

PROGRESS REPORT

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

Grant Title: NEW HAMPSHIRE'S MARINE FISHERIES INVESTIGATIONS

Project III: MULTI-SPECIES EVALUATION

Job 2: COASTAL HARVESTERS PROGRAM

Objective: To collect catch and effort information from coastal harvesters targeting and catching recreationally important finfish species or species not currently being reported to the National Oceanic and Atmospheric Administration Fisheries Service directly from harvesters fishing strictly in state waters.

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

ABSTRACT

Between January 1, 2021 and December 31, 2021, the NH Fish and Game Department conducted one investigation to collect catch and effort information from coastal harvesters targeting and catching recreationally important finfish species from the state of New Hampshire's coast and estuarine waters. Individuals who obtain a Harvest Permit to take marine species in New Hampshire coastal and estuarine waters are required to complete and submit trip-level logbooks on a monthly basis detailing harvest and effort. The majority of those who obtain this permit are seeking bait for other recreational fisheries. The harvest of these baitfish is not captured or quantified by any other harvest and effort reporting programs.

The reporting compliance rate was approximately 78% in 2021, with 16 individuals out of 73 permittees not reporting. The total reported annual marine species harvest in New Hampshire's coastal and estuarine waters decreased from 331,714 lbs in 2020, to 64,792 lbs in 2021. American Eel *Anguilla rostrata*, Atlantic Menhaden *Brevoortia tyrannus*, and Killifish *Fundulus* spp. continue to be species consistently harvested as bait for recreational fisheries. In response to low river herring (Alewife *Alosa pseudoharengus* and Blueback Herring *Alosa aestivalis*) spawning returns and not

meeting the fishery-independent target outlined in NH's Atlantic States Marine Fisheries Commission River Herring Sustainable Fishing Plan the NH Fish and Game Department closed the fishery to all harvest of river herring beginning in 2021. Participation in the coastal harvester program decreased as a result of the river herring closure.

Harvesters used seven different gear types to capture six taxa of marine species from New Hampshire waters in 2021. Atlantic Menhaden represented the most sought after and harvested species of baitfish.

## INTRODUCTION

In New Hampshire (NH), persons harvesting horseshoe crabs *Limulus polyphemus* by any method, American Eels *Anguilla rostrata* by any method other than angling, or marine finfish by seine, net, weir, pot, or trap from coastal and estuarine waters are required to obtain a Harvest Permit from the NH Fish and Game Department. A Harvest Permit is also required to take any species, except American lobster *Homarus americanus* and crabs, for commercial purposes from state waters, unless reported through another method (e.g., National Oceanic and Atmospheric Administration's (NOAA) Vessel Trip Reporting Program). The permittees are required to complete monthly logbooks on their harvest and effort. Collection of this information fills a gap in the fishery-dependent data collection program. Most of these harvesters either harvest exclusively in state waters or retain the marine species they catch for personal use (e.g., food, bait, etc.); thus, the information is not captured by NOAA's Fisheries Service commercial reporting program. Due to certain gear restrictions (i.e., no mobile gear in state waters) few traditional commercial finfish operations in NH obtain this permit. The majority of people obtaining the permit are individuals seeking bait for various fisheries such as the recreational Striped Bass *Morone saxatilis* fishery and NH's lobster fishery.

Many of the fish targeted and retained by these harvesters, such as river herring (Alewife *Alosa pseudoharengus* and Blueback Herring *Alosa aestivalis*), Atlantic Menhaden *Brevoortia tyrannus*, and American Eel, are forage for important recreationally harvested finfish species.

Information from the coastal harvester's mandatory logbooks provides annual harvest and effort information useful for improving the quality of stock assessments and fisheries management.

## PROCEDURES

Mandatory trip-level logbooks are required to be submitted on a monthly basis for those months an individual holds a permit to harvest marine species within the coastal or estuarine waters of NH. The required elements to be reported are in accordance with the Atlantic Coastal Cooperative Statistics Program's standards which include date fished, trip number, species sought, quantity of species retained, disposition of the harvest, area fished, gear type, number and size of gear, effort (in hours), number of sets, and quantity of bycatch by species. If the individual used a boat or sold their catch, the following elements are also required: port, county and state harvest was landed, hours at sea, number of crew, dealer license number, and unload date. The reports are required to be submitted by the tenth day of the following month for those months the individual is permitted to harvest whether or not effort occurred. Permits for subsequent years are not issued to an individual until the previous years' reporting requirements have been met.

