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Northeast Area Monitoring and Assessment Program Mid-Atlantic Nearshore Trawl Survey 8/8/08

Northeast Area Monitoring and Assessment Program

Northeast Area Monitoring and Assessment Program (NEAMAP)

Mid-Atlantic Nearshore Trawl Survey: Data collection and analysis in support of single and multispecies stock assessments and management

Progress Report:

Spring 2008 Survey Data Summary

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By:

Christopher F. Bonzek
James Gartland
J. David Lange
Robert J. Latour, Ph.D.

Department of Fisheries Science
Virginia Institute of Marine Science
College of William and Mary
Gloucester Point, VA

NEAMAP ASMFC Progress Report

I. **Project Title:** Data collection and analysis in support of multispecies stock assessments in the mid-Atlantic: Northeast Area Monitoring and Assessment Program Nearshore Trawl Program.

II. **Grantee State and Contact Name:** Virginia/Virginia Institute of Marine Science – Christopher F. Bonzek

III. **Project Period:** 1 August 2005 – 31 May 2009
Reporting Period: 1 February 2008 – 31 July 2008

IV. **Project Description:** This is a new fisheries-independent bottom trawl survey operating in the near coastal ocean waters of the Southern New England and Mid-Atlantic regions. The survey is an element of the ASMFC Northeast Area Monitoring and Assessment Program (NEAMAP) and is designed to sample fishes and invertebrates from coastal waters bounded by the 20ft.and 60ft. depth contours between Montauk, New York and Cape Hatteras, North Carolina and waters between the 60ft.and 120ft. depth contours in Rhode Island Sound and Block Island Sound using a bottom trawl. The main objective of the survey is the estimation of abundance, biomass, length and age structures, various other assessment related parameters and diet compositions of select finfishes inhabiting the area.

V. **Project Summary/Accomplishments:** The spring 2008 survey was successfully completed during a research cruise which occurred between 23 April and 15 May 2008. A total of 150 stations, the target number, was sampled. About 299,000 individual fishes weighing over 32,000kg and representing 85 species were captured, including 9 species not previously seen in NEAMAP cruises. Individual length measurements were recorded for 54,701 specimens. Lab processing is proceeding on the 6,133 ageing structures (otoliths, vertebrae, spines) and 4,810 stomach samples which were collected (1,309 stomachs have been fully processed as of the date of this report). A full report is attached to this standard project summary.

VI. **Challenges/Changes:** Beyond completion of laboratory samples, no significant challenges remain for this contract segment.

VII. **Participants:** Primary program personnel remain unchanged.

VIII. **Quality Assurance:** Previous progress reports provided brief descriptions of quality assurance procedures in selecting fishing gear, conducting fishing operations, and processing the catch. These are interwoven into the attached report as well. Data collected during the survey have been processed through several data quality checks which were previously developed for other survey work and new checks developed specifically for NEAMAP.

IX. **Funding Status:** Expenditures have been generally in line with expectations. We anticipate that the combination of ASMFC and Mid-Atlantic Council Research Set Aside (RSA) Program funds will be sufficient for remaining operations in CY 2008.

X. **Future Activities:** The future of this program is dependent upon continued funding. We anticipate sufficient RSA funds to complete the fall 2008 cruise and are presently awaiting a likely allocation of funds from the state of New York, which would begin to carry operations in 2009.

XI. **Presentations/Public Outreach:** During 2008, presentations of survey results have been (or will be) made as follows:

- January 2008: Mid-Atlantic Fishery Management Council
- February 2008: Cape May NJ Party and Charter Boat Association
- February 2008: NMFS NEFSC Trawl Advisory Panel
- February 2008: Bass Pro Shops Fishing Classic (Hampton, VA), Booth exhibit
- March 2008: NEAMAP Operations Committee
- March 2008: NEAMAP Board
- April 2008: New England Fishery Management Council
- July 2008: NEAMAP Board

Further, numerous individuals representing the recreational, commercial, and management communities have observed survey operations both in port and in the field during layovers in Pt. Judith, RI, Montauk, NY, and Cape May, NJ. Brief news descriptions of the survey have appeared on local television in Providence, RI, in a June 2008 article in *The Fisherman* (published in New Jersey for the recreational community) and the September 2008 issue of *National Fisherman* . During the fall 2008 cruise the NEAMAP vessel and crew will be present for the New Bedford Working Waterfront festival. This is expected to result in extensive outreach to press, industry, and local and national political office holders.

Introduction

Concerns regarding the status of fishery-independent data collection from the continental shelf waters between Cape Hatteras, North Carolina and the U.S. / Canadian border led the Atlantic States Marine Fisheries Commission's (ASMFC) Management and Science Committee (MSC) to draft a resolution in 1997 calling for the formation the Northeast Area Monitoring and Assessment Program (NEAMAP) (ASMFC 2002). NEAMAP is a cooperative state-federal program modeled after the Southeast Area Monitoring and Assessment Program (SEAMAP), which had been coordinating fishery-independent data collection south of Cape Hatteras since the mid-1980s (Rester 2001). The four main goals of this new program directly address the deficiencies noted by the MSC for this region and include 1) developing fishery-independent surveys where current sampling is either inadequate or absent 2) coordinating data collection amongst existing surveys as well as any new surveys 3) providing for efficient management and dissemination of data and 4) establishing outreach programs (ASMFC 2002). The NEAMAP Memorandum of Understanding was signed by all partner agencies by July 2004.

One of the first major efforts of the NEAMAP was to design a trawl survey intended to operate in the coastal zone (out to the 27.4m depth profile) of the Middle Atlantic Bight (MAB - i.e., Montauk, New York to Cape Hatteras, North Carolina). While the National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center's (NEFSC) bottom trawl survey has been sampling from Cape Hatteras to the U.S. / Canadian border in waters less than 91.4m since 1963, few stations are sampled in waters less than 27.4m due to the sizes of the sampling area and vessels (NEFSC 1988, R. Brown, NMFS, pers. comm). In addition, of the six coastal states in the MAB, only New Jersey conducts a fishery-independent trawl survey in its coastal zone (Byrne 2004). This new NEAMAP Inshore Trawl Survey is intended to fill the aforementioned gap in fishery-independent survey coverage, which is consistent with the program goals.

In early 2005, the ASMFC made $250,000 of "plus-up" funds that it had received through the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) available for pilot work in an effort to assess the viability of the NEAMAP Inshore Trawl Survey. The Virginia Institute of Marine Science provided the sole response to the Commission's request for proposals and was awarded the funding in August 2005. Two brief pre-pilot cruises and the full pilot cruise were conducted in 2006 (Bonzek et al., 2007).

Early in 2007 ASMFC bundled funds from a combination of sources which were sufficient to begin full scale sampling operations in the fall of 2007. This report summarizes results from the spring 2008 cruise.

Two significant changes to the area sampled by the NEAMAP Nearshore Trawl Program occurred prior to the fall 2007 cruise:

- In 2007 NEFSC took delivery of the *FSV Henry B. Bigelow*, began preliminary sampling operations, and determined that the vessel could safely operate in waters as shallow as 18.3m. NEFSC then made a determination that future surveys would likely extend inshore to that depth contour (R. Brown, NMFS, pers. comm.). The NEAMAP Operations Committee subsequently decided that the offshore boundary of the NEAMAP survey coastal sampling (i.e., Montauk to Cape Hatteras) should be realigned to coincide

- NEFSC contributed significant funds toward NEAMAP full implementation with the provision that the additional under-sampled areas of Block Island Sound and Rhode Island Sound be added to the NEAMAP sampling area. These areas are deeper than other NEAMAP regions but from a 'distance from shore' standpoint are within the range covered by NEAMAP in other states.

Methods

Station Selection
Primary consideration in regards to survey stratification was consistency with the NMFS bottom trawl surveys. However, those surveys will be redesigned and re-stratified for 2009 (and beyond) and so re-stratification for the inshore NEAMAP areas was open for consideration as well.

