

FINAL REPORT

State: NEW HAMPSHIRE **Grant:** F-61-R-25/F22AF00514

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, 2019 - December 31, 2023

ABSTRACT

Between January 1, 2019 and December 31, 2023, the New Hampshire Fish and Game Department conducted one investigation per year to monitor the recreational fishery for Striped Bass *Morone saxatilis* in NH waters. Participation ranged from 38 to 78 anglers during 2019–2023. Anglers reported between 1,004 and 2,474 effort hours directed at Striped Bass annually. A reported 8,066 Striped Bass were caught during the sampling period and volunteers provided length data on 7,121 (91%) of those fish. Lengths ranged from 8 to 50 inches, the mean length of Striped Bass reported was between 21.2 and 37.2 inches annually. Eighty-eight percent of the lengths were from sub-legal size fish that would not have been obtained by a conventional creel survey. Percentage of legal-size fish has risen over the last decade. Sixty-seven percent of all legal-size fish that were caught by participating anglers were released in 2023. Reported measurements suggest a large input from the 2015 cohort, which had strong recruitment in the Chesapeake Bay. 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 in 2019, with new management measures that took effect in 2020. In 2021, Amendment 7 was added to the Fisheries Management Plan, which specified the low recruitment assumption for the 2022 stock assessment update. A 2022 stock assessment update determined the Atlantic Striped Bass stock is overfished and overfishing is not occurring. On May 2, 2023, emergency action was taken to change the recreational size limit in response to the

unprecedented 2022 harvest which nearly doubled the 2021 harvest. The maximum size limit was reduced to less than 31 inches in order to prevent further harvest from the strong 2015 cohort.

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 in NH, 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 sub-legal and legal fish that are released, 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) for Striped Bass in 1993. The program is used to obtain information about the fishery that will assist managers in efforts to effectively manage the Striped Bass resource along the coast 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.

The local chapter of the Coastal Conservation Association assisted by providing a membership list, and survey forms were sent by the NHFG to all members. In addition, they annually donate a framed and numbered Striped Bass print to be raffled to one survey participant. A second prize has been donated annually by Kittery Trading Post since 2011.

The survey logbooks provided 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. Instructions

for completing the logbooks were included on the form. Participants were given the opportunity to electronically submit logbook information in a spreadsheet format through e-mail, and beginning in 2014, an online version was also made available. The online logbook allowed anglers to submit reports daily; the form asked for 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, as well as the summarized data of all participants.

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). 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 the 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).

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

RESULTS

Between January 1, 2019 and December 31, 2023, the New Hampshire Fish and Game Department conducted one investigation per year to monitor the recreational fishery for Striped Bass *Morone saxatilis* in NH waters. During the project period, the number of reporting anglers ranged from a low of 38 in 2023 to a high of 78 in 2022 (Table 2.2-1). The reported fishing effort was also the lowest in 2023 at 340 angler hours, the greatest amount of effort reported occurred in 2020 with 669 angler hours directed at Striped Bass via the Striped Bass Volunteer Angler Survey Program. Anglers reported catching a total of 8,871 Striped Bass during the 2019–2023 fishing seasons, of which, 20% were of legal-size. Approximately 11% of the legal-size fish caught were harvested.

Anglers who reported their trips using mail-in forms showed a preference for boat fishing and the use of bait consistently through the project period (Table 2.2-2). Those who report via e-mail reported the greatest number of trips per angler, averaging between 14.3 in 2023 to 47.5 in 2022, and the

fishing platform and tackle preference varied annually. Online respondents typically reported the fewest number of trips per angler and the types of trips reported also varied yearly, however, lures had the greatest percentage of use for four of the five years.

The catch per hour fished ranged from 0.59 in 2023 to 1.23 in 2021 (Table 2.2-1). The CPUE of legal-size fish was lower than the previous five year sampling period; fish caught per hour decreased from 0.08 in 2019 to 0.03 in 2020, then made a gradual increase to 0.14 in 2023.

