

# STRIPED BASS FISHERIES AND MONITORING PROGRAMS IN THE TAR RIVER, NORTH CAROLINA–2014



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*Abstract.*—Between 16 April and 13 May 2014, 339 Striped Bass *Morone saxatilis* were sampled on the Tar River spawning grounds via boat electrofishing. Tar River relative abundance pooled across all sampling dates was 28.3 fish/h, and peaked the week of 5 May 2014 at 35.8 fish/h. Catch rates were comparable to recent sample years on the Tar River. Seven year-classes were represented in the sample (male ages 2–7 and female ages 2–8). Age 3 and 4 males from the 2011 and 2010 year classes made the highest contribution (60.8%) to the total catch in 2014, with CPUE for each of these cohorts at 8.6 fish/h. The 2010 and 2011 year-classes were also the most abundant for females. An estimated 1,001 angler-hours of effort were directed towards Striped Bass in the upper Tar River during the spring of 2014 with zero harvest. Genetic analysis revealed hatchery contribution (93-95%) and wild reproduction (5-7%) in the Tar River. Truncated length and age distribution along with the absence of older fish in the Tar River suggests that mortality continues to hinder stock recovery and continued management efforts to improve stock characteristics are needed.

The North Carolina Wildlife Resources Commission (NCWRC) is responsible for annual spawning stock assessments of migratory Striped Bass *Morone saxatilis* populations utilizing inland waters within the Central Southern Management Area (CSMA). The CSMA is defined as all internal coastal, joint, and contiguous inland waters of North Carolina south of a line from Roanoke Marshes Point across to Eagle Nest Bay in Dare County, to the South Carolina state line (NCDENR 2013), including the Tar River.

Striped Bass in the CSMA are considered a stock of concern by the North Carolina Division of Marine Fisheries (NCDMF) due to a “lack of adequate data”, and the need for conservative management efforts are supported by “truncated size and age distributions, low overall abundance, and an absence of older fish in spawning ground surveys” (NCDENR 2013). Spawning stock data collected in inland waters by NCWRC will be combined with NCDMF data collected in joint and coastal waters to develop a comprehensive stock assessment model for Striped Bass within the CSMA. Estimates of fishing mortality rates coupled with analyses of basic population trends are critical for determining the appropriate total allowable harvest of Striped Bass from the CSMA Striped Bass fisheries while still allowing for stock preservation and growth. Development and execution of comprehensive inter-agency fisheries management plans are necessary to support the enhancement of Striped Bass populations within coastal North Carolina for the benefit of recreational and commercial anglers (NCDENR 2013).

In the Tar River, Striped Bass have been surveyed by Commission staff using boat-mounted electrofishing each spring since 1996 to assess spawning stock characteristics. Due to low spawning stock abundance and limited Striped Bass recruitment, Striped Bass populations in the Tar River are not at levels that can be sustained without stocking. Stagnant size and age structure distributions, coupled with a lack of older fish, suggest mortality rates continue to be too high to allow for population recovery (NCDENR 2013). Striped Bass have been stocked in the lower Tar River since 1983. Non-lethal, parentage-based tagging (PBT) using microsatellite markers to identify annual contribution of hatchery Striped Bass began in 2010. In 2010 and 2011, Roanoke River Striped Bass were the genotyped brood source for these stockings. In 2012, a change to using endemic brood fish occurred with the theory that endemic Tar River Striped Bass should be more successful than using nonnative broodfish (Bulak et al. 1995). A formal evaluation of the contribution of hatchery fish to spring migrations of Striped Bass is necessary to determine if stocking may be an effective restoration strategy.

This report documents the annual Striped Bass spawning stock survey conducted in the Tar River in 2014. The objective of this spawning stock survey was to quantify Striped Bass spawning stock characteristics by estimating relative abundance, size-structure, age-structure, and contribution of hatchery fish to the spawning stock. Additionally, preliminary recreational fishery statistics collected during the NCDMF Tar River creel survey are reported.

## **Methods**

### *Spawning Stock Assessment*

Boat electrofishing was conducted within one of three, approximately 15-mile segments between Rocky Mount and Tarboro (Figure 1), which were all within the reported spawning grounds for Striped Bass (Kornegay and Humphries 1975). Attempts were made to distribute sampling evenly among each of the three segments. However, relationships between streamflow and fish abundance near the upper extent of available spawning grounds often restrict sampling to the lower two segments, with certain minimum river flows required to allow access to specific sampling segments (Table 1). Sampling consisted of boat electrofishing for approximately 30 minutes followed by maneuvering downstream several miles and sampling again for approximately 30 minutes. Sampling ceased when water temperatures

consistently exceeded optimal temperatures for spawning (18–22°C) and Striped Bass spawning appeared complete. Striped Bass were collected using a boat-mounted electrofishing unit (Smith-Root 7.5 GPP) with 1 dip netter. To minimize size selection during sampling, fish were netted as they were encountered, and electrofishing time (seconds) was recorded for each sample site. Relative abundance of Striped Bass for each sample was indexed by catch per unit effort (CPUE; fish/h). Mean daily water temperature (°C) was recorded at each sample site.

Each collected Striped Bass was measured for total length (TL; mm) and weighed (g). Sex was determined by applying directional pressure to the abdomen toward the vent and observing the presence of milt (male) or eggs (female). Scales were removed for aging purposes from a subsample of fish during each sampling event (approximately 5 fish per 25-mm size-class by sex) on the left side of the fish between the lateral line and the dorsal fin (NCWRC and NCDMF 2011). To estimate contribution of hatchery fish to the spawning stock using PBT analysis, a partial pelvic fin clip was removed from Striped Bass <600 mm (anticipated size of age-4 and younger fish) until 200 fin clips were collected and preserved in a 95% ethyl alcohol solution.

Before release, untagged Striped Bass were tagged with an individually numbered internal anchor tag as a cooperative effort with the ongoing NCDMF Striped Bass tagging program (Winslow 2010). Recaptured, tagged Striped Bass were identified by tag number, and scales were removed from the right side of the fish if tagging occurred in a previous year. Recaptures from the current sample year were recorded in the site capture unless the recapture occurred on the same day as tagging.