Examination of existing NMFS strata revealed that the major divisions among survey areas (latitudinal divisions from New Jersey to the south, longitudinal divisions off Long Island) generally corresponded well with major estuarine outflow areas. Therefore these boundary definitions, with minor modifications so that regional boundaries would more closely correspond to state borders, were used for the NEAMAP survey. However, examination of the current NMFS depth stratum definitions reveals that in some areas (primarily off the southern states) current stratum boundaries do not correspond well to actual depth contours. Depth stratum assignments were redrawn using depth sounding data from the National Ocean Service using depth strata 20ft.-40ft. and 40ft.-60ft. from Montauk, NY to Cape Hatteras, NC and 60ft.-90ft. and 90ft.-120ft. in Rhode Island Sound and Block Island Sound (Figure 1). Finally, each stratum was subdivided into a grid pattern of potential sampling locations, with each cell measuring 1.5 x 1.5 minutes (2.25sq. nm). The number of stations (cells) selected for each stratum was assigned by proportional sampling according to surface area within the stratum, with a minimum of two stations per stratum.

Species Priority Lists
During the survey design phase, the NEAMAP Operations Committee developed a set of species priority lists. Priority 'A' species were to be subjected to the full processing procedure (see *Procedures at Each Station* below) at each station in which they were collected. Compared to the list used for the 2006 pilot survey, several Priority 'A' species were added due to the expanded survey area (this should lead to collections of additional species of management importance) and the requests of the Mid-Atlantic Fisheries Management Council. Priority 'B' species were to be sampled for full processing as time allowed. Priority 'C' species would only be taken for full processing if sampling of A and B species would not be affected. These three categories might be summarized as 'must have' 'great to have' and 'nice to have,' respectively. All other species (here called Priority 'D') were to have aggregate weights recorded and all or an appreciable subsample to be measured. A fifth category ('E') was later defined, including species which required special handling. This category included sharks (other than dogfish) and sturgeon, which were measured, tagged, and released; and selected invertebrates which were

processed similarly to Priority D fish species. Species included in categories A-C are presented below (Table 1).

Table 1. Species priority lists (categories A-C only).

A LIST	
Atlantic Cod	*Gadus morhua*
Black Sea Bass	*Centropristis striata*
Bluefish	*Pomatomus saltatrix*
Butterfish	*Peprilus triacanthus*
Haddock	*Melanogrammus aeglefinus*
Pollock	*Pollachius virens*
Scup	*Stenotomus chrysops*
Silver Hake	*Merluccius bilinearis*
Striped Bass	*Morone saxatilis*
Summer Flounder	*Paralichthys dentatus*
Weakfish	*Cynoscion regalis*
Winter Founder	*Pleuronectes americanus*
B LIST	
American Shad	*Alosa sapidissima*
Atlantic Menhaden	*Brevoortia tyrannus*
Atlantic Croaker	*Micropogonias undulatus*
Monkfish	*Lophius americanus*
Skate and Ray Species	
Smooth Dogfish	*Mustelus canis*
Spiny Dogfish	*Squalus acanthias*
Spot	*Leiostomus xanthurus*
Yellowtail Flounder	*Limanda ferruginea*
C LIST	
Alewife	*Alosa pseudoharengus*
Atlantic Herring	*Clupea harengus*
Atlantic Mackerel	*Scomber scombrus*
Black Drum	*Pogonias cromis*
Blueback Herring	*Alosa aestivalis*
Red Drum	*Sciaenops ocellatus*
Speckled Trout	*Cynoscion nebulosus*
Tautog	*Tautoga onitis*

Gear Performance
Wingspread, doorspread, and headrope height were measured on each tow during the spring 2008 cruise using a digital Netmind® Trawl Monitoring System. Wingspread sensors were positioned on the middle net 'jib' in accordance with NFMS procedures. The headrope sensor was mounted at the midpoint of the headrope. A catch sensor was mounted in the cod-end, set to signal when the catch reached roughly 5,000lbs. GPS coordinates and vessel speed were recorded at intervals using chartplotting software. These data can be used to plot tow tracks for each station. The same computer used to record Netmind readings was also employed to plot station locations (cell boundaries) and to run the countdown clock for each tow.

Procedures at Each Station
All fishing operations were conducted during daylight hours. Each tow was 20 minutes in duration with a target tow speed of between 2.9 and 3.3 knots. Three tows were truncated (two at 15 minutes, one at 17 minutes) due to known hangs in the tow path, surface traffic etc. No tows were terminated early due to triggering of the catch sensor.

At each station several standard parameters were recorded. These included:

- Station identification parameters (date, station number, region, stratum, depth).
- Vessel operation parameters (beginning and ending GPS position, beginning and ending tow times, compass course, speed over ground, engine RPMs).
- Gear identification and operational parameters (net type code and net number, door type code and door numbers, amount of cable deployed).
- Atmospheric and weather data (air temperature, wind speed, wind direction, general weather state, sea state, barometric pressure).
- Hydrographic data at the surface and at the bottom (water temperature, salinity, pH, and dissolved oxygen).

Upon arrival near a sampling cell, the Captain and Chief Scientist jointly determined the desired starting point and tow path. Flexibility was allowed with regard to these parameters such that a clear tow could be accomplished while staying within the boundaries of the defined cell.

Hydrographic data were taken at the end of each tow, with the vessel stationary while the fishing crew emptied the catch. This was a time-saving procedure compared to prior cruises in which these data were collected prior to setting the net, resulting in a pause in net deployment while the data were collected.

Vessel crew were responsible for all aspects of deployment and retrieval of the fishing gear. Due to the relatively shallow waters, 75fm. or less of warp was set out at all stations. One scientist was present in the wheelhouse during deployment and retrieval. The Captain signaled when the gear was fully set (winch brakes engaged), at which time the Netmind software, the tow track recording software, and the countdown clock were activated. At the conclusion of each tow, the scientist signaled the Captain when the clock reached zero, haulback commenced, and the Netmind recording software was stopped. Vessel crew dumped the catch into one of two enclosed locations (depending upon the size of the catch) on deck for sorting.

The catch was sorted by species and modal size group within species. Aggregate biomass (kg) was measured for each species-size group combination. For priority A species, and nearly always for priority B and C species, a subsample of five individuals from each group was selected for full processing (see next paragraph). For certain very common priority B species including spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), skates, rays, and dogfish only three individuals per group were sampled for full laboratory processing.

Data collected from each subsampled specimen included length (mm fork length where appropriate, mm total length for species lacking a forked caudal fin, mm pre-caudal length for sharks and dogfish, mm disk width for skates and rays, mm carapace width for crabs, mm carapace length for lobster, mm mantle length for squid), total and eviscerated weight (measured in grams, accuracy depended upon the balance on which individuals were measured), and macroscopic sex and maturity stage (immature, mature-resting, mature-ripe, mature-spent) determination. Stomachs were removed (except for spot and butterfish, for which previous sampling indicated that little useful data could be obtained from the stomach contents) and those containing prey items were preserved for subsequent examination. Otoliths or other appropriate ageing structures were removed from each subsampled specimen for later age determination. All specimens not selected for the complete processing were weighed (aggregate weight), and individual length measurements were recorded for either all or a large proportion, in accordance with approved subsampling procedures when necessary.

Laboratory Methods

Otoliths (or, depending upon the species, other appropriate ageing structures) were (and are being) prepared according to methodology established for other VIMS surveys. One otolith was selected and mounted on a piece of 100 weight paper with a thin layer of *Crystal Bond*. A thin transverse section was cut through the nucleus of the otolith using two *Buehler* diamond wafering blades and a low speed *Isomet* saw. The section was then mounted on a glass slide and covered with *Crystal Bond*. If necessary, the section was wet-sanded to an appropriate thickness before being covered with *Crystal Bond*. Some smaller, fragile otoliths were read whole. Both sectioned and whole otoliths were most commonly read using transmitted light under a dissecting microscope. Age was determined as the mode of three independent readings, one by each of three readers.

