranged from 12 to 46 inches, the mean length of Striped Bass reported was 21.5 inches. Ninety-seven percent of the lengths were from fish outside of the legal slot limit that would not have been obtained by a conventional creel survey. Seventy-two percent of all legal-size fish that were caught by participating anglers were released. Climatic factors and the availability of different year classes may be contributing factors to the variability of sizes of Striped Bass reported inter-annually. The Atlantic States Marine Fisheries Commission passed Addendum VI, with new management measures that took effect in 2020 to address the recent Striped Bass stock assessment designating the population as overfished and overfishing is occurring.

INTRODUCTION

Striped Bass *Morone saxatilis* has traditionally been an important component of the marine recreational fishery in New Hampshire (NH). The increased abundance of Striped Bass observed in the 1990s translated into increased effort in the recreational fishery for this species on NH's coast.

The Marine Recreational Information Program, conducted by the NH Fish and Game Department (NHFG) in concert with the National Oceanic and Atmospheric Administration Fisheries Service, is a general purpose survey that captures basic catch and effort data. More specific information about the Striped Bass fishery, such as the relative use of different terminal tackle types and size distribution of released fish, would aid in the management of this fishery.

To gain additional information specific to this important recreational fishery, the NHFG developed and implemented a Striped Bass Volunteer Angler Survey Program (SBVAS) in 1993. The program obtains information about the fishery that will assist managers in efforts to effectively manage the Striped Bass resource in NH and other Atlantic states.

PROCEDURES

Volunteer angler logbooks were distributed to anglers who expressed a willingness to participate in the program. Anglers were solicited at marinas, public access sites, sportsman's clubs, in NHFG publications, on recreational fishing websites, at public informational meetings concerning Striped Bass, and with social media at the start and end of the season. Two raffle prizes were advertised throughout the season.

The survey logbooks provided instructions and space for collecting the following information: angler's name and address, trip date, number of hours fished, number of anglers in party, number of fish caught and kept, number of fish caught and released, number of legal-size fish released, whether fishing occurred from boat or shore, the terminal tackle used, and length measurements (total length to the nearest inch) of any Striped Bass caught. In addition to paper forms, participants were given the opportunity to electronically submit logbook information in a spreadsheet format through e-mail or through an online platform. The online logbook allowed anglers to submit reports daily with identifying information so all trips could be traced back to the reporting angler.

A press release and social media were used at the end of the season in November to remind anglers to submit their logbooks. Those anglers that did supply a record of their fishing effort were provided with a letter

summarizing their individual data, summarized data of all participants, and were included in a raffle draw.

If anglers reported measurements as ranges that were in increments greater than four inches, they were omitted because such large increments can include the entire size range of several different age groups (Gary Nelson, Personal Communication, 2018). To utilize the smaller range measurements (four inches or less), the lengths of the fish reportedly caught in a given size range were sequentially apportioned to lengths within the range in one-inch increments with the central values having the greatest probability of being used. For example, if an angler reported catching four fish between 12 and 14 inches, length values would be assigned as follows: 12, 13, 13, and 14 inches. This method seems appropriate for small range increments at the lower fish sizes because mean annual growth of Striped Bass less than 25 inches is approximately four to six inches per year (Gary Nelson, Personal Communication, 2018).

Summary statistics were calculated for all logbook and length data received.

RESULTS

Between January 1, 2021 and December 31, 2021, the New Hampshire Fish and Game Department conducted one investigation to monitor the recreational fishery for Striped Bass in NH waters. Fifty-six anglers participated in New Hampshire's Volunteer Angler Creel Survey to collect catch, effort, and size information for Striped Bass in 2021, just short of the goal of at least 60 anglers. Participation in this survey varies annually and has been between 32 and 110 reporting anglers over the past decade, with the 56 participating anglers being a 23% decrease in participation from the previous year. More in-season outreach should be done in order to accomplish the goal of at least 60 participating anglers in the future.

The number of Striped Bass trips reported, via the SBVAS program, decreased by 22% and the reported fishing effort decreased by 32% at 1,691 fishing hours (Table 2.2-1). Anglers reported catching a total of 2,080 Striped Bass during 2021, a 7% decrease. Four percent of the reported Striped Bass caught were of legal size, and approximately 72% of the legal-sized fish caught were released.