Striped Bass scales were examined at 24X and 36X magnification using a microfiche reader, and annuli were counted to estimate age in accordance with standard protocols (NCWRC and NCDMF 2011). A subsample of approximately 30% of the scales aged was aged by a second reader. Differences between readers were resolved to establish 100% reader agreement. Proportions of each age-class within each 25-mm size-class were computed and expanded to the total number of Striped Bass collected within each size-class by sex. Mean lengths at age were calculated for the entire sample following methods described by Bettoli and Miranda (2001).

### *Stocking Program*

Striped Bass broodfish collections were conducted on 24 April and 7 May 2014 independent of the spawning stock survey. Collections were conducted via boat-mounted electrofishing with 1 dip netter. Broodfish were transported to Edenton National Fish Hatchery for propagation and rearing of juveniles, with the goal of producing 100,000 phase-II (6–8 inch) Striped Bass. Fin clips for genotyping were collected from all broodfish for future PBT assessments.

Genotyping for PBT analysis was conducted on fin clip samples by the South Carolina Department of Natural Resources (SCDNR) Hollings Marine Lab (O'Donnell et al. 2014–2015). Although stockings have occurred since 1983, PBT analysis is available for year-classes stocked in the Tar River since 2010 (Table 2). Stocking contribution from PBT analysis of fin clip samples collected in 2013 and 2014 were summarized.

## *Recreational Harvest Regulations and Monitoring*

The Striped Bass recreational fishery in inland and joint waters of the Tar River Basin is regulated by a daily possession limit and length limits that went into effect on 1 July 2008. The harvest season is from October 1 through April 30, with a daily creel limit of 2 fish per day with a minimum total length restriction of 18 inches (457 mm) and a protective slot of no harvest between 22 and 27 inches (559–686 mm) in joint or inland waters. Similar regulations were implemented for coastal fishing waters managed by NCDMF, but without the protective 22–27 inch slot limit in effect.

The creel survey conducted in the upper Tar River by the NCDMF consisted of a non-uniform probability based access point creel survey (Pollock 1994). The area surveyed encompassed nine access points from Battle Park to Falkland (NCDMF unpublished data). In 2014, surveys were conducted in the upper Tar River from 12 February through 3 May. Preliminary results of the 2014 creel survey were summarized including angler effort, harvest, and release of Striped Bass in the Tar River.

## **Results**

### *Spawning Stock Assessment*

Sampling began as the water temperature approached 15° C in mid-April. Electrofishing sampling in the Tar River between 16 April and 13 May 2014 yielded 339 Striped Bass. Male Striped Bass accounted for 71.7% of the sample (N=243), and females accounted for 28.3% (N=96). Relative abundance of Striped Bass (pooled CPUE or  $\sum$  fish collected/ $\sum$  hours of electrofishing effort) for 2014 was 28.3 fish/h (Table 3). The peak in weekly CPUE occurred during the week of 5 May 2014, with a value of 35.8 fish/h, and a water temperature of 17.3 °C (Table 3). This peak in CPUE occurred after a high flow event (Figure 2). An extreme high flow event lasting approximately one week occurred in mid-May 2014, and Striped Bass CPUE dropped considerably, while temperatures increased, and our sampling ceased.

Ageing assessments demonstrated almost half of the fish aged had the same results for primary and secondary readers, with 40% initial consensus, followed by resolving any discrepancies during concert reads. Six year classes of male Striped Bass were present in the 2014 sample (age 2 through 7). This was a decrease from eight year classes observed in 2013 (Dycus et al. 2014), yet an increase over five male year classes observed in 2012 (Homan et al. 2013). Approximately 4% of all males sampled were age 6 and older in 2014. This was a decrease from 2013, when considerably more, older males were sampled, yet the number of older males in 2014 was similar to 2011 and 2012 (Homan et al. 2012; Homan et al. 2013). Males from the 2010 and 2011 year classes (ages 3 and 4) made the highest contribution to the catch in 2014 (84.7% of all males sampled), with CPUE for each of these age classes equal at 8.6 fish/h (Table 4). Seven year classes of females were observed during the 2014 survey (ages 2 through 8), which was a slight decrease from 2013 when females ages 2 through 9 were sampled (Dycus et al. 2014). The 2010 and 2011 year classes (ages 3 and 4) were the most abundant for females sampled in 2014, making up 70.0% of all females sampled, with a CPUE of 2.7 fish/h for age 3 females and 2.8 fish/h for age 4 females (Table 4).

Mean length at age analysis for 2014 Tar River Striped Bass indicated that average sizes for females ages 3 and 4 were approximately 20 mm larger than males of the same age, whereas females ages 6 and 7 were approximately 50 mm larger than males of the same age, demonstrating generally higher growth rates for females (Table 4). A summarization of mean length at age for the different year classes examined since 2000 indicated minor annual variation in growth rates between year classes of the same age, with average lengths being similar for younger fish, to slightly greater for females age 4 and older (Table 5). In 2014, female average weights were similar to that of males for ages 2 through 5, whereas female average weights were greater than male average weights for ages 6 and 7 (Table 4).

The Tar River 2014 male Striped Bass size distribution peaked between 475 and 575 mm (Figure 3). Age analysis showed some overlap in sizes, but most of these fish were from the 2011 (age 3) and 2010 (age 4) year classes (Figure 4). There was a decrease in the number of larger males sampled compared to 2013, with few males greater than 600 mm (Dycus et al. 2014). The female size distribution peaked between 500 and 600 mm, with most of these fish from the 2011 (age 3), 2010 (age 4), and 2009 (age 5) year classes (Figures 3 and 5).

### *Stocking Program*

*Broodfish collections and stocking.*—Three females (660, 699, and 787 mm) and nine males (508–648 mm) were collected via electrofishing and transported to Edenton National Fish Hatchery for production. Broodfish were euthanized after spawning was complete to prevent future spawning that would confound PBT analyses. Total weight of broodfish removals was 33.1 kg. Fin clip samples were provided to the SCDNR Hollings Marine Lab to genotype broodfish for parentage-based tagging (PBT) to determine hatchery or wild origin for future sampling collections containing the 2014 year-class. Hatchery-reared progeny were moved to ponds for grow-out to phase-II sizes (6–8 inches). A total of 92,727 phase-II Striped Bass was stocked at the Dinah’s Landing boating access area in Goose Creek State Park, near Washington, NC.