Stomach samples were (and are being) analyzed according to standard procedures (Hyslop 1980). Prey were identified to the lowest possible taxon. Experienced laboratory personnel are able to process, on average, approximately 30 to 40 stomachs per person per day.

Analytical Methods (Abundance)

Overall abundance estimates are expressed in terms of minimum trawlable number or biomass according to the general formula:

$$N = \frac{cA}{a}, \qquad (1)$$

where N is the minimum number (or biomass) of fish present within the sampling area that are susceptible to the sampling gear, c is the mean number (or weight) of fish captured per tow, a is the area swept by one trawl tow, and A is the total survey area.

Specifically, abundance was calculated in accordance with standard stratified random sampling:

$$\hat{N} = \sum_{s=1}^{n_s} A_s \hat{\bar{N}}_s \,, \qquad (2)$$

where A_s is the area of stratum s, n_s is the total number of strata in which the species under consideration was captured, and $\hat{\bar{N}}_s$ is an estimate of the mean area-swept catch in stratum s given by:

$$\hat{\bar{N}}_s = \frac{\sum_{i=1}^{n_{t,s}} \frac{c_i}{\hat{a}_i}}{n_{t,s}} \,, \qquad (3)$$

In equation (3), c_i and $\hat{a}_i$ represent the catch (number or weight) and an estimate of the trawl area-swept at sampling location *i*, respectively, and $n_{t,s}$ is the number of tows in stratum *s*. Note that the a_i estimates were calculated using vessel GPS data for distance towed and net mensuration gear for measurements of net opening (an average value was calculated from the measurements taken during each tow). As no correction is made for gear efficiency these estimates represent the minimum number (or biomass) of fish present within the sampling area that are susceptible to the sampling gear.

This method produces estimates of abundance for each stratum, which are totaled to produce estimates for the entire survey area. As regional stratum boundaries were drawn to generally correspond with state borders, estimates of abundance (and certain other stock parameters) can be (and in previous reports, were) produced on a state-specific basis. While usually not biologically meaningful, for some parameters it was considered worthwhile to present results in this way due to the potential usefulness for fishery managers. However, state-specific estimates of abundance can be misleading as the sampling area off the coast of each state is variable; a state with a low catch rate for a particular species but with a large sampling area might have a high minimum trawlable abundance in comparison to another state with a high catch rate but a smaller sampling area.

For this report, overall and state-specific estimates of abundance are presented as stratified geometric means of catch per unit area swept (swept area catch rates were standardized to 25,000 sq.m. which is roughly the area swept on an average 20-minute tow). Preliminary evidence indicates that NEAMAP catch data are log-normally distributed which makes the geometric mean the appropriate CPUE metric. Efforts to determine the most appropriate overall and region-specific estimates of abundance will continue and may result in different estimates being presented in future reports.

Analytical Methods (Length Frequency)
Length frequency histograms were constructed using 10mm bins. Length bins were identified using the bin midpoint (e.g. the 250mm bin represents individuals between 245mm and 254mm).

For this and several other stock parameters, data from fully processed specimens are expanded to the entire sample (i.e., catch level) for parameter estimation. Because workup procedures result in differential subsampling rates among size groups, failure to account for such factors would bias resulting stock parameter estimates. In the NEAMAP database each specimen has a calculated expansion factor associated with it which represents the number of fish that the specimen represents in the total sample for that station.

Analytical Methods (Sex Ratios)
Sex ratios were determined by summation of data from fully processed specimens, using the expansion factors as described above.

Analytical Methods (other analyses)
Due to the short period of time between the end of survey operations and submission of this report, several analyses (e.g., length-weight, maturity ogives, von Bertalanffy growth curves, age-frequencies) presented in previous reports are not yet available for this reporting period. These analyses, using spring 2008 survey data, will be presented in future reports.

Analytical Methods (Diets)
Similarly as stated above, there has been insufficient time to process a large number of preserved stomach samples for this report. For a few species of elevated management interest (smooth and spiny dogfish, several skate species, summer flounder) however, these analyses have been completed and are presented in this report.

Diets for each species were determined by estimating the mean proportional contribution of prey type (k) to predator (x) by weight or number ($W_{k,x}$) using the following equation:

$$W_{k,x} = \frac{\sum_{i=1}^{n} M_{i,x} q_{i,k,x}}{\sum_{i=1}^{n} M_{i,x}}, \qquad (4)$$

where

$$q_{i,k,x} = \frac{w_{i,k,x}}{w_{i,x}}, \qquad (5)$$

where $M_{i,x}$ is the number of predator x captured at station i, $w_{i,k,x}$ is the total weight (or number) of prey type k encountered in the stomachs of predator x collected at station i, and $w_{i,x}$ is the total weight (or number) of all prey items encountered in these stomachs (Buckel et al. 1999). This cluster sampling estimator was used since trawl collections yield a cluster of each predator at each station.

Results

Gear Performance

As was the case during the pilot survey and prior work, the 4-seam net performed consistently within the expected parameters (Figure 2). Prior surveys were conducted using only one of the three nets presently owned by the survey. To test the consistency of net construction and performance, a second net was used for most of the present survey. The net suffered significant damage on tow number 143 (the damage was repaired at the conclusion of the survey) and the original net was used for the remaining 8 tows. No significant deviations were seen in net performance compared to previous surveys, nor between the two nets. The slight increase in wingspread which may have occurred over the course of the pilot survey when the original net was first used was not observed while using the second new net.

Stations Sampled

Based on a specified sampling rate of one station per 30sq.nm, the target number of stations to be sampled was 150 for the entire sampling area (1,938 cells x 2.25sq.mi. per cell / 30 stations per sq.nm. = 145 stations) and 150 stations were successfully occupied. The number of stations available and the number sampled in each stratum is given (Table 2).

Of the 150 stations sampled, 130 were sampled within the specified primary sampling cell and 20 were chosen from the available randomly selected alternate sites, due to issues such as known hangs or other obstructions, fixed gear, or vessel traffic. The highest number of alternate stations occupied was in BI Sound (4 out of 10) and RI Sound (10 out of 17) due to a high degree of caution, to unfamiliarity with the area, and to a relatively small number of towable locations in this area. For future surveys we anticipate obtaining a better sample of known towable locations through cooperation with local industry representatives. A region-by-region summary of these results is presented (Table 3).

Table 2. Number of available sample cells and number sampled in each stratum.

Region	State*	Stations Sampled								
		20ft.-40ft.		40ft. – 60ft.		60ft. – 90ft.		90ft. – 120ft.		Sq. nm. per Station
		Stations sampled	Total cells	Stations sampled	Total cells	Stations sampled	Total cells	Stations sampled	Total cells	
RI Sound	RI					6	85	11	161	32.6
BI Sound	RI					3	42	7	88	29.2
1	NY	0	0	2	19					21.4
2	NY	2	8	3	19					12.2
3	NY	2	16	3	28					19.8
4	NY	2	16	3	29					20.2
5	NY	2	27	3	45					31.1
6	NJ	2	20	3	42					27.9
7	NJ	4	49	6	97					32.9
8	NJ	2	32	7	90					30.5
9	DE	4	54	8	113					31.3
10	MD	2	33	8	114					33.1
11	VA	5	62	9	122					29.6
12	VA	5	60	5	67					28.6
13	VA	7	94	11	142					29.5
14	NC	2	24	5	61					27.3
15	NC	2	25	4	55					30.0
Total		43	520	80	1043	9	127	18	249	29.1

* Note that region boundaries are not perfectly aligned with all state boundaries:

- Some stations in RI Sound may occur in MA
- Some stations in BI Sound may occur in NY
- Region 5 spans the NY-NJ Harbor area
- Some stations in Region 9 may occur in NJ

Table 3. Number of primary and alternate stations occupied in each region.