Length measurements were provided on 8,066 fish ranging from 8 to 50 inches (Table 2.2-3). Eighty-eight percent of all reported length measurements were of sub-legal size fish (less than 28 inches). The mean size of fish caught ranged from 21.2 inches in 2020 to 37.2 inches in 2019 (Figure 2.2-1). The use of bait resulted in larger fish caught than either lure or fly tackle types (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 38 in 2023 to a high of 110 in 2017 (Table 2.2-1). A number of measures have been employed to boost participation, including: direct contact through mail and e-mail with potential Striped Bass anglers, advertising on social media, and offering incentives. A second incentive was added in 2011, and seemed to have a short-term positive impact on the number of reporting anglers but the level began to drop again the following year. Since 2000, the Coastal Conservation Association of NH has supplied one to two raffle prizes per season. It appears that the incentives may not be a driving factor for participation.

Anglers were able to report their fishing trips online for the first time in 2014, and that year had a 57% increase in the number of participating anglers. The online reporting option has remained the most popular form of submittal, with 79% of all participants choosing this option in 2023 (Table 2.2-2).

The three reporting options offered may be targeting different angler types. The majority of anglers choose to report their trips online and 95% of 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 between 3.0 and 4.7 trips. Those reporting through mail-in paper logbook or e-mail spreadsheet reported more trips per angler with a mean of 9.5 and 47.5 trips, respectively. It appears as though the annual forms (mail-in logbook and e-mail spreadsheet) are more appealing to anglers who make far

more fishing trips in a year, on average, than those that report via the online version. 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 fisherman while still offering options that are preferred by avid anglers will provide a more representative view of NH's Striped Bass fishery.

The majority of the Striped Bass reported each year are fish less than 28 inches in length, and during the project period, 88% of all reported measurements were sub-legal fish (Table 2.2-3). This survey is the primary source for length data on sub-legal, recreationally caught Striped Bass in NH, and the SBVAS plays an important role in the management of the Striped Bass fishery. The NHFG has continued to promote the high importance of providing length measurements through communications related to this survey program, and as a result, during 2019–2023 anglers provided measurements on 8,066 Striped Bass; 91% of all fish encountered (Table 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 using length data collected through this program, you can visually follow different cohorts of fish over time (Figure 2.2-1). One strong recruitment year was 2011, with a large production in the Chesapeake Bay (ASMFC 2022). 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). From 2020 through 2023 the mean length rose steadily from 21.2 to 27.1 inches. A large component of NH's fishery during those years was likely from the 2015 year class (Gary Nelson, Personal Communication). The 2015 cohort appeared to influence the increasing mean length of fish through 2023, when the most abundant sized fish reported caught were between 24 and 29 inches. While the data suggest at the continued presence of the 2011 through 2015 cohorts, their contribution was outshined 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). The strength of the Chesapeake Bay's 2014 year class was below average; it is possible that in 2016 these 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).

It has been shown that terminal tackle also has an effect on the size of Striped Bass caught (Patterson et al. 2014). Figure 2.2-2 illustrates tackle selectivity, specifically between bait and the artificial terminal tackle types, with bait consistently catching larger average sized fish. While the size of Striped Bass caught may be influenced by the use of different tackle types, it is also more broadly influenced by the population structure.

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 2019). It appears as though the lengths reported through this reporting program follow the overall population trends closely, picking up the most prominent year-classes as with the 2011 and 2015 cohorts recently. 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 2019). Therefore, while the SBVAS is useful in demonstrating trends in angler effort and success within state waters, it should be noted that 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 size and structure.

Many of the anglers that report via the SBVAS practiced catch and release during all or a portion of their Striped Bass fishing trips. The catch and release angler is a large portion of all reporting anglers. However, during the study period the percent of legal-size fish released index generally decreased from the high of 82% in 2019 and 2020 to a low of 66% in 2023. 66% of legal sized fish were released in 2023, remaining below the decade mean of 73%.