*Hatchery contribution during 2013 spring sampling.*—Genetic analysis of 166 Striped Bass fin clip samples collected in 2013 was completed in spring 2014,. Of the 166 samples collected in spring 2013, 140 exhibited a genotype indicative of hatchery parentage (84%). The 2010 (age 3) year-class was dominant, accounting for 60% (N=99) of the total sample, while the 2011 (age 2) year-class accounted for 25% of the total sample (N=41). The remaining 26 individuals could not be assigned hatchery parentage and were designated as “wild” fish, although, as indicated previously, PBT analysis is not available for year classes prior to 2010. In lieu of this stipulation, hatchery fish comprised approximately 85% of the fish that were analyzed for genetic markers in 2013 (Figure 6).

*Hatchery contribution during 2014 spring sampling.*—Genetic analysis of 205 Striped Bass fin clip samples collected in 2014 was completed in spring 2015. Of the 205 samples collected in 2014, 174 exhibited a genotype indicative of hatchery parentage (84%). The 2011 (age 3) year-class was dominant, accounting for 56% (N=114) of the total sample, followed by the 2010 (age 4) year-class at 27% (N=55), while the 2012 (age 2) year-class accounted for 2% (N=5) of the total sample. The remaining 31 individuals could not be assigned hatchery parentage and were designated as “wild” fish (Figure 7).

## *Recreational Harvest*

A total of 334 trips consisting of 1,001 angler-hours of effort were directed towards Striped Bass in the upper Tar River during 2014. An estimated 121 Striped Bass were caught on the upper Tar River in April 2014; no Striped Bass were harvested during the creel survey (NCDMF unpublished data; Table 6), although 90% of the estimated catch was legal size and eligible for harvest. The remaining 10% of the catch was in the protected size limit (22-27 inches) and not eligible for harvest.

## **Discussion**

The Tar River Striped Bass pooled catch rate in 2014 was similar to catch rates obtained in 2013, 2012 and 2011, yet considerably lower than the 2010 catch rate, which was the highest catch rate since the spawning ground surveys began in 1996 (Dycus et al. 2014, Homan et al. 2013, Homan et al. 2012, Homan et al. 2011). The percentage of females was similar to the majority of sampling years, except for 2011, which was unusually high at 51%. However, the proportion of older females was down considerably compared to 2013, where approximately half of all females sampled were age 6 or older (Dycus et al. 2014). The dominance of younger females sampled in 2014 was similar to results found in 2011 and 2012 (Homan et al. 2012; Homan et al. 2013). Maintaining the trend observed in 2013 for multiple years, along with further expanding the age structure for the Tar River spawning stock is necessary. Despite one rather large female (980 mm) sampled in 2014, there were few females sampled greater than 650 mm with a considerable decrease in larger females compared to the 2013 sample (Dycus et al. 2014). Overall, approximately 7% of the Striped Bass collected during 2014 were age 6 and older. The contribution of older fish has trended downward in recent samples since peaking in 2012, yet has been quite variable over time (Figure 8). The continued collection of an increasing number of larger, older fish will be necessary to suggest that a population recovery is occurring within the Tar River. It is important to acknowledge, however, that analysis of CPUE and size structure is somewhat deterred by the lack of a well-defined, concentrated spawning ground such as that found on the Roanoke River. In addition, spring streamflow and associated navigability significantly affected our ability to access spawning areas and may inflate or underestimate Striped Bass abundance within and among seasons, with the spring of 2014 having several particularly extreme high flow events (Figure 2).

In 2013, 26 Striped Bass (of the 166 fin clip samples) were not assigned hatchery parentage and were designated as “wild” fish; however, PBT analysis was not available for year-classes prior to 2010. These 26 individuals either hatched in the wild or were stocked before 2010. Of these 26 fish, 10 were aged as older than age 3 (2010 year class) and were therefore not subject to being identified via PBT analysis, 4 were age 2 and were presumably “wild” fish, and 12 were not aged. Half of the unaged fish were greater than 526 mm. In 2013, the largest age-3 Striped Bass sampled measured 526 mm. Thus, 6 of the 12 fish that were not aged were likely age 3 or younger (available for PBT detection) and most likely were true “wild” reproduced Tar River fish, while the remainder were likely older than age 3 and were not available for PBT analysis. In 2014, 31 Striped Bass (of the 205 fin clip samples) were not assigned hatchery

parentage and therefore designated as “wild” fish. Of the 31 “wild” fish, four were aged as older than age 4 (2010 year class) and were not subject to PBT analysis, whereas 6 were age 4 or younger and were presumably “wild” fish. Of the remaining 21 fish that were not aged, four were shorter than the shortest age-4 fish and were likely naturally produced (wild), while the remainder could be older than age 4 and not discernable to detection via PBT. Therefore, based on available data, approximately 7% (10 of 150 samples available to PBT) of the Tar River Striped Bass population appeared was from natural or “wild” reproduction in 2013, and 5% (10 of 184 samples available to PBT) was from natural production in 2014. The 2015 sample will provide more age classes available for PBT analysis and will further document the level of natural reproduction. Additionally, except for approximately 2% of the fish genetically analyzed in 2014, all of the hatchery produced fish have been from the 2010 and 2011 year classes, which were produced from Roanoke River broodfish. Substantially more fish from the 2012 and younger year classes should be subject to PBT analysis in the 2015 sample, which will reflect results based on utilization of Tar River endemic Striped Bass broodfish. In consideration of the 2015 data, if “wild” reproduction remains <10%, then the overwhelming majority of this fishery has and will likely continue to be supported by stocking, and adjusting the regulations to allow for a longer harvest season and more liberal size and creel regulations in inland waters seems appropriate.

The upper Tar River creel survey ran from 12 February to 3 May in 2014, which captures the majority of the Striped Bass angling effort; however, anglers are often observed targeting Striped Bass throughout May, and depending on flows, Striped Bass can be found from the Battle Park area downstream to the Old Sparta access area during this time. Bank fishing can be popular for Striped Bass and accounted for approximately 50% of the effort at the Battle Park access area (NCDMF unpublished data). The Battle Park area offers several accommodations for bank anglers ranging from cleared bank areas and trails to wooden fishing platforms. The Old Sparta area has limited bank fishing opportunities and would benefit from a safe and permanent fishing platform.