The harvest information is reported in either weight or quantity. All quantitative data are converted to weight using the conversions in Table 3.2-1. Harvest weight, effort, and CPUE data are compiled by species. Effort measurements for each gear are presented in Table 3.2-2. If the number of harvesters reporting a single species is less than three, harvest, effort, and location data are not published to protect the confidentiality of an individual's data.

## RESULTS

Between January 1, 2021 and December 31, 2021, the NH Fish and Game Department conducted one investigation to collect catch and effort information from coastal harvesters targeting and catching recreationally important finfish species from the state of New Hampshire's coast and estuarine waters. Seventy-three individuals obtained harvest permits in 2021 (Table 3.2-3); the reporting compliance rate was approximately 78% with 16 non-reporters. Thirteen permittees reported harvesting 64,792 lbs of marine species in 2021, an 80% decrease from 331,714 lbs in 2020 (Table 3.2-4).

Seven different gear types were used to harvest six taxa from NH's waters (Table 3.2-5). Atlantic Menhaden were harvested with three different gear types; cast net, gill net, and seine. American Eels were harvested with two gear types, while the remainder of species were each harvested by one gear type. Minnow traps was the only gear used to harvest multiple species.

Atlantic Menhaden were the most sought after and harvested species in 2021 representing approximately 94% of NH's total harvested weight (Tables 3.2-

3 and 3.2-6). Five individuals reported harvesting 60,900 lbs of Atlantic Menhaden in 2021, a decrease from the 310,361 lbs harvested in 2020 (Tables 3.2-3 and 3.2-4). Targeted harvest of Atlantic Menhaden occurred in state waters between June and July (Table 3.2-6). Seventy percent (42,600 lbs) of Atlantic Menhaden were harvested in July (Table 3.2-6) with 99% (42,100 lbs) of the July harvest being from the Seabrook coast (Tables 3.2-6 and 3.2-7).

Due to closure of the in-state fishery for river herring in 2021, no river herring were harvested at any locations (Tables 3.2-3 and 3.2-8).

Killifish *Fundulus spp.* were harvested by three individuals using minnow traps in NH's estuarine and coastal waters (Tables 3.2-3 and 3.2-5). Killifish annual harvest has been increasing in recent years with the second highest catch of 34 lbs in 2021 (Table 3.2-4). Minnow traps had a total CPUE of 1.97 Killifish per hour (Table 3.2-9).

Various species of finfish were targeted and harvested in 2021 including American Eel, Atlantic Menhaden, and Killifish. A complete summary of effort and CPUE by gear, month, and area for selected marine species is presented in Table 3.2-10.

## DISCUSSION

Mandatory reporting of harvest activities on various marine species in NH coastal and estuarine waters closes a reporting gap between harvesting in federal waters, which is reported to NOAA Fisheries Service, and state waters. Species-specific harvest and effort data from this program are utilized in fisheries management for some species as well as address bait fish or requirements for various Atlantic States Marine Fisheries Commission's fishery management plans. Some of the harvested finfish species are not only important as a forage base for recreationally important fish, but also used widely as bait in recreational fisheries (i.e., Striped Bass, Bluefish *Pomatomus saltatrix*, and American lobster).

The anadromous river herring is a prime example of this; they are an important forage fish in both freshwater as young-of-the-year and the marine environment as juveniles and adults. River herring are used as bait by both recreational anglers and the lobster fishery, therefore have been one of the most sought after baitfish of permittees in NH waters over the last ten years (Table 3.2-4). However, in recent years New Hampshire has experienced a decline in river herring spawning returns (see F-61-R-PI-1) and has seen relatively high harvest (Table 3.2-4). Due to NH not meeting its fishery-independent target outlined in NH's Atlantic States Marine Fisheries Commission River Herring Sustainable Fishing Plan the NH Fish and Game

Department closed the fishery to all harvest of river herring beginning in 2021. The decrease in coastal harvester permits issued in 2021 (Table 3.2-3) was largely a reflection of the closure.