As reported in the 2022 stock assessment update, Atlantic Coast Striped Bass has been characterized as overfished, but no overfishing occurring. The stock remains below the spawning stock biomass target and threshold but in an increasing trend. The release of recreational harvest numbers for 2022 revealed an unprecedented harvest which nearly doubled that of 2021. In an effort to protect the strong 2015 cohort, emergency action was taken effective May 2, 2023 through October 28, 2024 with the expectation of further management being implemented in 2024, to reduce the maximum size limit to less than 31 inches. Many Striped Bass anglers are conservation-minded and it is difficult to say whether it was the more stringent management or the prevailing culture of catch

and release that caused anglers to release a majority of the legal-size fish caught in recent years.

In conclusion, participation in New Hampshire's Volunteer Angler Creel Survey for Striped Bass fluctuates year to year. This is largely due to the introduction of an online reporting option in 2014 has been a popular recruiting tool for new anglers moving forward. The reported survey data indicated that 88% of fish caught during the sampling period were of sub-legal size, with a mean length of between 16.3 and 23.1 inches. Reported measurements suggest a large input from the 2015 cohort, which had strong recruitment in the Chesapeake Bay. Terminal tackle preference, as well as the persistence of certain year-classes could affect the size of fish reported caught. 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. Finally, between 67% and 82% of all legal-size fish that were caught by participating anglers were released in 2019–2023, continuing the trend of high catch and release likely driven by conservation-minded anglers. Regulatory changes to New Hampshire's Striped Bass Fishery, including a slot size limit and mandatory use of inline circle hooks with bait, took effect in 2020 as a result of the 2019 stock assessment. Further changes were implemented in 2023 by emergency action in response to unprecedented high harvest in 2022.

REFERENCES

- Atlantic States Marine Fisheries Commission (ASMFC). 2019. Addendum VI to the Atlantic Striped Bass Interstate Fishery Management Plan: 18% Reduction in removals & Circle Hook Measures. 3-2; 26p.
- Atlantic States Marine Fisheries Commission (ASMFC). 2016. 2016 Atlantic Striped Bass Assessment Update. ASMFC. Atlantic Striped Bass Technical Committee. 15-19; 100p.
- Atlantic States Marine Fisheries Commission (ASMFC). 2022. 2022 Atlantic Striped Bass Assessment Update. ASMFC. Atlantic Striped Bass Technical Committee. 38p.
- Maryland Department of Natural Resources (MD DNR). 2016. Maryland Juvenile Striped Bass Survey. Maryland Department of Natural Resources, Federal Aid in Sportfish Restoration, Project F-61-R-P11-J3-T3, Final Report, Annapolis, MD, 237-243p.
- Nelson, G. 2016 Personal Communication. Massachusetts Division of Marine Fisheries, Annisquam River Marine Fisheries Field Station, 30 Emerson Ave., Gloucester, MA.
- 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.
- Patterson, C., K. Sullivan, M. Dionne, R. Heuss, J. Carloni, R. Eckert, B. Smith, and S. Conlin. 2014. New Hampshire's Marine Fisheries Investigations, Anadromous Fish Investigations, 2009-2013. Project No. F-61-R-J5. NH Fish & Game Dept., Durham, NH. 73pp.
- Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division January 2, 2019.

Table 2.2-1. Summary of data reported by participants in New Hampshire's Striped Bass Volunteer Angler Survey, 2014–2023.