The catch per unit effort increased from 2020 by 18% for catch per trip and increased by 35% for catch per hour fished. The index of legal Striped Bass caught per hour fished increased to 0.04 from 0.03 in 2020, and remained below the decade mean of 0.10 (Table 2.2-1).

Anglers reporting by mail-in forms fished from boats for a majority of their trips and preferred bait as their primary tackle (Table 2.2-2). Those who reported via e-mail had the greatest average number of trips per angler; preferred bait, and 98% of their trips were aboard a boat. Online respondents reported the fewest average number of trips per angler, showed a preference for fishing with lure, and had the greatest percentage of shore fishing trips of all reporting types. Eight individuals reported using prohibited hook-types while fishing with bait.

Length measurements were provided on 1,911 fish ranging from 12 to 46 inches in 2021 (Table 2.2-3). Ninety-seven percent of all reported length measurements were outside of the legal slot length (legal length is between 28 inches and less than 35 inches). The mean size of fish caught was 21.5 inches, a slight increase over the previous year (Figure 2.2-1). Anglers employing bait and lures as terminal tackle, on average, caught larger fish than flies (Figure 2.2-2).

DISCUSSION

The Striped Bass survey relies on anglers to voluntarily submit logbook accounts of their fishing trips. The voluntary nature of the survey causes low response rates and retention of participants is difficult. During the past decade the number of reporting anglers has fluctuated from a low of 32 in 2012 to a high of 110 in 2017 (Table 2.2-1). A number of measures have been employed to boost participation; direct contact through mail and e-mail with potential Striped Bass anglers, advertising on social media, and offering raffle prizes. Since 2000, the Coastal Conservation Association of NH has supplied one to two raffle prizes per season. Beginning in 2011, Kittery Trading Post also contributed an item to the raffle. Despite the added incentive, the level of participation has continued to fluctuate.

Anglers were able to report their fishing trips online for the first time in 2014, boosting the number of participating anglers by 57 percent. The online reporting option has remained the most popular form of submittal, with 75% of all participants choosing this media in 2021 (Table 2.2-2).

The three reporting options appear to be targeting different angler types. The majority of anglers report their trips online and all first time reporters chose this platform during the project period (Table 2.2-2). Anglers that used the online platform reported fewer trips on average, with a mean of 4.5 trips. Those reporting through mail-in paper logbook or e-mail spreadsheet reported more trips per angler, mean of 9.5 and 19.3 trips, respectively. It appears reporting on an annual basis (mail-in logbook and

e-mail spreadsheet mediums) are more appealing to anglers who make far more fishing trips in a year, than those that reported via the online method. These are usually avid anglers, and while their inclusion is positive for collecting biological information, the data gathered from them could be misleading about the health of the Striped Bass fishery with biased catch per unit effort estimates. The continued availability of an online reporting option that is more appealing to the occasional angler while still offering options that are preferred by avid anglers will provide a more representative view of NH's Striped Bass fishery.

The most recent stock assessment included the Marine Recreational Information Program's re-estimation of recreational catch and harvest (NEFSC 2019). Due in part to the inclusion of these revised data, it was found that Striped Bass are overfished and overfishing is occurring, despite management measures enacted in 2015. The Atlantic States Marine Fisheries Commission implemented Addendum VI, with new management measures that took effect in 2020, aimed at further reducing harvest. Changes to the Striped Bass fishery in New Hampshire included implementation of a slot limit allowing harvest of fish between 28 inches and less than 35 inches total length, as well as mandatory use of circle hooks when using bait to target Striped Bass.

Starting in 2018 reporting anglers were asked to designate a hook-type used during bait fishing trips. In 2020, the NHFG made inline circle hook use mandatory when fishing with bait for striped bass. Twenty-two percent of bait anglers reporting through the SBVAS used gear that was out of compliance in 2021 (Table 2.2-1). Additional outreach regarding the striped bass regulations will accompany further communications to the Striped Bass fishing community and further outreach is needed to reach the general fishing public.