Harvest regulations in inland waters are unlikely to affect Tar River Striped Bass mortality at the current level of angling effort. Less than 10% of the angling effort and none of the Striped Bass harvest occurred in the upper Tar River during spring 2014 (NCDMF unpublished data); however, the creel survey in the upper Tar River ended in early May in 2014 and would have likely captured more effort if the survey ran throughout the month of May. It is unlikely that no harvest of Striped Bass occurred, yet levels were likely very low, particularly in comparison with the remainder of the Tar River during this same time period, which had an estimated harvest of just over 1,000 Striped Bass (NCDMF unpublished data). Additionally, of the females in the 2014 NCWRC electrofishing sample, 1% was less than 18 inches, 49% were between 18 and 22 inches, 39% were within the protected slot limit of 22 to 27 inches, while 12% were larger than the protected slot, indicating that the protective slot limit protected approximately 40% of the females and allowing them to complete at least one spawning migration before being allowed for harvest. However, almost 100% of these fish would be vulnerable to harvest in coastal waters (which include the Tar-Pamlico River downstream of the Norfolk and Southern Railroad Bridge at Washington), in which no protective slot limit exists.

## Management Recommendations

1. Maintain current inland and joint waters recreational harvest limits for the 2016-2017 regulations cycle, yet consider extending the harvest season and easing size and creel limits for future regulation proposals, particularly if the 2015 data shows a similar or increased level of hatchery contributions to the population.
2. Maintain the current sampling methods for Striped Bass in the Tar River, except majority of ages could be based on genetic analysis for hatchery origin cohorts.
3. Maintain the current phase-II stocking program in 2015, along with parentage based tagging genetic analysis.
4. Develop a fishing platform (public fishing area) adjacent to the Commission's Old Sparta boating access area.
5. Coordinate with NCDMF to extend the upper Tar River creel survey through 31 May 2015.

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TABLE 1.—Access areas, sampling segments, and minimum requirements for access on the Tar River for spring Striped Bass sampling.

Access Ramp	Segment	USGS Gage Station	Min Discharge (ft <sup>3</sup> /s)	Min Gage (ft)
Battle Park City Ramp	1	2082585	175	4.3
Dunbar WRC Ramp	2	2082585	175	4.3
Bells Bridge WRC Ramp	3	2083500	470	3.8

TABLE 2.—Tar River Striped Bass stocking history since 1983. Beginning in 2010, broodfish were genotyped for Parentage Based Tagging analysis. Beginning in 2012, only Tar River broodfish were used to produce fish for stocking in the Tar River. Only years in which stockings occurred are shown.

Year	Broodfish Source	Phase I*	Phase II**	PBT Analysis Available
1983	Roanoke River		76,674	
1984	Roanoke River		26,000	
1987	Roanoke River		17,993	
1991	Roanoke River		30,801	
1993	Roanoke River		118,600	
1994	Roanoke River	127,635	183,254	
1995	Roanoke River	100,000		
1996	Roanoke River	39,450	140,972	
1997	Roanoke River	28,022	24,031	
1998	Roanoke River	230,606		
1999	Roanoke River	100,000	17,954	
2000	Roanoke River	188,839		
2001	Roanoke River	171,000	37,000	
2002	Roanoke River	39,110		
2003	Roanoke River	100,000	159,996	
2004	Roanoke River	100,000		
2005	Roanoke River	114,000	267,376	
2006	Roanoke River	134,100		
2007	Roanoke River	160,995	69,871	
2008	Roanoke River	331,202	91,962	
2009	Roanoke River	99,730	61,054	
2010	Roanoke River		114,012	Yes
2011	Roanoke River		107,767	Yes
2012	Tar River		45,669	Yes
2013	Tar River	257,403	123,416	Yes
2014	Tar River	138,859	92,727	Yes

\*In 2013, 122,453 of the phase I fish were stocked at the NCWRC Mason's Landing boat ramp (on Tranter's Creek), with the remaining 134,950 phase I fish stocked at the Dinah's Landing boat ramp in Goose Creek State Park. In 2014, 63,412 of the phase I fish were stocked at the NCWRC Hardee Creek boat ramp in Greenville, with the remaining 75,447 phase I fish stocked at the NCWRC Mason's Landing boat ramp. All other phase I fish were stocked at either the NCWRC Mason's Landing boat ramp or at Whichard's Beach, both in close proximity to Washington, NC.

\*\*In 2010, 19,156 phase II fish were stocked at the NCWRC Mason's Landing boat ramp, with all other phase II fish in 2010 and all years stocked at the Dinah's Landing boat ramp in Goose Creek State Park.

TABLE 3.—Weekly mean CPUE (average CPUE across all sample sites with standard error) of Striped Bass collected by electrofishing on the Tar River spawning grounds during 2014. Sample sites (N) correspond to 30 minute to one hour samples located within 15 mile sample segments 1, 2, or 3. Pooled CPUE (total catch/total effort) is also provided.

Sample Week (Dates)	N	Effort (h)	Catch	Mean CPUE (SE)	Water temp (°C)	Flow (CFS)
1 (16 April)	2	1	15	15.0 (3.0)	15	2,170
2 (21, 23 April)	6	3	100	33.3 (9.6)	13.5	1,050
3 (28, 29 April)	5	2.5	70	28.0 (13.4)	15	2,780
4 (5, 6, 9 May)	8	4	143	35.8 (11.4)	17.3	670
5 (13 May)	3	1.5	11	7.3 (3.3)	21	970
<b>Totals and Mean CPUE (SE)</b>	<b>24</b>	<b>12</b>	<b>339</b>	<b>28.3</b>		

TABLE 4.—Age composition, mean total length (mm), and mean total weight (kg) at age of Striped Bass collected from the Tar River by electrofishing, 2014. Standard errors are listed in parentheses.