With the drastic decline in the Atlantic Herring *Clupea harengus* population, restrictive commercial quotas, and much lower landings, bait needs have shifted to Atlantic Menhaden when abundant in state waters. This species accounted for most of the harvest in 2021 with a total harvest of 60,900 lbs (Table 3.2-4). Five individuals reported fishing effort for Atlantic Menhaden in 2021 (Table 3.2-3), a notable decrease from the previous three years. The overall increase in harvest in recent years is largely from individuals seeking Atlantic Menhaden for use as bait in the lobster fishery.

In summary, species harvested in NH's coastal waters for use as bait in recreational fisheries continue to be an important resource in state waters. This demand for bait has maintained the American Eel, Atlantic Menhaden, and Killifish fisheries. Thirteen of the 73 Harvest permittees reported harvesting 64,792 lbs of marine species in 2021. Seven different gear types were used to harvest six different taxa. River herring are an important bait species and represent one of the most sought after and harvested species by permittees in past years, but due to a closure of the fishery no river herring were allowed to be harvested in 2021. Atlantic Menhaden have been abundant in state waters in recent years and harvest has increased considerably. Species harvested for use as bait in New Hampshire's recreational fisheries continue to be an important commodity in state waters.

Table 3.2-1. Conversion factors used to adjust harvest reported in numbers of marine species by persons with Harvest Permits for New Hampshire coastal and estuarine waters from 2021.

Species	Conversions
American Eel	4 fish = 1 lb
Atlantic Menhaden	1 fish = 1 lb
Horseshoe crab	1 male = 0.56 lb
	1 female = 1.77 lb
Killifish	1 liquid quart = 1.125 lb
	1 liquid quart = 275 fish
River herring	1 fish = 0.5 lb

Table 3.2-2. Effort measurements for each gear type reported by persons with Harvest Permits for New Hampshire coastal and estuarine waters from 2021.

Gear	Effort
Cast net	Hours fished
Eel pot	Trap haul set over days
Gill net	(Net area/100) * Hours fished
Hand	Hours fished
Minnow trap	Trap haul set over days
Scallop dredge	Hours fished
Seine	(Net area/100) * Hours fished

Table 3.2-3. Number of Harvest Permittees that reported fishing effort for each marine species by year and total number of Harvest Permits that were issued for New Hampshire coastal and estuarine waters from 2012-2021.

Species	Number of permittees									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
American Eel	7	8	6	<3	8	3	4	<3	3	<3
American Plaice	<3	-	-	-	-	-	-	-	-	-
Atlantic Cod	<3	-	-	-	-	-	-	-	-	-
Atlantic Herring	-	-	-	-	-	-	<3	-	-	-
Atlantic Mackerel	-	-	-	-	<3	<3	-	<3	-	-
Atlantic Menhaden	<3	-	-	-	-	3	19	19	19	5
Atlantic sea scallop	-	-	-	-	-	<3	<3	<3	<3	<3
Atlantic surf clam	-	-	-	-	-	-	-	-	<3	-
Atlantic Tomcod	-	-	-	-	-	-	-	-	-	<3
Bluefish	<3	-	-	-	-	-	-	-	-	-
Cusk	<3	-	-	-	-	-	-	-	-	-
Goosefish	<3	-	-	-	-	-	-	-	-	-
Haddock	<3	-	-	-	-	-	-	-	-	-
Horseshoe crab	-	-	3	<3	<3	<3	<3	<3	<3	<3
Killifish	3	4	<3	3	4	3	4	4	4	3
Pollock	<3	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	<3	<3	-	-	-	-	-
River herring	20	20	29	21	23	14	16	21	17	-
Silver Hake	<3	-	-	-	-	-	-	-	-	-
Spiny Dogfish	<3	-	-	-	-	-	-	-	-	-
Stickleback Spp.	-	-	-	-	<3	<3	<3	-	-	-
White Hake	<3	-	-	-	-	-	-	-	-	-
Winter Flounder	<3	-	-	-	-	-	-	-	-	-
Witch Flounder	<3	-	-	-	-	-	-	-	-	-
# Permits issued	108	102	83	74	76	70	95	105	99	73
# Permittees reported effort	35	31	34	28	36	24	40	45	43	13

Table 3.2-4. Harvest Permittees reported total weight (lb) of harvested marine species by year for New Hampshire coastal and estuarine waters from 2012–2021.