The majority of the Striped Bass reported each year are outside of the legal limit; prior to 2020 this referred only to fish under 28 inches in length. Over the five years leading up to the regulation change (2015–2019), the average annual percent of sublegal lengths reported was 93%. With the slot limit in effect for 2020, the reported lengths that were outside of the legal limit rose to 97% and remained at this level in 2021. This survey plays an important role in the management of the Striped Bass fishery and is the primary source for length data on non-legal, recreationally caught Striped Bass in NH. The NHFG continues to communicate the high importance of providing length measurements related to this survey program. As a result, anglers provided length measurements on 1,911 Striped Bass in 2021, representing 92% of all fish caught (Tables 2.2-1 and 2.2-3).

Length measurements provided by the SBVAS are important to the coast-wide stock assessment for Striped Bass to characterize the catch from recreational anglers in NH. The mean length of Striped Bass caught in NH varies annually and cohorts can visually be followed using length data collected through this program (Figure 2.2-1). One strong recruitment year was 2011, with large production in the Chesapeake Bay (ASMFC 2016). This cohort can be followed through the reported length frequencies over the years as a reported peak length of 18 inches in 2014, increasing to 22 inches in 2015 (Gary Nelson, Personal Communication, 2018). While the data suggested the continued presence of the 2011 cohort, their contribution was surpassed by the inundation of small fish starting in 2016.

The data shows that in both 2016 and 2017 a large percentage of the Striped Bass caught were very small fish, which had not been seen in most of the previous years (Figure 2.2-1). The majority of fish reported were between 12 and 16 inches in 2016 and 2017, increasing slightly in 2018. These fish were likely from the 2014 and 2015 year classes (Gary Nelson, Personal Communication, 2018). The strength of the Chesapeake Bay's 2014 year class was below average. It is possible that in 2016 these small fish came from another producer area, such as the Hudson River, which produced a strong year class in 2014 (ASMFC 2016). However, juveniles typically are non-migratory, and the Hudson River also contains a contingent of permanent residents; making a large contribution of young fish unlikely in most years. On the other hand, the 2015 year class showed strong recruitment in the Chesapeake Bay (MD DNR 2016).

Many factors can affect the recruitment of juvenile Striped Bass and the resulting year class availability within the fishery. These factors include winter temperatures, hydrological conditions, and zooplankton prey availability (NEFSC 2013). It appears as though the SBVAS reported lengths follow the overall population trends closely, picking up the most prominent year-classes as with the 2011 and 2015 cohorts. However, northward migrating Striped Bass populations may vary greatly from year to year and are dependent upon factors such as weather, disease, water temperatures, and abundance of prey (NEFSC 2013). Therefore, while the SBVAS is useful in demonstrating trends in angler effort and success within state waters, the fluctuations in Striped Bass abundance within the coastal waters of NH should not be used alone in drawing conclusions about the coast-wide Striped Bass population's size and structure.

In conclusion, participation in New Hampshire's Volunteer Angler Creel Survey for Striped Bass fluctuates, and in 2021 there was a 23% decrease over

the previous year. The reported survey data indicated that 97% of fish caught during the sampling period were outside of the legal slot limit, with a mean length of 21.5 inches. Comparisons to stock assessment data indicate that the survey may adequately characterize the NH fishery, but efforts should continue to ensure increased participation by anglers of various experience levels and fishing behavior. Regulatory changes to New Hampshire's Striped Bass Fishery, including a slot size limit and mandatory use of circle hooks with bait, took effect in 2020 as a result of the most recent stock assessment. There is a need for additional outreach to educate the public on the newest regulations.

REFERENCES

Atlantic States Marine Fisheries Commission (ASMFC). 2016. 2016 Atlantic Striped Bass Assessment Update. ASMFC. Atlantic Striped Bass Technical Committee. 15-19; 100p.

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Northeast Fisheries Science Center (NEFSC). 2013. 57th Northeast Regional Stock Assessment Workshop (57th SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-16; 967 p.

Northeast Fisheries Science Center (NEFSC). 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 19-08; 457 p.

Table 2.2-1. Summary of data reported by participants in New Hampshire's Striped Bass Volunteer Angler Survey, 2012–2021.