Year Class	Age	N Aged	N Estimated	N Total	% Composition	CPUE (fish/h)	Mean Total length (mm)	Mean Total weight (kg)
<b>Males</b>								
2012	2	5	2	7	2.9	0.6	437 (4)	0.9 (0.1)
2011	3	24	79	103	42.4	8.6	502 (2)	1.4 (0.1)
2010	4	25	78	103	42.4	8.6	549 (3)	1.8 (0.1)
2009	5	8	12	20	8.2	1.7	612 (4)	2.6 (0.1)
2008	6	4	1	5	2.1	0.4	657 (9)	3.2 (0.2)
2007	7	2	3	5	2.1	0.4	682 (18)	3.7 (0.8)
<b>Females</b>								
2012	2	1	0	1	1	0.1	412 (n/a)	0.7 (n/a)
2011	3	10	23	33	34.4	2.7	519 (3)	1.4 (0.1)
2010	4	14	20	34	35.4	2.8	572 (5)	2.1 (0.1)
2009	5	9	5	14	14.6	1.2	612 (8)	2.6 (0.1)
2008	6	6	0	6	6.3	0.5	708 (21)	3.7 (0.4)
2007	7	4	2	6	6.3	0.5	725 (16)	4.3 (0.3)
2006	8	1	1	2	2.1	0.2	737 (n/a)	4.3 (n/a)
<b>TOTALS</b>								
<b>Males</b>		<b>68</b>	<b>175</b>	<b>243</b>				
<b>Females</b>		<b>45</b>	<b>51</b>	<b>96</b>				
<b>Unknown</b>		<b>n/a</b>						
<b>Overall</b>		<b>113</b>	<b>226</b>	<b>339</b>				

TABLE 5.—Mean total length (mm) at age for Tar River Striped Bass year classes examined since 2000. Only those year classes with four or more individuals aged are included.

Sex and Year Class	Age							
	1	2	3	4	5	6	7	8
<b>Males</b>								
2000		345	450	500	539	661		
2001			415	458	609	572		
2002			394	525	528			
2003			475	512	563	554		
2004			459	526	524	573		
2005		357	449	479	550	587	635	673
2006		424	406	509	560	614	647	
2007			462	515	557	599		
2008			463	519	552	657		
2009			504	499	612			
2010			470	549				
2011		409	502					
2012		437						
<b>Females</b>								
2000				495			607	
2001						572		
2002				522	571			
2003			485		582	581	648	
2004		445		522	551	606	641	
2005			465	498	561	651	692	
2006				521	597	646	683	
2007				538	614	641	725	
2008			459	558	537	708		
2009		454		500	612			
2010			420	572				
2011		407	519					

TABLE 6.— Estimated effort, harvest, and discard statistics of the Tar River recreational Striped Bass fishery. Statistics are preliminary and estimated using data collected by the NCDMF creel survey in the upper zone of the Tar River between 12 Feb 2014 and 03 May 2014.

Month	Effort		Harvest	Discard	
	Trips	Hours	Number	Legal Size	In Slot
Feb	0	0	0	0	0
Mar	0	0	0	0	0
Apr	334	1,001	0	108	13
May	0	0	0	0	0
Total	334	1,001	0	108	13

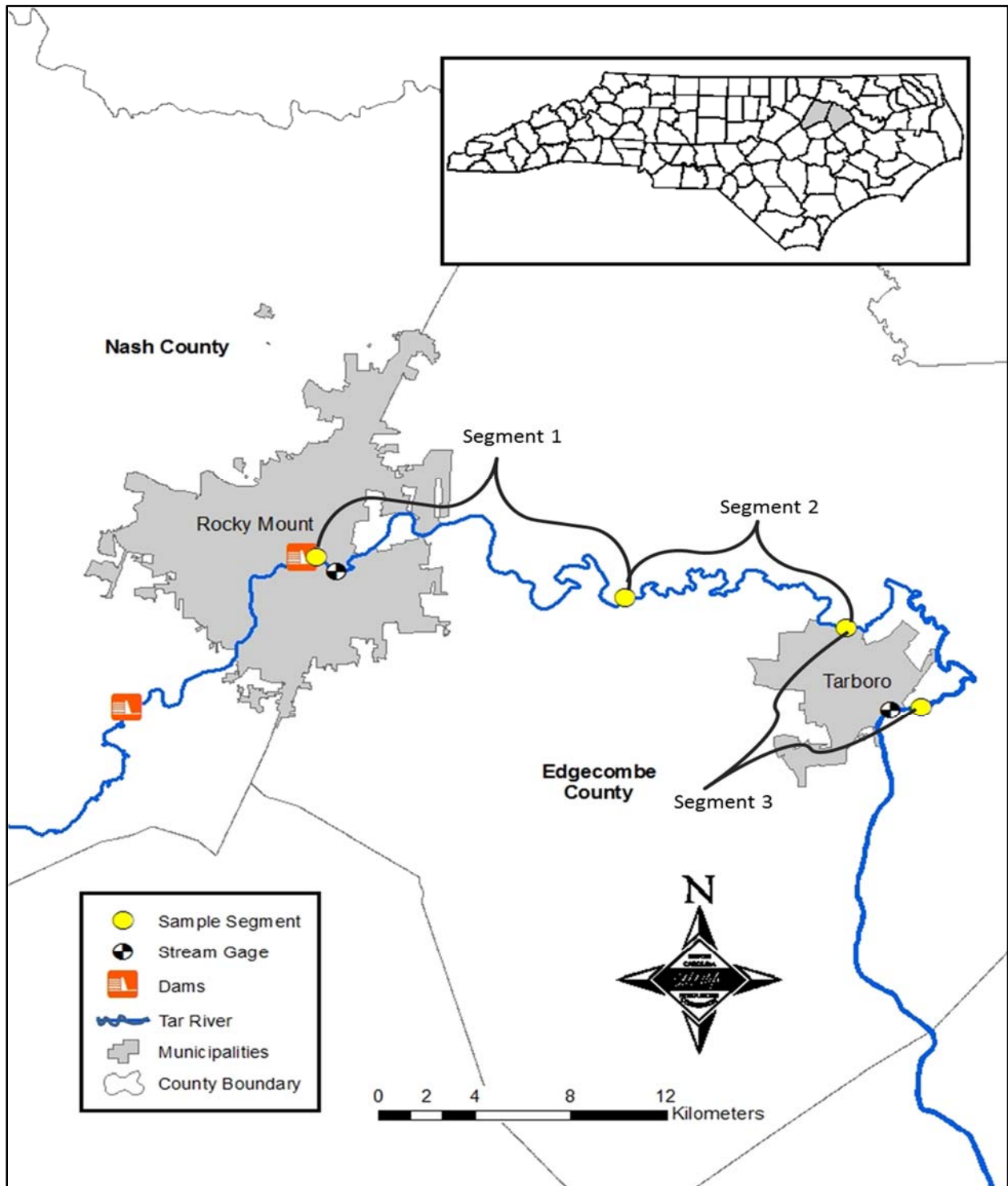


FIGURE 1.—Striped Bass sampling sites on the Tar River, spring 2014.