Region	Primary Stations	Alternate Stations	Total	Region	Primary Stations	Alternate Stations	Total
RI Sound	7	10	17	**8**	9	0	9
BI Sound	6	4	10	**9**	12	0	12
1	1	1	2	**10**	10	0	10
2	4	1	5	**11**	13	1	13
3	5	0	5	**12**	9	1	10
4	5	0	5	**13**	18	0	18
5	4	1	5	**14**	7	0	7
6	4	1	5	**15**	6	0	6
7	10	0	10	**Total**	**130**	**20**	**150**

On the 17 full sampling days (i.e., no long steam times or port calls), an average of 8.2 stations per day were sampled. Counting all 22 days at sea, including transit days and partial sampling days, the number of stations averaged 6.8. Day-by-day vessel activities and work schedules are presented (Table 4).

Table 4. Summary of activities conducted during each day at sea during the spring 2008 NEAMAP cruise.

Hours Worked and Stations Sampled Each Day																												
	Time of Day																											
Date	12:00 AM						6:00 AM						12:00 PM						6:00 PM					11:00 PM	No. Station
23-Apr	Final Survey Preparations / Leave dock at noon																								4
24-Apr																									9
25-Apr																									5
26-Apr																									12
27-Apr																									9
28-Apr																									9
29-Apr																									10
30-Apr																									12
1-May																									10
2-May																									4
3-May	Survey Demo. Cape May, NJ																								0
4-May																									7
5-May																									9
6-May																									8
7-May																									8
8-May																									6
9-May																									5
10-May	Survey Demo. Pt. Judith, RI																								2
11-May																									9
12-May	Weather Day - Local Press Interviews - Pt. Judith, RI																								0
13-May	Weather Day - Local Press Interviews - Pt. Judith, RI																								0
14-May	Survey Demo. Montauk, NY																								6
15-May																									6
16-May	Survey Demo. Cape May, NJ & Retows at previously sampled sites																								
17-May	Steam towards Virginia & Retows at previously sampled sites																								
18-May	Arrive Hampton, Va, 6:00am / Survey Completed																								

= Fishing hours
= Personnel hours

Catch Summary

A total of 299,000 specimens weighing 32,000kg were collected during the spring 2008 survey. A total of 54,700 individuals were measured (laying all individuals head-to-tail 9,360m, or 5.8miles, of fish were measured). Of those specimens taken for full workup, 6,133 otoliths (or other ageing structures) were taken and 4,810 full stomachs were preserved for later analysis. On average at each station, 1,993 (range 58 – 41,065) specimens were captured (Figure 3) weighing 214kg (range 6.0kg – 2,293kg) (Figure 4), 365 specimens were measured (range 58 – 1,222), and 41 specimens were processed for the full workup (range 13 – 106). At each station, an average of 17.8 species was captured (range 10 – 29) (Figure 5). The number of specimens processed for each species, separately for each priority category, is summarized in Table 5. North-to-south catch rates for several moderately-to-very abundant species followed an observable pattern during sampling operations. A demonstration of this is presented in a series of state-specific histograms showing kg-per-tow and number-per-tow (Figure 6).

Species Data Summaries
Several graphical data summaries are shown for each species (Figures 7-79). Species are organized alphabetically. Due to the short period of time between the end of the survey and the due date for this report, fewer analyses are presented for each species compared to previous NEAMAP progress reports. It is anticipated that a more comprehensive report covering all 2008 survey operations will be prepared later.

For most species, the following tables and figures are presented:

- A table presenting total number caught, total biomass, minimum and maximum lengths by state and region.
- Geometric mean catch per area swept (both number and biomass) by state, annotated with overall survey index, minimum trawlable abundance, number of stations at which the species was captured, minimum and maximum number per station, and mean number per station.
- Length-frequency histogram including the number of specimens subjected to full laboratory processing, annotated with the total number of specimens captured and measured and the number of otoliths and stomachs removed for processing.
- Histograms of sex ratio by state, and for species with adequate sample size, by size groups, annotated with the number of specimens examined. Note that for lower priority species sex ratio data may not be available.

These data summaries are numbered as follows:

- Alewife – Table 6, Figures 7-9.
- American lobster – Table 7, Figures 10-12.
- American shad – Table 8, Figure 13-15.
- Atlantic croaker – Table 9, Figures 16-18.
- Black seabass – Table 10, Figures 19-21.
- Blueback herring – Table 11, Figures 22-24.
- Bluefish – Table 12, Figures 25-27.
- Bluntnose stingray – Table 13, Figures 28-29.
- Butterfish – Table 14, Figures 30-32.
- Clearnose skate – Table 15, Figures 33-35.
- Horseshoe crab – Table 16, Figures 36-38.
- Kingfish spp. – Table 17, Figures 39-40.
- Little skate – Table 18, Figures 41-43.
- Loligo squid – Table 19, Figures 44-45.
- Red hake – Table 20, Figures 46-47.
- Scup – Table 21, Figures 48-50.
- Silver hake – Table 22, Figures 51-53.
- Silver perch – Table 23, Figures 54-55.
- Smooth dogfish – Table 24, Figures 56-58.
- Spot – Table 25, Figures 59-61.
- Spotted hake – Table 26, Figures 62-63.
- Striped anchovy – Table 27, Figures 64-65.
- Striped searobin – Table 28, Figures 66-67.

- Summer flounder – Table 29, Figures 68-70.
- Weakfish – Table 30, Figures 71-73.
- Winter flounder – Table 31, Figures 74-76.
- Winter skate – Table 32, Figures 77-79.

Literature Cited

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Table 5. Number of specimens captured and measured and number of otoliths (or other hard parts) and stomachs sampled, by species priority level.

Priority A Species					
Species	**Total Number Caught**	**Total Species Weight (kg)**	**Number Measured**	**Number of Otoliths**	**Number of Stomachs**
black seabass	166	83.9	166	140	119
bluefish	37	10.9	37	27	24
butterfish	47742	689.2	8315	746	0
pollock	3	0.0	3	2	1
scup	51629	1256.1	7167	869	754
silver hake (whiting)	28765	549.8	3063	409	397
striped bass	40	171.1	40	39	33
summer flounder	768	527.0	768	522	373
weakfish	39580	2198.8	2174	305	279
winter flounder	1863	83.9	1525	466	450
Priority B Species					
Species	**Total Number Caught**	**Total Species Weight (kg)**	**Number Measured**	**Number of Otoliths**	**Number of Stomachs**
American shad	1205	40.8	1205	327	321
Atlantic croaker	467	25.0	212	41	38
Atlantic menhaden	32	2.0	32	10	10
Atlantic stingray	7	17.0	7	0	0
barndoor skate	2	1.2	2	1	1
bluntnose stingray	84	308.2	26	2	2
bullnose ray	3	50.4	3	0	0
clearnose skate	3216	4234.1	1047	209	202
little skate	9876	5868.4	2994	315	303
monkfish	31	130.8	31	31	23
roughtail stingray	1	0.9	1	0	0
skate spp.	901	209.9	740	0	0
smooth dogfish	927	2501.7	688	297	288
spiny dogfish	1329	3389.8	947	322	243
spot	28561	1059.2	1220	61	0
winter skate	1713	3168.3	1214	317	299
yellowtail flounder	1	0.3	1	1	0
Priority C Species					
Species	**Total Number Caught**	**Total Species Weight (kg)**	**Number Measured**	**Number of Otoliths**	**Number of Stomachs**
alewife	2419	141.8	1572	350	344
Atlantic herring	187	15.6	177	54	45
Atlantic mackerel	11	1.5	11	11	10
black drum	5	140.9	5	5	
blueback herring	3692	62.2	1773	236	234
tautog	8	16.0	8	8	8

continued

Table 5. cont..