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Reporting anglers | 32 | 35 | 55 | 70 | 65 | 110 | 67 | 49 | 73 | 56 |
| # of trips | 580 | 631 | 633 | 710 | 716 | 866 | 678 | 625 | 669 | 520 |
| Angler hours | 1,852 | 2,295 | 2,063 | 2,523 | 2,417 | 2,902 | 2,184 | 2,040 | 2,474 | 1,691 |
| Total Striped Bass caught | 1,638 | 1,885 | 2,015 | 1,637 | 3,988 | 7,526 | 2,996 | 2,071 | 2,241 | 2,080 |
| # harvested | 83 | 140 | 49 | 33 | 62 | 93 | 62 | 27 | 13 | 21 |
| # legal ^a sized released | 253 | 276 | 125 | 145 | 122 | 192 | 169 | 120 | 60 | 53 |
| Fishing type (percent) | | | | | | | | | | |
| boat | 69% | 66% | 51% | 62% | 61% | 59% | 58% | 50% | 65% | 55% |
| shore | 31% | 34% | 49% | 38% | 39% | 41% | 42% | 50% | 35% | 45% |
| Tackle type (percent) | | | | | | | | | | |
| bait | 54% | 53% | 40% | 50% | 46% | 45% | 45% | 39% | 50% | 47% |
| lure | 24% | 28% | 25% | 23% | 23% | 25% | 24% | 24% | 38% | 38% |
| fly | 27% | 28% | 40% | 32% | 34% | 32% | 32% | 37% | 13% | 18% |
| Bait anglers by hook-type ^a | | | | | | | | | | |
| total bait anglers | | | | | | | 41 | 30 | 46 | 38 |
| % inline circle hook | | | | | | | 51% | 67% | 80% | 87% |
| % offset circle hook | | | | | | | 29% | 17% | 17% | 11% |
| % j-hook | | | | | | | 32% | 30% | 7% | 11% |
| Catch/trip | 2.8 | 3.0 | 3.2 | 2.3 | 5.6 | 8.7 | 4.4 | 3.3 | 3.4 | 4.0 |
| Harvest/trip | 0.14 | 0.22 | 0.08 | 0.05 | 0.09 | 0.11 | 0.09 | 0.04 | 0.02 | 0.04 |
| Catch/hr. fished | 0.88 | 0.82 | 0.98 | 0.65 | 1.65 | 2.59 | 1.37 | 1.02 | 0.91 | 1.23 |
| Legal ^b catch/hr. fished | 0.18 | 0.18 | 0.08 | 0.07 | 0.08 | 0.10 | 0.11 | 0.07 | 0.03 | 0.04 |
| Harvest/hr. fished | 0.04 | 0.06 | 0.02 | 0.01 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 | 0.01 |
| % caught & released | 95% | 93% | 98% | 98% | 98% | 99% | 98% | 99% | 99% | 99% |
| % legal ^b sized released | 75% | 66% | 72% | 81% | 66% | 67% | 73% | 82% | 82% | 72% |

^a Some anglers reported using multiple hook types.

^b Legal size for years 2012–2019 was 28 inches or greater. Legal size in 2020 and 2021 was between 28 inches and less than 35 inches.


Table 2.2-2. Summary of data reported by participants in New Hampshire's Striped Bass Volunteer Angler Survey, by reporting type, 2021.

| | | Mail-in | E-mail | Online |
|-----------------------------|-------|---------|--------|-----------------|
| Reporting anglers | | 11 | 3 | 42 ^a |
| # first time reporters | | 0 | 0 | 27 |
| # trips reported per angler | mean | 9.5 | 19.3 | 4.5 |
| | max | 40 | 47 | 54 |
| | min | 2 | 1 | 1 |
| Trip length (hours) | mean | 3.3 | 2.2 | 3.1 |
| | max | 7.0 | 5.0 | 9.0 |
| | min | 0.5 | 1.0 | 0.5 |
| Tackle type | bait | 54% | 59% | 40% |
| | lure | 15% | 19% | 57% |
| | fly | 42% | 24% | 3% |
| Fishing platform | boat | 56% | 98% | 41% |
| | shore | 44% | 2% | 59% |

^a Three unique online entries were anonymous.