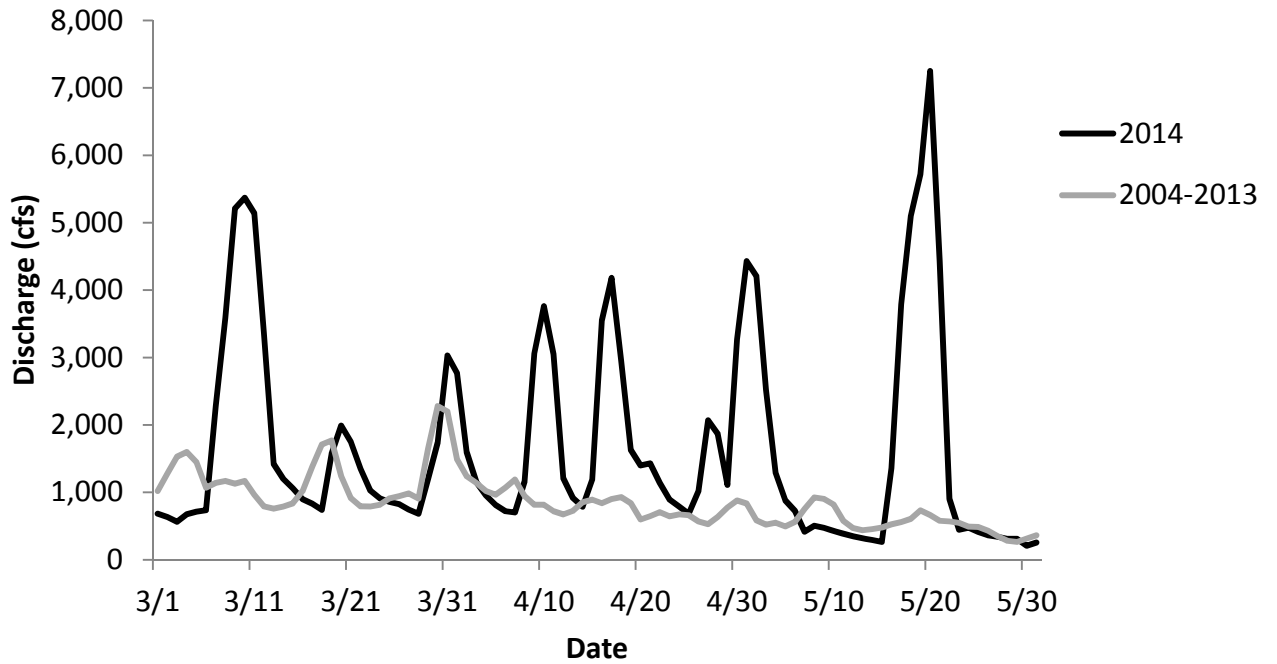


FIGURE 2.—Mean daily discharge from March–May 2004–2013 and 2014 in the Tar River, Rocky Mount, NC. Discharge measurements from USGS gage number 2082585.

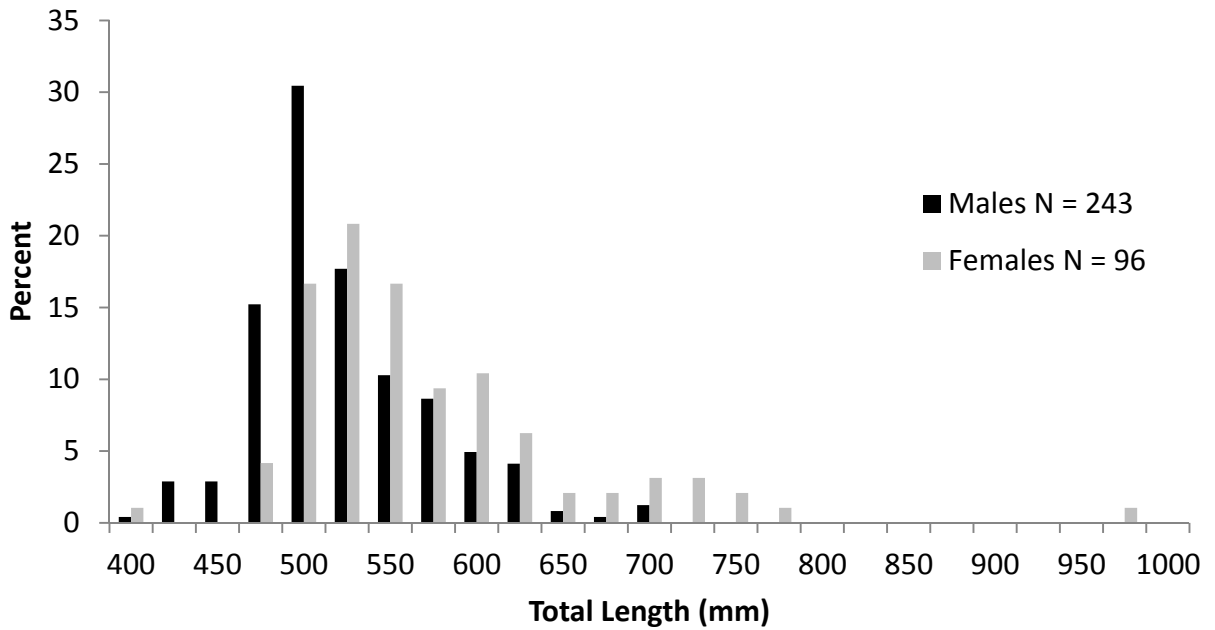


FIGURE 3.—Length frequency histogram for Striped Bass collected from the Tar River, spring 2014. Male and female plots each sum separately to 100 percent.