	2014 ^a	2015	2016 ^a	2017	2018	2019	2020	2021	2022	2023
Reporting anglers	55	70	65	110	67	49	73	56	78	38
# of trips	633	710	716	866	678	625	669	520	607	340
Angler hours	2,063	2,523	2,417	2,902	2,184	2,040	2,474	1,691	2,076	1,004
Total Striped Bass caught	1,637	1,637	3,988	7,526	2,996	2,071	2,241	2,080	1,890	589
# harvested	49	33	62	93	62	27	13	21	79	54
# legal sized released	125	145	122	192	169	120	60	53	196	109
Fishing type (percent)										
Boat	51%	62%	61%	59%	58%	50%	65%	55%	53%	39%
Shore	49%	38%	39%	41%	42%	50%	35%	45%	47%	61%
Tackle type (percent)										
Bait	40%	50%	46%	45%	45%	39%	50%	47%	32%	24%
Lure	25%	23%	23%	25%	24%	24%	38%	38%	39%	63%
Fly	40%	32%	34%	32%	32%	37%	13%	18%	31%	14%
Catch/trip	3.2	2.3	5.6	8.7	4.4	3.3	3.4	4.0	3.1	1.7
Harvest/trip	0.08	0.05	0.09	0.11	0.09	0.04	0.02	0.04	0.13	0.16
Catch/hr. fished	0.98	0.65	1.65	2.59	1.37	1.02	0.91	1.23	0.91	0.59
Legal catch/hr. fished	0.08	0.07	0.08	0.10	0.11	0.08	0.03	0.04	0.13	0.14
Harvest/hr. fished	0.02	0.01	0.03	0.03	0.03	0.01	0.01	0.01	0.04	0.05
% caught & released	98%	98%	98%	99%	98%	99%	99%	99%	96%	91%
% legal sized released	72%	81%	66%	67%	73%	82%	82%	72%	71%	67%

^a Summary data differs from previous reports due to data review in 2017

Table 2.2-2. Summary of data reported by participants in New Hampshire's Striped Bass Volunteer Angler Survey, by reporting type, 2019–2023.

	2019			2020			2021			2022			2023		
	Mail-in	E-mail	Online	Mail-in	E-mail	Online	Mail-in	E-mail	Online	Mail-in	E-mail	Online	Mail-in	E-mail	Online
# Reporting anglers	11	2	33	6	4	63	11	3	42	7	2	69	5	3	30
# First time reporters	2	0	22	1	0	33	0	0	27	0	0	40	2	2	17
# Trips reported	13.9	33.0	4.2	13.8	17.3	3.8	9.5	19.3	4.5	17.9	47.5	3.0	11.0	14.3	4.7
max	49	56	29	34	28	44	40	47	54	48	68	58	24	31	53
per angler	3	10	1	2	7	1	2	1	1	2	27	1	2	3	1
Trip length	3.3	2.4	3.1	2.9	2.4	3.6	3.3	2.2	3.1	2.5	2.3	3.6	3.0	2.4	2.8
max	10.0	6.5	9.5	11.5	9.0	9.0	7.0	5.0	9.0	7.0	8.0	10.0	8.0	5.0	7.0
min	0.5	0.5	0.5	1.0	0.5	0.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	0.5	0.5
Tackle type															
bait	62%	66%	20%	92%	19%	45%	54%	59%	40%	54%	0%	33%	51%	7%	18%
lure	9%	12%	62%	11%	58%	42%	15%	19%	57%	9%	36%	59%	4%	88%	77%
fly	32%	21%	18%	0%	30%	13%	42%	24%	3%	40%	68%	7%	44%	0%	5%
Fishing platform															
boat	58%	100%	45%	87%	80%	52%	56%	98%	41%	58%	68%	42%	55%	100%	15%
shore	42%	0%	55%	13%	20%	48%	44%	2%	59%	42%	32%	58%	45%	0%	85%

Table 2.2-3. Length frequency data for Striped Bass measured by anglers participating in New Hampshire's Striped Bass Volunteer Angler Survey, 2019–2023.