Table 2.2-3. Length frequency data for Striped Bass measured by anglers participating in New Hampshire's Striped Bass Volunteer Angler Survey, 2021.

| Length (inches) | # | % |
|-----------------|-----|-------|
| 12 | 23 | 1.20 |
| 13 | 28 | 1.47 |
| 14 | 63 | 3.30 |
| 15 | 110 | 5.76 |
| 16 | 188 | 9.84 |
| 17 | 108 | 5.65 |
| 18 | 128 | 6.70 |
| 19 | 81 | 4.24 |
| 20 | 122 | 6.38 |
| 21 | 41 | 2.15 |
| 22 | 180 | 9.42 |
| 23 | 93 | 4.87 |
| 24 | 274 | 14.34 |
| 25 | 106 | 5.55 |
| 26 | 179 | 9.37 |
| 27 | 64 | 3.35 |
| 28 | 17 | 0.89 |
| 29 | 10 | 0.52 |
| 30 | 16 | 0.84 |
| 31 | 4 | 0.21 |
| 32 | 8 | 0.42 |
| 33 | 5 | 0.26 |
| 34 | 6 | 0.31 |
| 35 | 1 | 0.05 |
| 36 | 9 | 0.47 |
| 37 | 1 | 0.05 |
| 38 | 15 | 0.78 |
| 39 | 0 | 0.00 |
| 40 | 14 | 0.73 |
| 41 | 1 | 0.05 |
| 42 | 10 | 0.52 |
| 43 | 1 | 0.05 |
| 44 | 1 | 0.05 |
| 45 | 3 | 0.16 |
| 46 | 1 | 0.05 |
| N | | 1,911 |
| Mean length | | 21.5 |