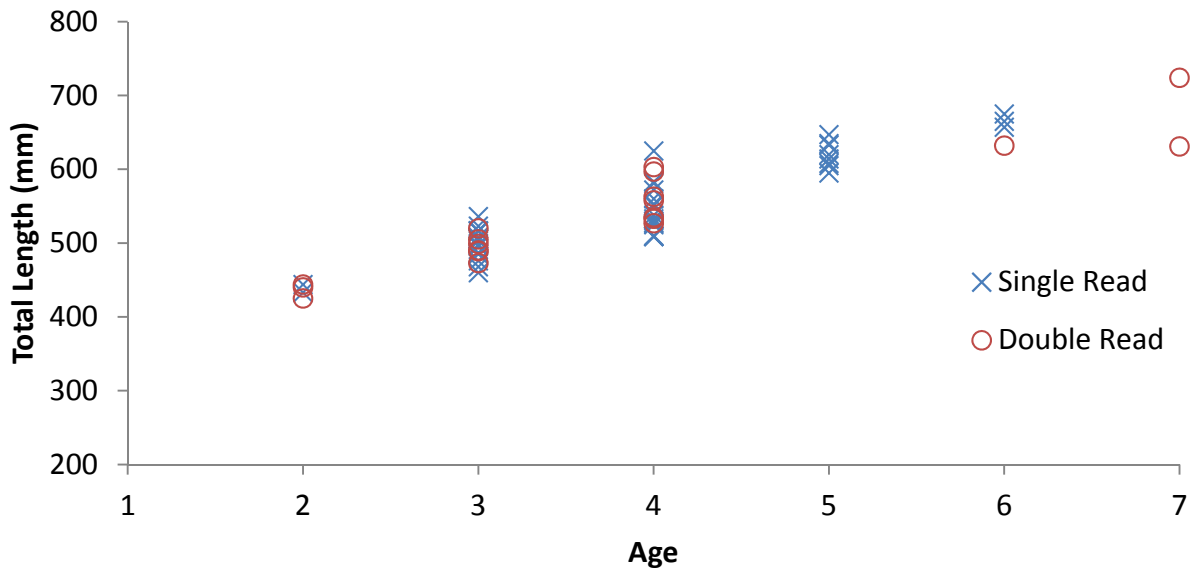


FIGURE 4.—Range of length-at-age for male Striped Bass collected on the Tar River, spring 2014.

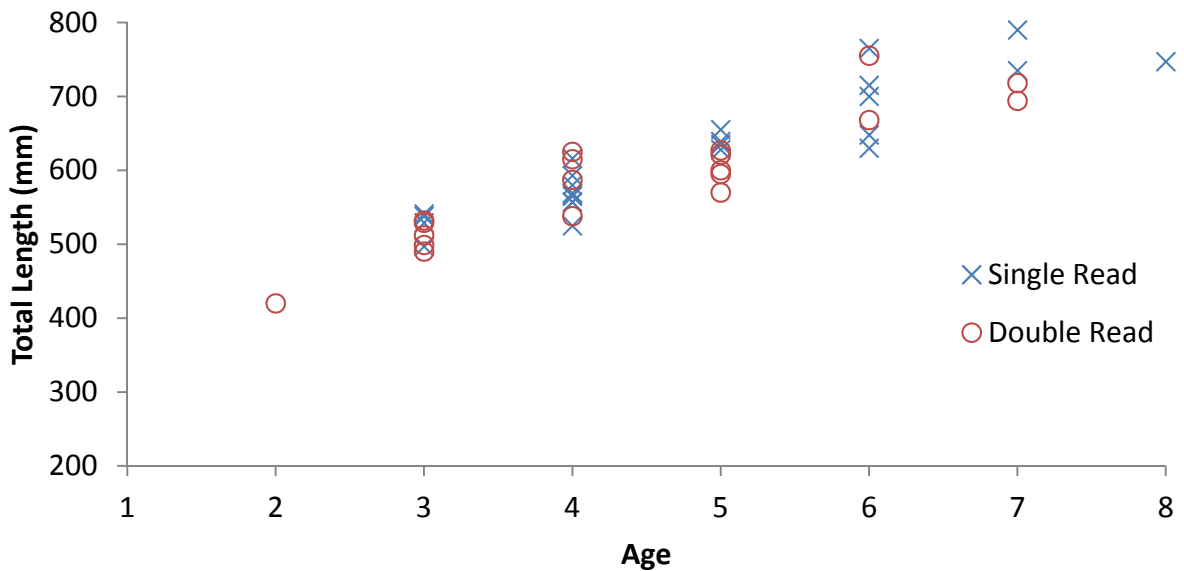


FIGURE 5.—Range of length-at-age for female Striped Bass collected on the Tar River, spring 2014.