Length (inches)	2019		2020		2021		2022		2023	
	#	%	#	%	#	%	#	%	#	%
8	2	0.11	5	0.25	0	0.00	0	0.00	0	0.00
9	0	0.00	3	0.15	0	0.00	0	0.00	0	0.00
10	2	0.11	23	1.17	0	0.00	0	0.00	0	0.00
11	4	0.22	20	1.02	0	0.00	1	0.06	1	0.18
12	57	3.06	107	5.46	23	1.20	21	1.18	0	0.00
13	33	1.77	61	3.11	28	1.47	5	0.28	0	0.00
14	99	5.32	106	5.41	63	3.30	32	1.80	1	0.18
15	61	3.28	37	1.89	110	5.76	11	0.62	0	0.00
16	91	4.89	62	3.16	188	9.84	70	3.94	2	0.36
17	60	3.23	33	1.68	108	5.65	30	1.69	1	0.18
18	190	10.22	103	5.25	128	6.70	165	9.28	9	1.62
19	148	7.96	68	3.47	81	4.24	46	2.59	7	1.26
20	214	11.51	214	10.91	122	6.38	174	9.79	14	2.52
21	150	8.06	108	5.51	41	2.15	60	3.37	21	3.78
22	191	10.27	220	11.22	180	9.42	126	7.09	33	5.94
23	105	5.65	153	7.80	93	4.87	61	3.43	29	5.22
24	199	10.70	201	10.25	274	14.34	231	12.99	71	12.77
25	49	2.63	131	6.68	106	5.55	123	6.92	47	8.45
26	56	3.01	143	7.29	179	9.37	166	9.34	52	9.35
27	22	1.18	45	2.29	64	3.35	95	5.34	52	9.35
28*	10	0.54	19	0.97	17	0.89	64	3.60	46	8.27
29*	8	0.43	5	0.25	10	0.52	53	2.98	35	6.29
30*	7	0.38	12	0.61	16	0.84	43	2.42	46	8.09
31	8	0.43	4	0.20	4	0.21	17	0.96	14	2.70
32	19	1.02	8	0.41	8	0.42	32	1.80	8	1.44
33	3	0.16	5	0.25	5	0.26	19	1.07	7	1.26
34	13	0.70	7	0.36	6	0.31	7	0.39	13	2.34
35	6	0.32	2	0.10	1	0.05	9	0.51	2	0.36
36	11	0.59	7	0.36	9	0.47	22	1.24	8	1.44
37	1	0.05	0	0.00	1	0.05	10	0.56	1	0.18
38	10	0.54	10	0.51	15	0.78	18	0.01	9	1.62
39	8	0.43	0	0.00	0	0.00	3	0.17	1	0.18
40	7	0.38	3	0.15	14	0.73	18	1.01	5	0.90
41	3	0.16	7	0.36	1	0.05	8	0.45	1	0.18
42	7	0.38	7	0.36	10	0.52	17	0.96	12	2.16
43	4	0.22	4	0.20	1	0.05	6	0.34	3	0.54
44	0	0.00	4	0.20	1	0.05	4	0.22	1	0.18
45	1	0.05	10	0.51	3	0.16	4	0.22	3	0.54
46	0	0.00	1	0.05	1	0.05	2	0.11	0	0.00
47	1	0.05	2	0.10	0	0.00	1	0.06	1	0.18
48	0	0.00	1	0.05	0	0.00	0	0.00	0	0.00
49	0	0.00	0	0.00	0	0.00	2	0.11	0	0.00
50	0	0.00	0	0.00	0	0.00	2	0.11	0	0.00
N	1,860		1,961		1,911		1,778		556	
Mean Length	37.2		21.2		21.5		24.1		27.1	