Priority D Species					
Species	Total Number Caught	Total Species Weight(kg)	Number Measured	Number of Otoliths	Number of Stomachs
Atlantic cutlassfish	206	4.4	189		
Atlantic sturgeon	9	121.1	9		
Atlantic thread herring	2	0.0	2		
Atlantic torpedo	2	68.4	2		
banded drum	1066	42.2	98		
banded rudderfish	3	0.0	3		
barrelfish	4	0.2	4		
bay anchovy	23926	75.8	3838		
blackcheek tonguefish	153	10.7	44		
cunner	6	0.3	6		
Etropus sp.	40	0.9	40		
fawn cusk-eel	1	0.1	1		
fourspot flounder	203	53.1	182		
Gulf Stream flounder	125	3.3	125		
harvestfish	451	12.6	45		
hickory shad	64	6.4	64		
hogchoker	17	1.6	17		
inshore lizardfish	1	0.0	1		
kingfish spp	6638	699.8	759		
lined seahorse	1	0.0	1		
longhorn sculpin	78	17.1	78		
mantis shrimp	7	0.2	7		
northern puffer	49	6.3	49		
northern searobin	45	1.4	45		
northern stargazer	2	3.3	2		
ocean pout	371	309.3	91		
pigfish	8	0.6	8		
red hake	1464	168.4	454		
rock crab	209	27.5	209		
rough scad	1	0.0	1		
round herring	430	11.6	19		
sea raven	6	4.2	6		
silver perch	2663	90.8	316		
smallmouth flounder	9	0.2	9		
spotted hake	11717	241.7	3162	3	3
striped anchovy	1198	19.0	471		
striped burrfish	6	2.4	6		
striped searobin	414	86.4	246		
white perch	1	0.1	1		
windowpane	756	191.0	697		
witch flounder	1	0.1	1		
wolf eelpout	1	0.6	1		

continued

Table 5. cont.

Priority E Species					
Species	**Total Number Caught**	**Total Species Weight (kg)**	**Number Measured**	**Number of Otoliths**	**Number of Stomachs**
American lobster	519	89.8	286		
blue crab - male	1	0.2	1		
blue crab, adult female	7	1.0	7		
brown shrimp	5	0.2	5		
dusky shark	1	2.2	1		
horseshoe crab	1201	1229.6	774		
Loligo squid	19549	776.2	5127		
sand tiger shark	1	5.9	1		
sandbar shark	5	14.4	5		
thresher shark	5	229.2	5		
species TBD	5	0.0	5	5	5
Total	**298,924**	**32,058.5**	**54,700**	**6,131**	**4,809**

Figure 1. NEAMAP sampling area with region boundaries and depth strata.

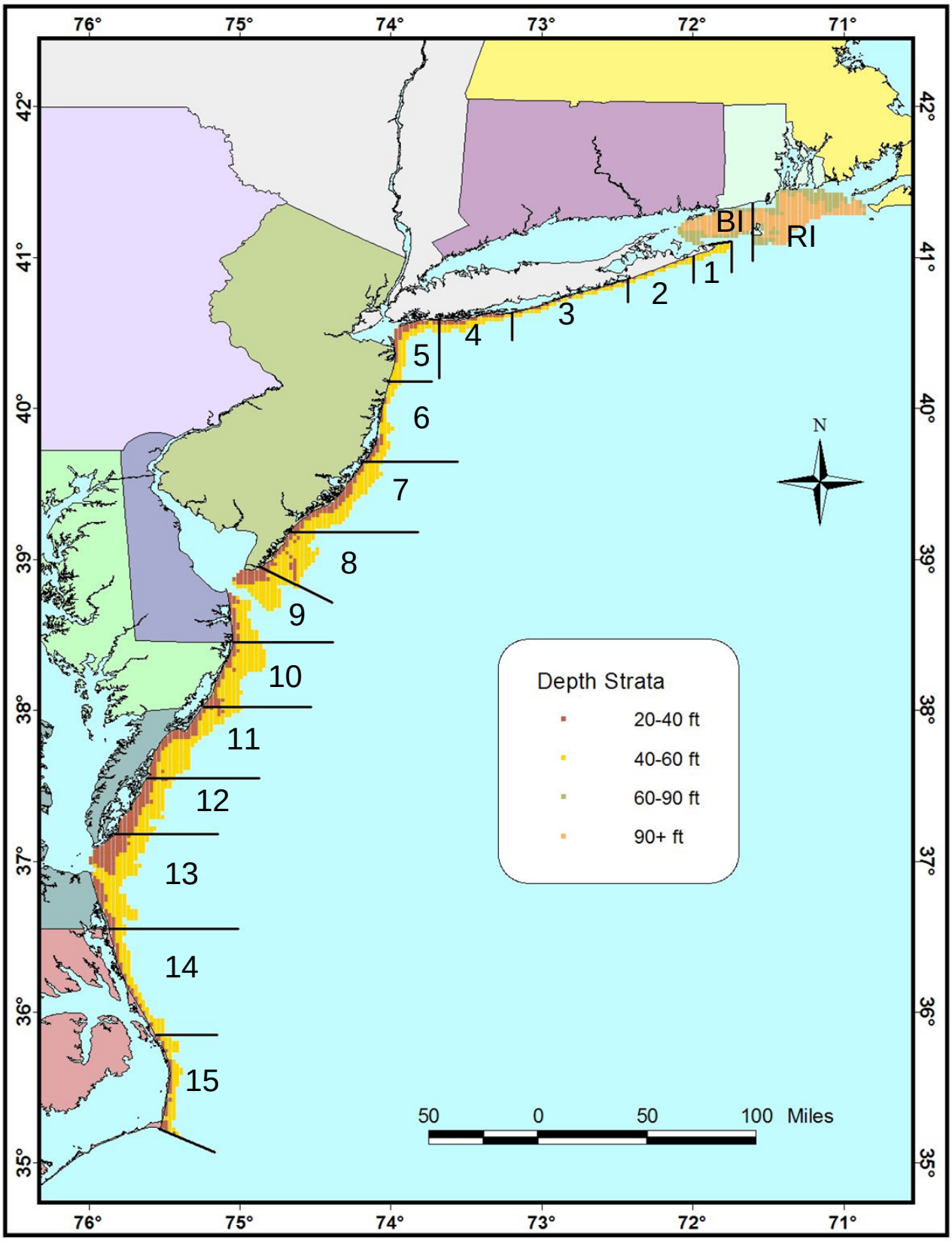


Figure 2. Chronological summary of average net performance parameters for each tow. Accepted ranges for each parameter are given by the dotted lines.