 Legal size fish

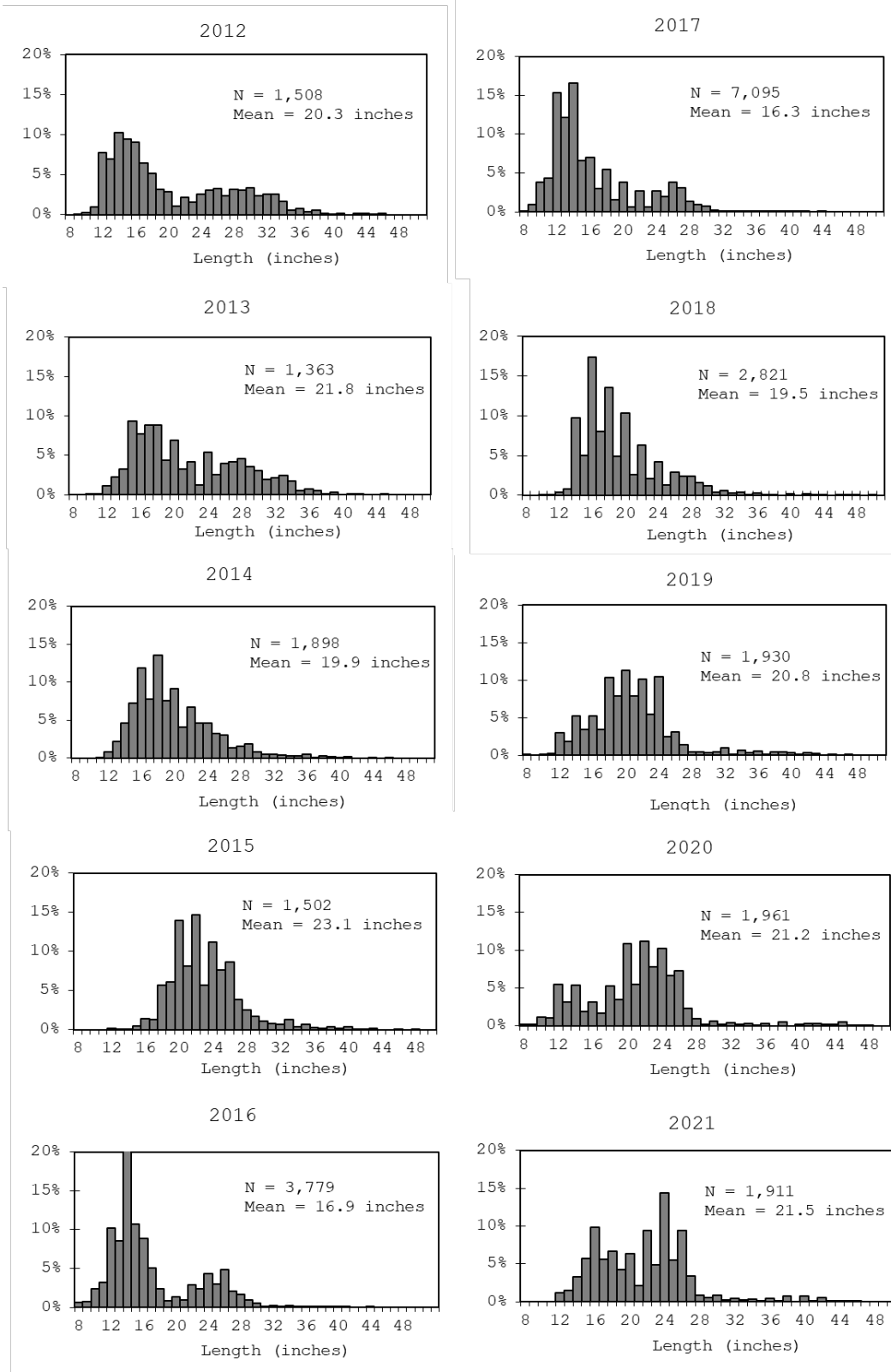


Figure 2.2-1. Annual length frequency comparisons of Striped Bass from New Hampshire's Striped Bass Volunteer Angler Survey, 2012–2021.

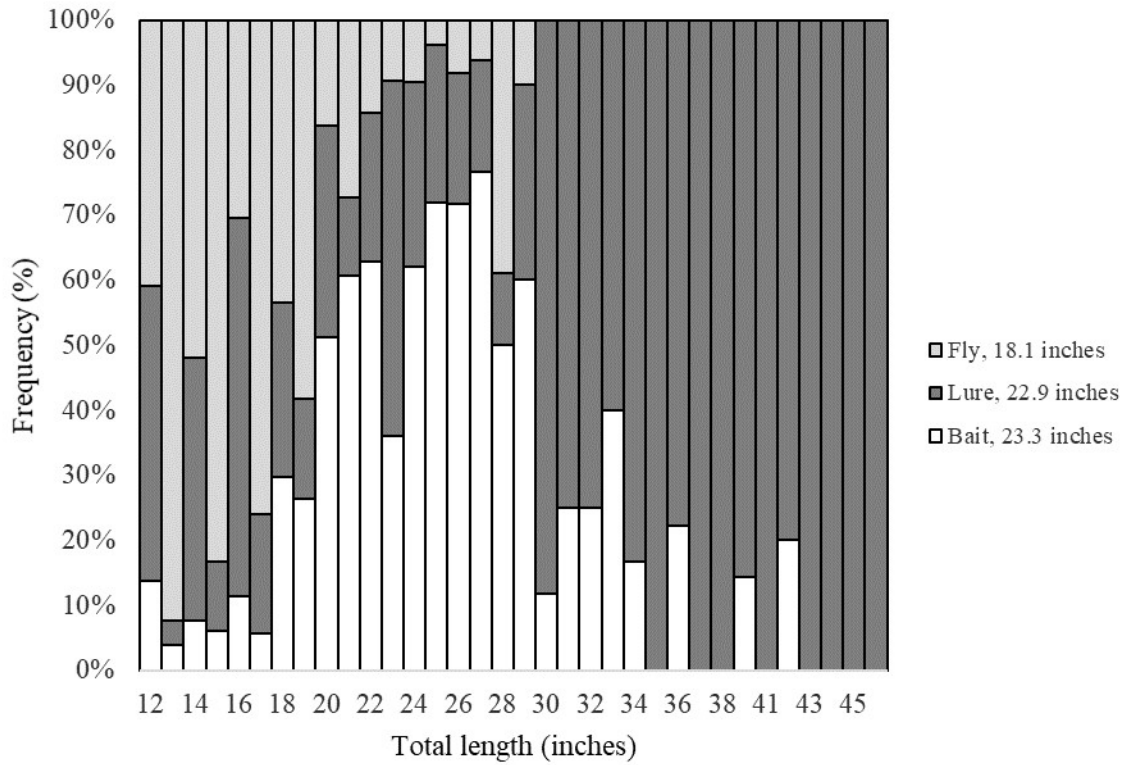


Figure 2.2-2. Proportion at length by bait type and mean lengths of Striped Bass caught using bait, lure, and fly from New Hampshire’s Striped Bass Volunteer Angler Survey, 2021.