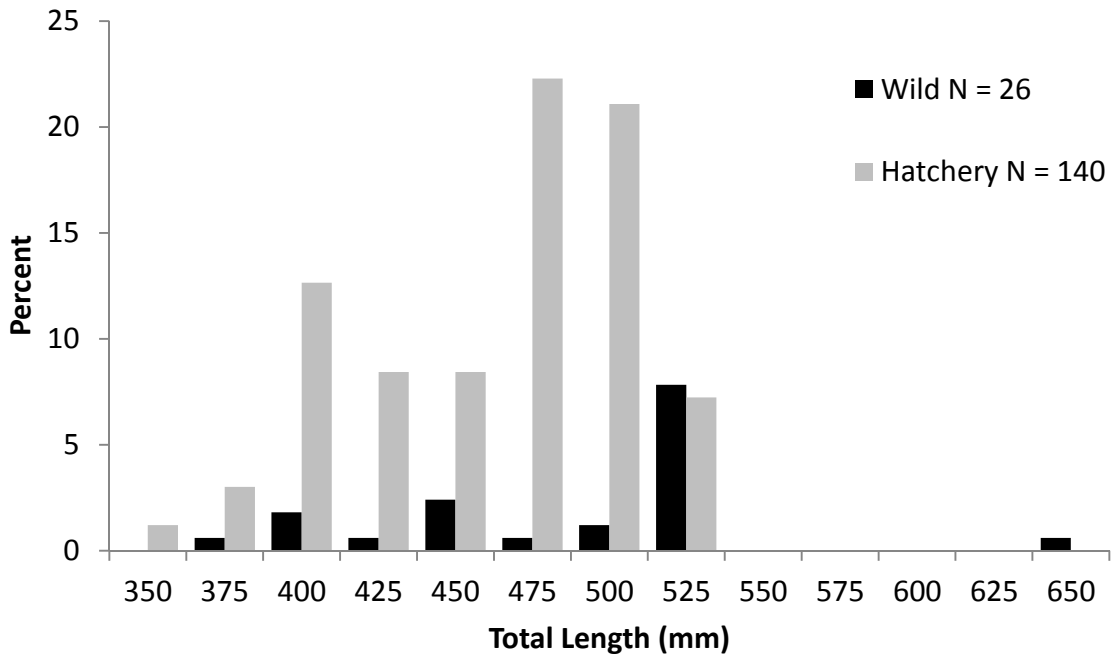


FIGURE 6.—Percentage of hatchery and wild origin fish by size class from fin clip samples collected on the Tar River in spring 2013.

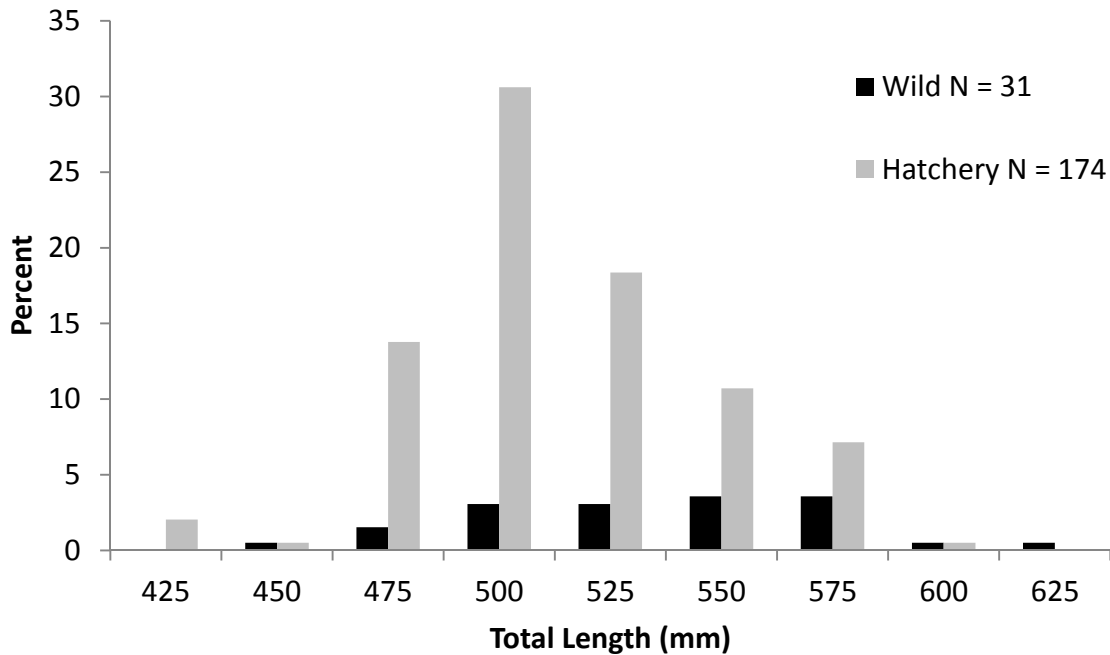


FIGURE 7.—Percentage of hatchery and wild origin fish by size class from fin clip samples collected on the Tar River in spring 2014.

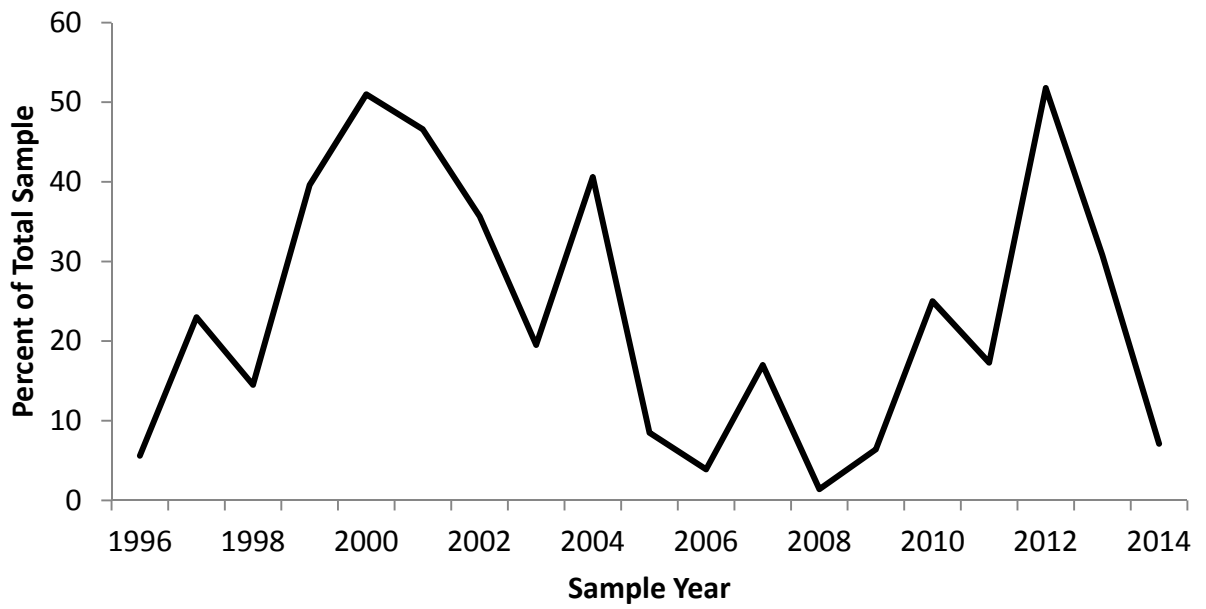


FIGURE 8.—Proportion of Striped Bass samples age 6 and older collected on the Tar River by electrofishing since 1996.