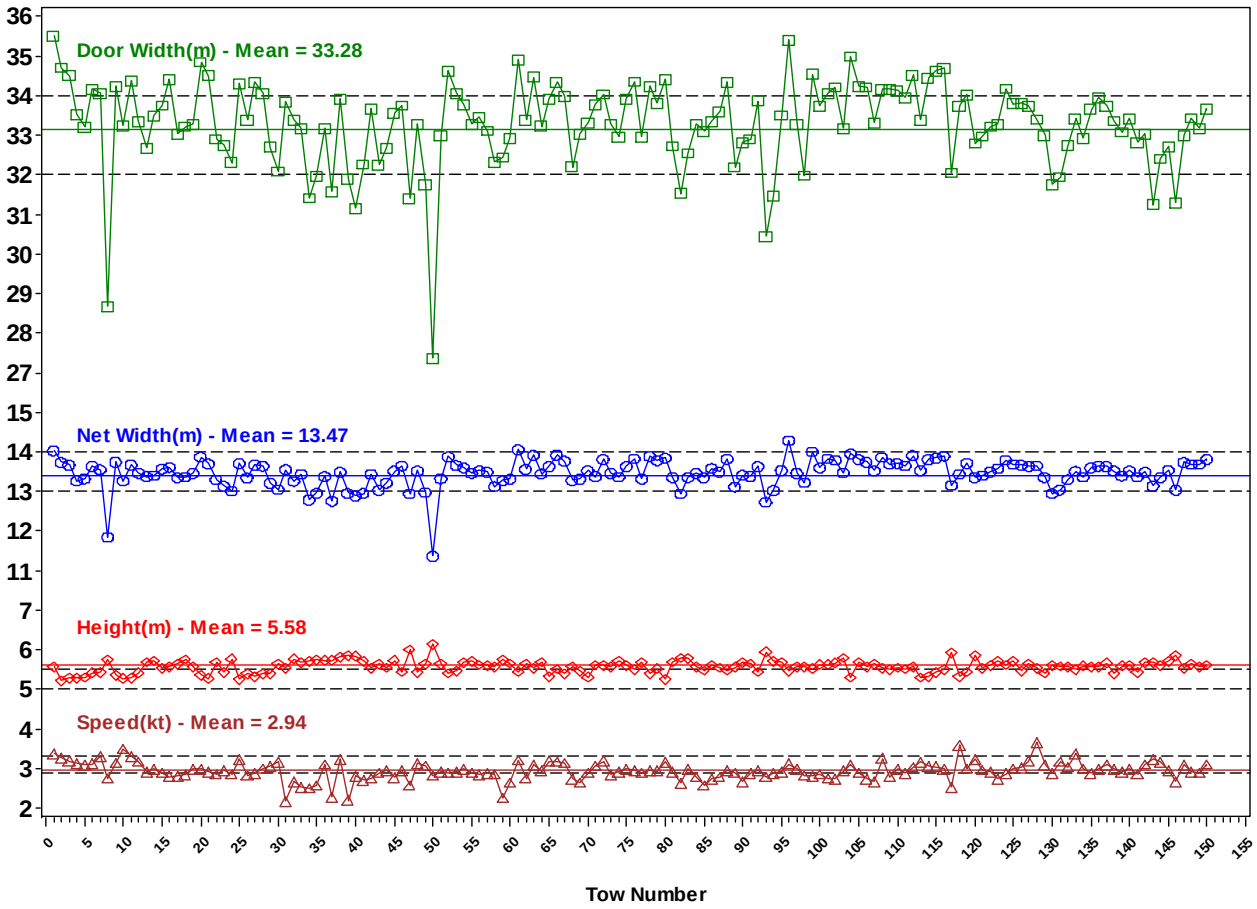


Figure 3. Frequency histogram of number of specimens captured at each station (note irregularly incremented values at the high end of the x-axis).

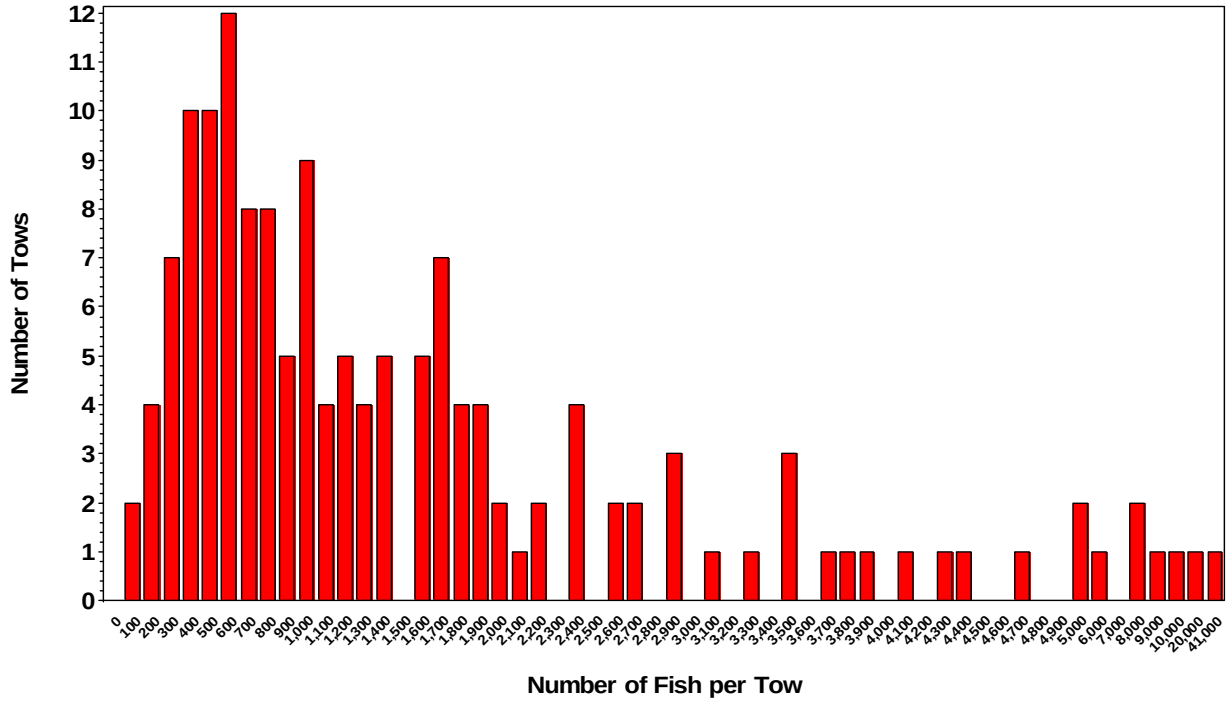


Figure 4. Frequency histogram of biomass of all specimens captured at each station (note irregularly incremented values at the high end of the x-axis).

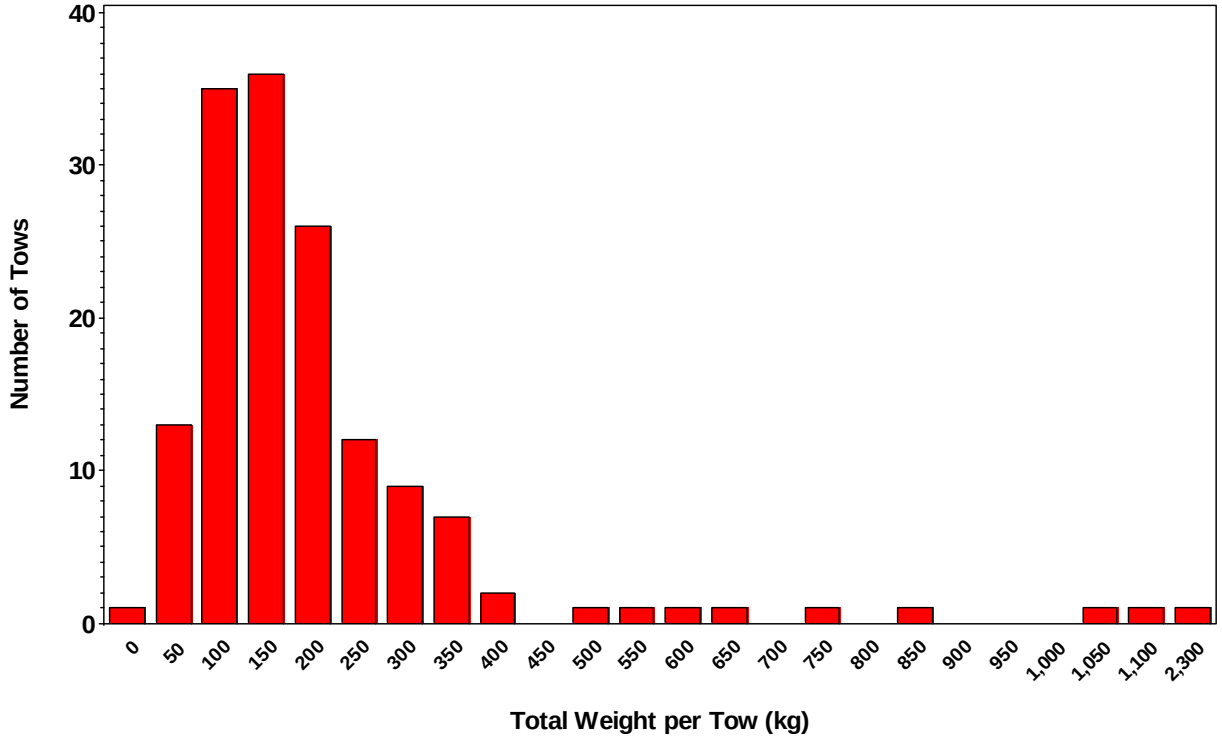


Figure 5. Frequency histogram of number of species captured at each station.