Legal size fish
 *Legal size fish effective May 2, 2023

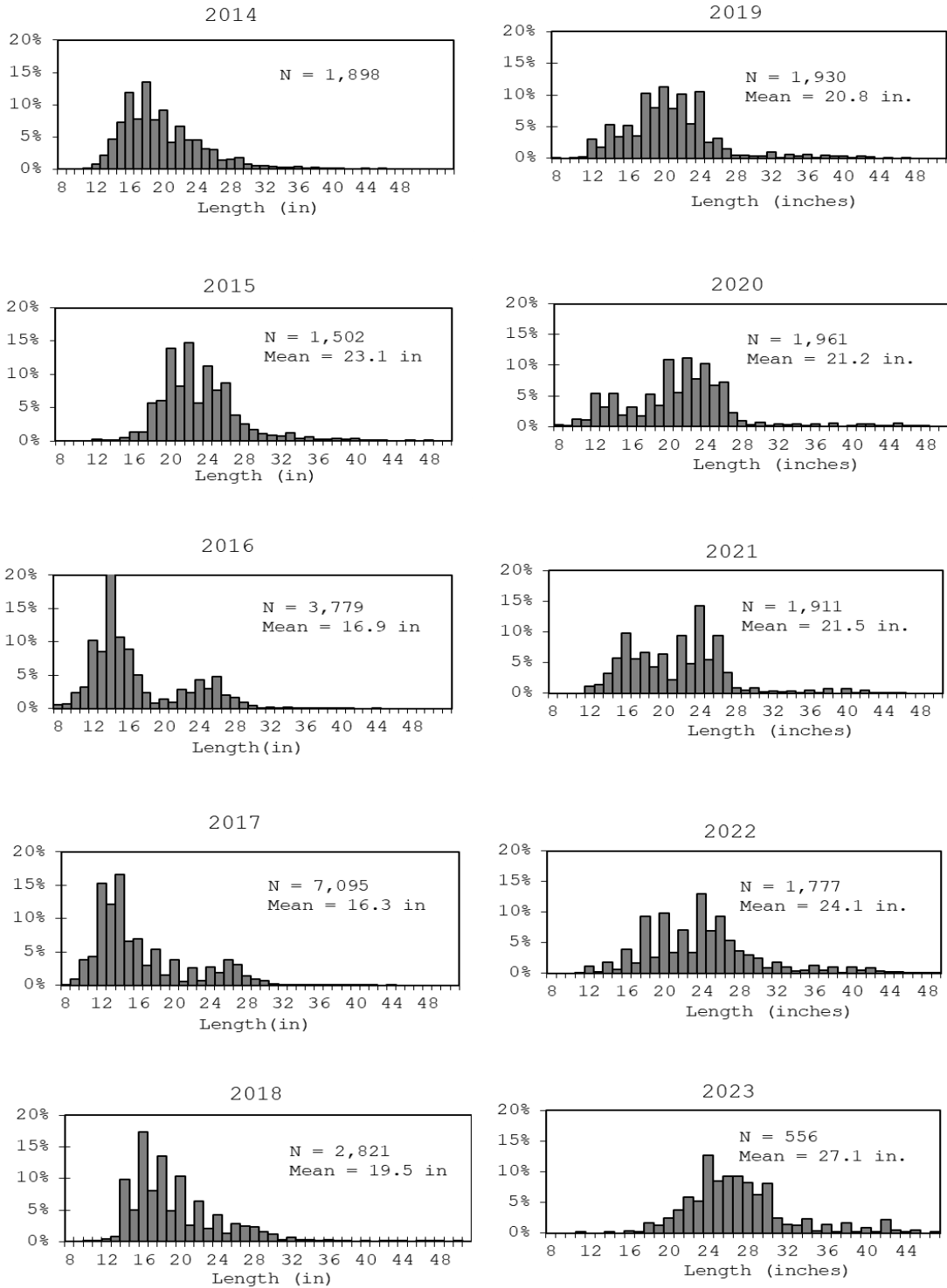


Figure 2.2-1. Length frequency comparisons of Striped Bass from New Hampshire's Striped Bass Volunteer Angler Survey, 2014–2023.