Species	Weight of harvest									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
American Eel	167	106	35	a	44	19	19	a	12	a
American Plaice	a	-	-	-	-	-	-	-	-	-
Atlantic Cod	a	-	-	-	-	-	-	-	-	-
Atlantic Herring	-	-	-	-	-	-	a	-	-	-
Atlantic Mackerel	-	-	-	-	a	a	-	a	-	-
Atlantic Menhaden	a	-	-	-	-	8,364	79,401	262,705	310,361	60,900
Atlantic sea scallop	-	-	-	-	-	a	a	a	a	a
Atlantic surf clam	-	-	-	-	-	-	-	-	a	-
Atlantic Tomcod	-	-	-	-	-	-	-	-	-	a
Bluefish	a	-	-	-	-	-	-	-	-	-
Cusk	a	-	-	-	-	-	-	-	-	-
Goosefish	a	-	-	-	-	-	-	-	-	-
Haddock	a	-	-	-	-	-	-	-	-	-
Horseshoe crab	-	-	91	a	a	a	a	a	a	a
Killifish	4	12	a	12	11	6	12	16	79	34
Pollock	a	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	-	a	-	-	-	-	-
River herring	2,681	4,481	5,737	7,566	4,354	3,916	4,398	11,326	7,964	-
Silver Hake	a	-	-	-	-	-	-	-	-	-
Spiny Dogfish	a	-	-	-	-	-	-	-	-	-
Stickleback spp. <sup>b</sup>	-	-	-	-	a	a	a	-	-	-
White Hake	a	-	-	-	-	-	-	-	-	-
Winter Flounder	a	-	-	-	-	-	-	-	-	-
Witch Flounder	a	-	-	-	-	-	-	-	-	-
Confidential harvest <sup>d</sup>	25,410	-	a	138	102	1,325	1,479	805	13,298	3,858
Yearly total	28,262	4,599	5,876	7,717	4,511 <sup>c</sup>	13,630 <sup>c</sup>	85,309 <sup>c</sup>	274,852	331,714	64,792

<sup>a</sup> Weight of harvest not shown due to confidentiality restrictions of the data

<sup>b</sup> Catch reported in numbers, no conversion factor available for the appropriate size fish.

<sup>c</sup> Yearly total reflects missing lbs from species with no conversion factors.

<sup>d</sup> Confidential harvest is the combined weight of all species of fish that were harvested by less than three harvesters for that year.



Table 3.2-5. Percent weight composition, by gear type, for harvested marine species by Harvest Permittees for New Hampshire coastal and estuarine waters in 2021.

Percent weight composition by gear							
Species	Cast net	Eel pot	Gill net	Hand	Minnow trap	Scallop dredge	Seine
American Eel		a			a		
Atlantic Menhaden	a		a				a
Atlantic sea scallop						100%	
Atlantic Tomcod					100%		
Horseshoe crab				100%			
Killifish					100%		

<sup>a</sup> Percent weight composition not shown due to confidentiality restrictions of the data.

Table 3.2-6. Harvest Permittees reported harvested weight (lb) of marine species and percentage of annual harvest, by species and month, for New Hampshire coastal and estuarine waters in 2021.

Weight of harvest							
Species	Jan	Feb	Mar	Apr	May	Jun	Jul
Atlantic Menhaden						18,300	42,600
Killifish	a	a	a	a	a	a	a

Species	Aug	Sep	Oct	Nov	Dec	Annual harvest (lb)	% of annual harvest
Atlantic Menhaden						60,900	94%
Killifish	a	a	a	a	a	34	<1%

<sup>a</sup> Weight of harvest not shown due to confidentiality restrictions of the data.

Table 3.2-7. Reported harvested weight (lb) of select marine species by Harvest Permittees for New Hampshire coastal and estuarine waters, by month and area in 2021.