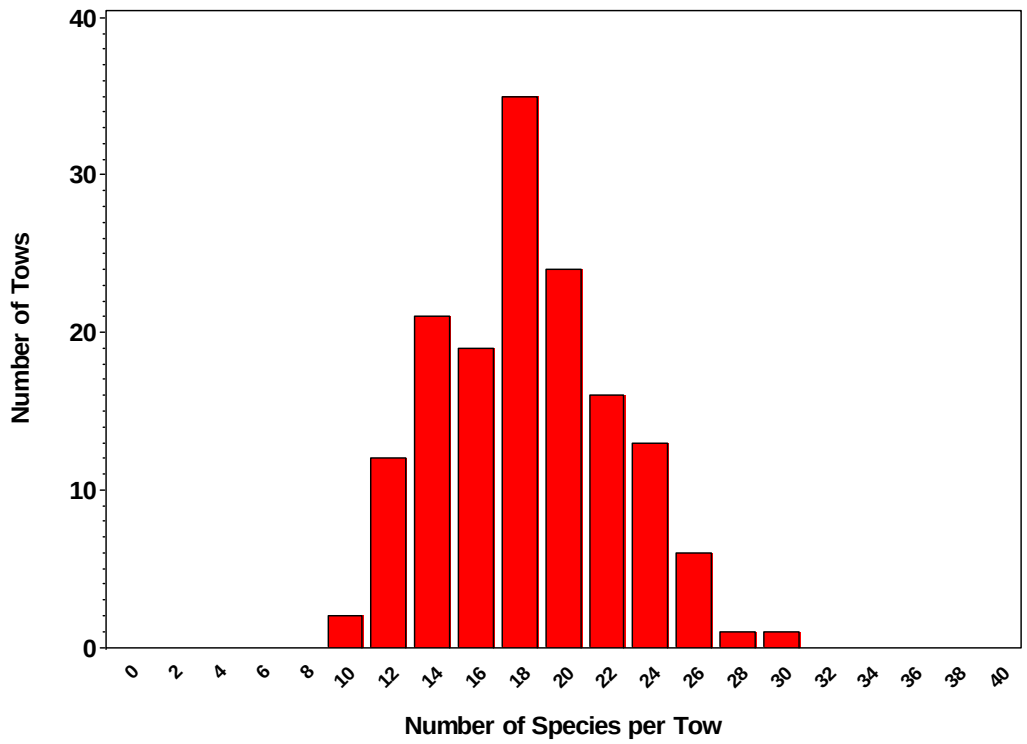
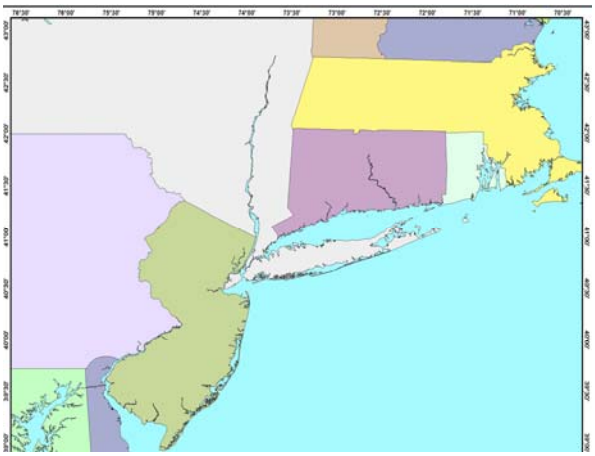
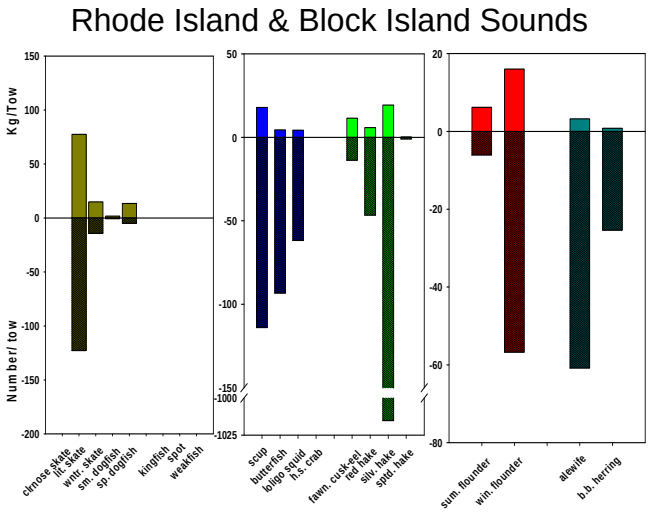
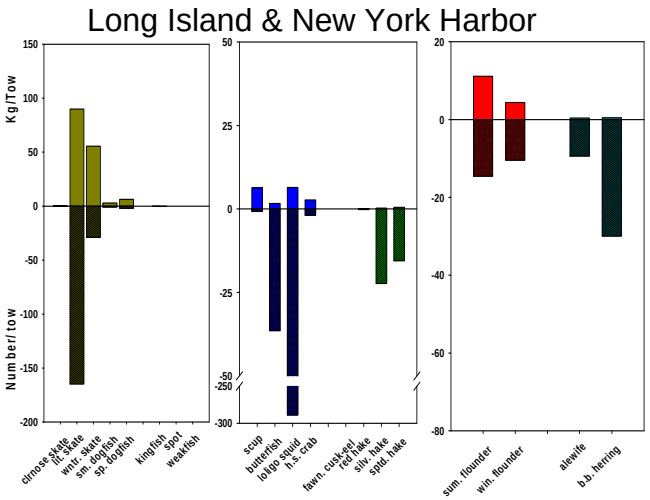


Figure 6. State-by-state catch-per-tow (kg and number) for several species.







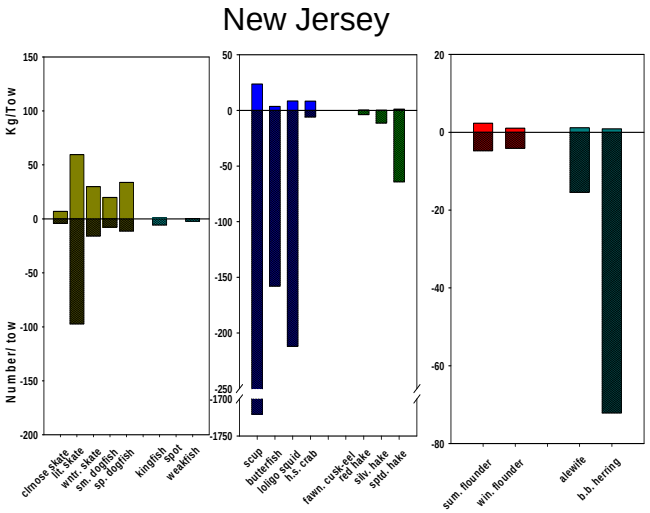
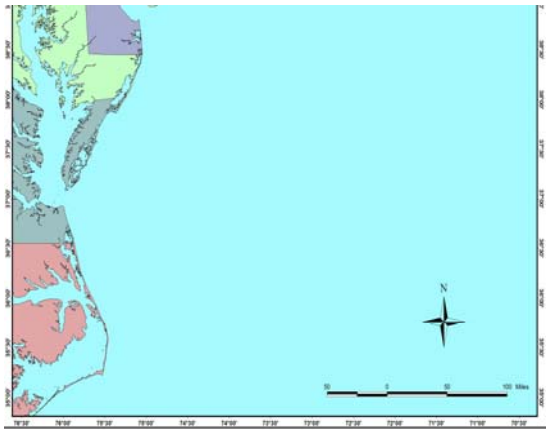
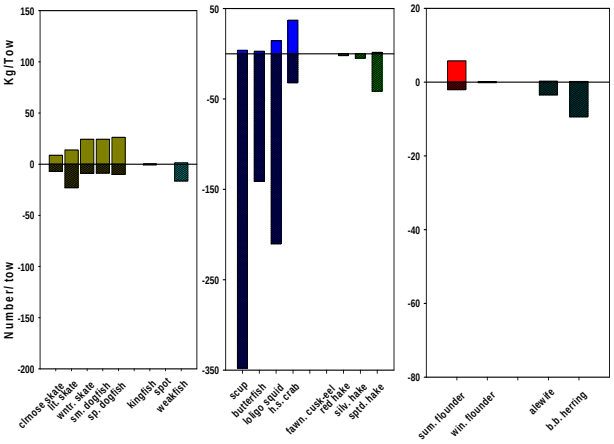