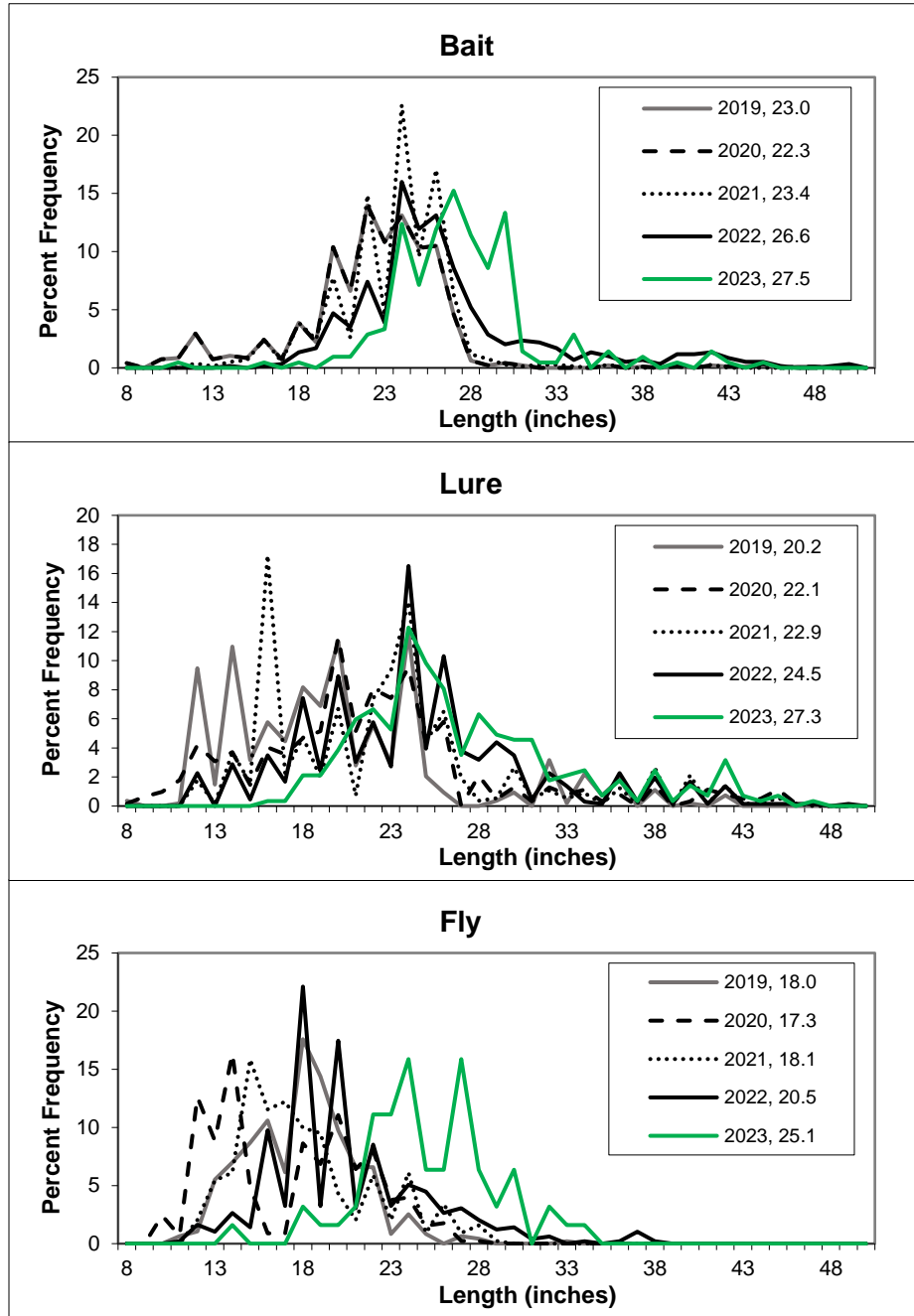


Figure 2.2-2. Length frequencies and mean lengths of Striped Bass caught using bait, lure, and fly from New Hampshire’s Striped Bass Volunteer Angler Survey, 2019-2023