Month/area	Atlantic Menhaden	Killifish
January		
Hampton Harbor		a
Squamscott R.		a
February		
Hampton Harbor		a
March		
Squamscott R.		a
April		
Squamscott R.		a
May		
Squamscott R.		a
June		
Hampton Coast	a	
Seabrook Coast	a	
Squamscott R.		a
Tide Mill Creek		a
July		
Hampton Coast	500	
Seabrook Coast	42,100	
Tide Mill Creek		a
August		
Tide Mill Creek		a
September		
Tide Mill Creek		a
October		
Great Bay		a
Tide Mill Creek		a
November		
Tide Mill Creek		a
December		
Great Bay		a
Tide Mill Creek		a

<sup>a</sup> Weight of harvest not shown due to confidentiality restrictions of the data.

Table 3.2-8. Total reported harvest of river herring by Harvest Permittees, and percentage of total river herring harvested at all locations in New Hampshire from 2012-2021. (No harvest in 2021 due to fishery closure.)

Year	Bellamy R.		Cocheco R.		Great Bay		Lamprey R.	
	lb	%	lb	%	lb	%	lb	%
2012	a	a	a	a	a	a	a	a
2013	253	6%	a	a			a	a
2014	a	a	a	a	a	a	a	a
2015	a	a					a	a
2016	a	a					a	a
2017	a	a					a	a
2018	a	a					a	a
2019	a	a					a	a
2020	a	a					a	a
2021	River herring fishery was closed in 2021							

Year	Little Bay		Oyster R.		Salmon Falls R.		Squamscott R.		Winnicut R.		Total harvest (lb)
	lb	%	lb	%	lb	%	lb	%	lb	%	
2012					a	a	1,647	61%	a	a	2,681
2013							3,942	88%			4,481
2014	a	a					4,380	76%			5,737
2015							6,446	85%			7,566
2016							4,206	97%	a	a	4,354
2017							2,529	65%			3,916
2018							2,439	55%			4,398
2019							8,756	77%			11,326
2020							5,118	64%			7,964
2021	River herring fishery was closed in 2021										0

Table 3.2-9. Reported effort and CPUE of marine species by Harvest Permittees for New Hampshire coastal and estuarine waters, by gear type, for each month in 2021.

Species	Effort and CPUE											
	Jan		Feb		Mar		Apr		May		Jun	
	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE
Atlantic Menhaden												
Cast net												
Gill net											a	a
Seine											a	a
Killifish												
Minnow trap	a	a	a	a	a	a	a	a	a	a	a	a

Species	Effort and CPUE												Total by species & gear		
	Jul		Aug		Sept		Oct		Nov		Dec				
	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	Effort	CPUE	
Atlantic Menhaden															
Cast net	a	a												a	a
Gill net	a	a												a	a
Seine	a	a												a	a
Killifish															
Minnow trap	a	a	a	a	a	a	a	a	a	a	a	a	a	348.00	1.97

<sup>a</sup> Effort and CPUE for each gear type not shown due to confidentiality restrictions of the data.

Table 3.2-10. Reported fishing effort and CPUE of marine species by Harvest Permittees for New Hampshire coastal and estuarine waters by month, area, and gear type in 2021.

Month/area/gear	Atlantic Menhaden		Killifish	
	Effort	CPUE	Effort	CPUE
January				
Hampton Harbor				
Minnow trap			a	a
Squamscott R.				
Minnow trap			a	a
February				
Hampton Harbor				
Minnow trap			a	a
March				
Squamscott R.				
Minnow trap			a	a
April				
Squamscott R.				
Minnow trap			a	a
May				
Squamscott R.				
Minnow trap			a	a
June				
Hampton Coast				
Gill net	a	a		
Seine	a	a		
Seabrook Coast				
Gill net	a	a		
Squamscott R.				
Minnow trap			a	a
Tide Mill Creek				
Minnow trap			a	a
July				
Hampton Coast				
Cast net	a	a		
Gill net	a	a		
Seine	a	a		
Seabrook Coast				
Cast net	a	a		
Gill net	a	a		
Seine	a	a		
Tide Mill Creek				
Minnow trap			a	a
August				
Tide Mill Creek				
Minnow trap			a	a
September				
Tide Mill Creek				
Minnow trap			a	a
October				
Great Bay				
Minnow trap			a	a
Tide Mill Creek				
Minnow trap			a	a

Table 3.2-10. (cont.)

November				
Tide Mill Creek				
Minnow trap			a	a
December				
Tide Mill Creek				
Minnow trap			a	a

<sup>a</sup> Effort and CPUE for each gear type is not shown due to confidentiality restriction of the data.