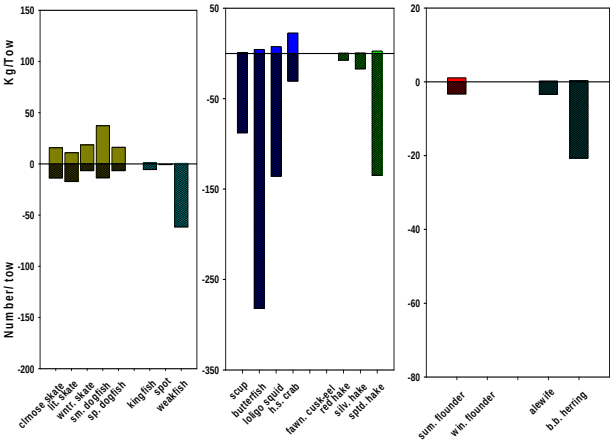
Figure 6. cont.



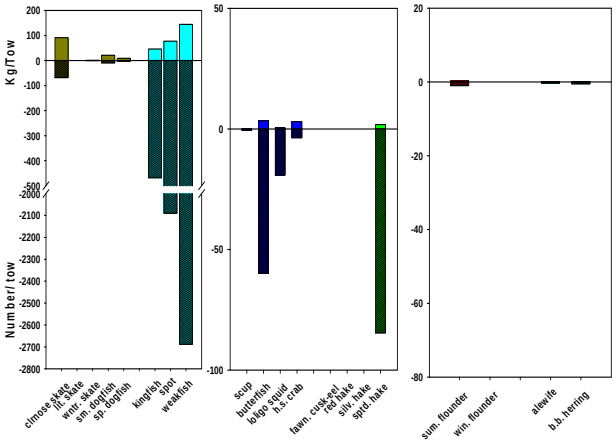
Delaware



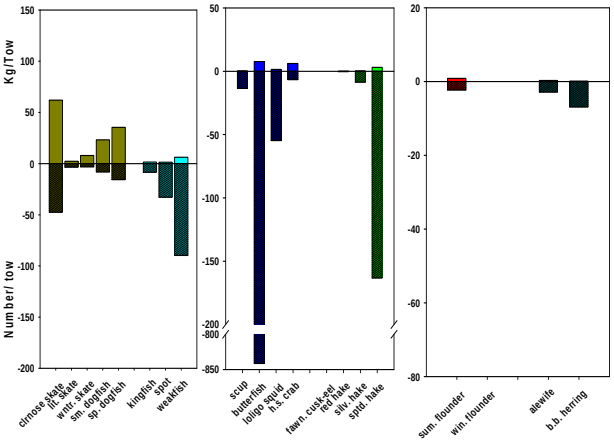
Maryland



North Carolina



Virginia



Alewife
(Priority C)

Table 6. Number, biomass, minimum and maximum size of specimens captured, by state and region, for alewife.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	1590	83.914	98	300
RI	BI	51	3.244	111	238
NY	01	65	4.71	113	268
NY	02	31	1.365	111	224
NY	03	104	2.025	90	232
NY	04	6	0.262	111	253
NY	05	1	0.014	104	104
NJ	06	247	21.07	84	264
NJ	07	81	5.707	93	261
NJ	08	42	2.041	86	227
DE	09	42	2.628	109	261
MD	10	34	2.169	117	239
VA	11	81	8.747	82	284
VA	12	25	1.592	103	277
VA	13	15	1.796	108	240
NC	14	4	0.486	212	260
NC	15				

Figure 7. Geometric mean catch per area swept by state and overall, with summary catch rates, for alewife.

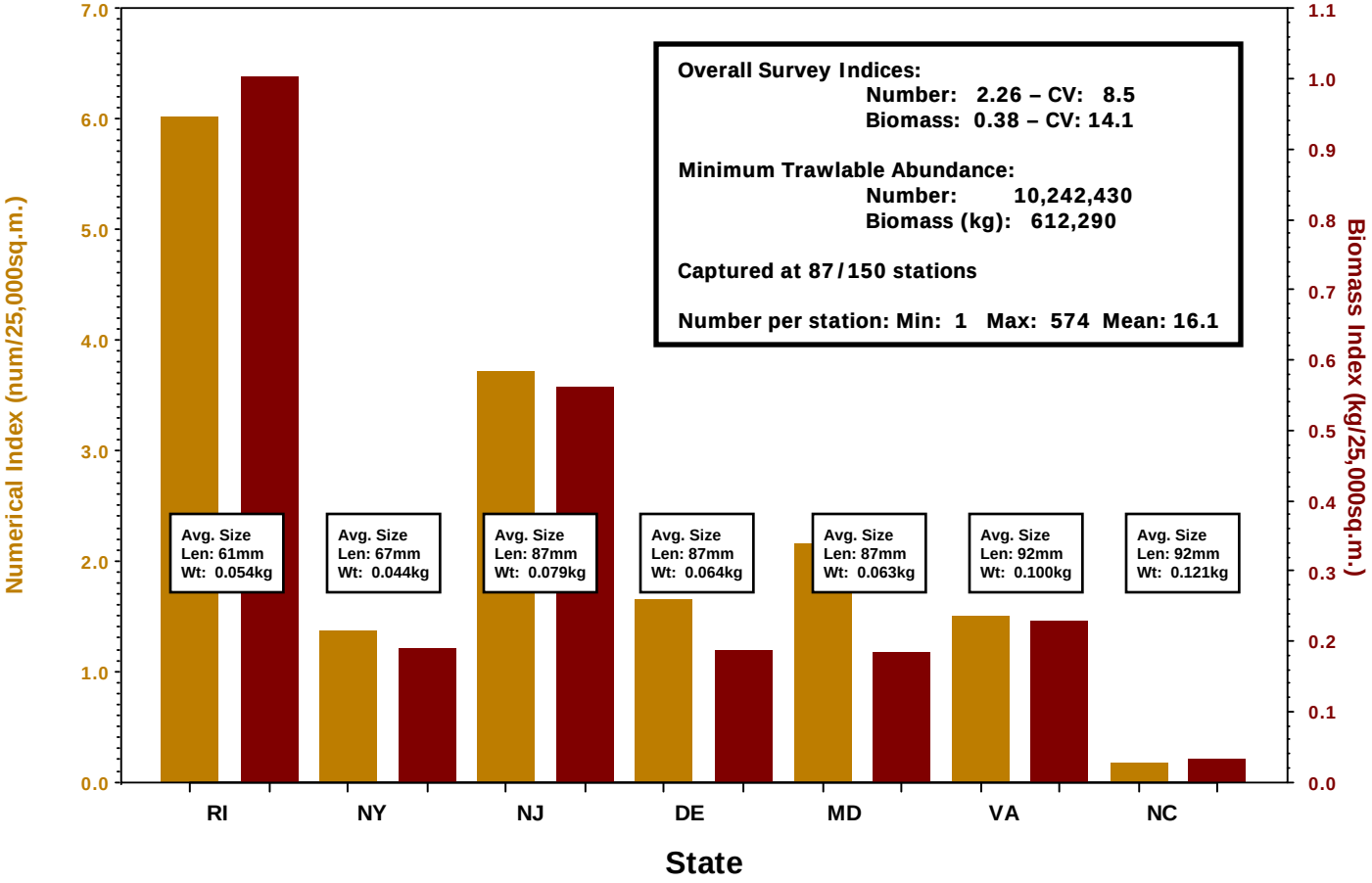


Figure 8. Length frequency histogram for alewife.

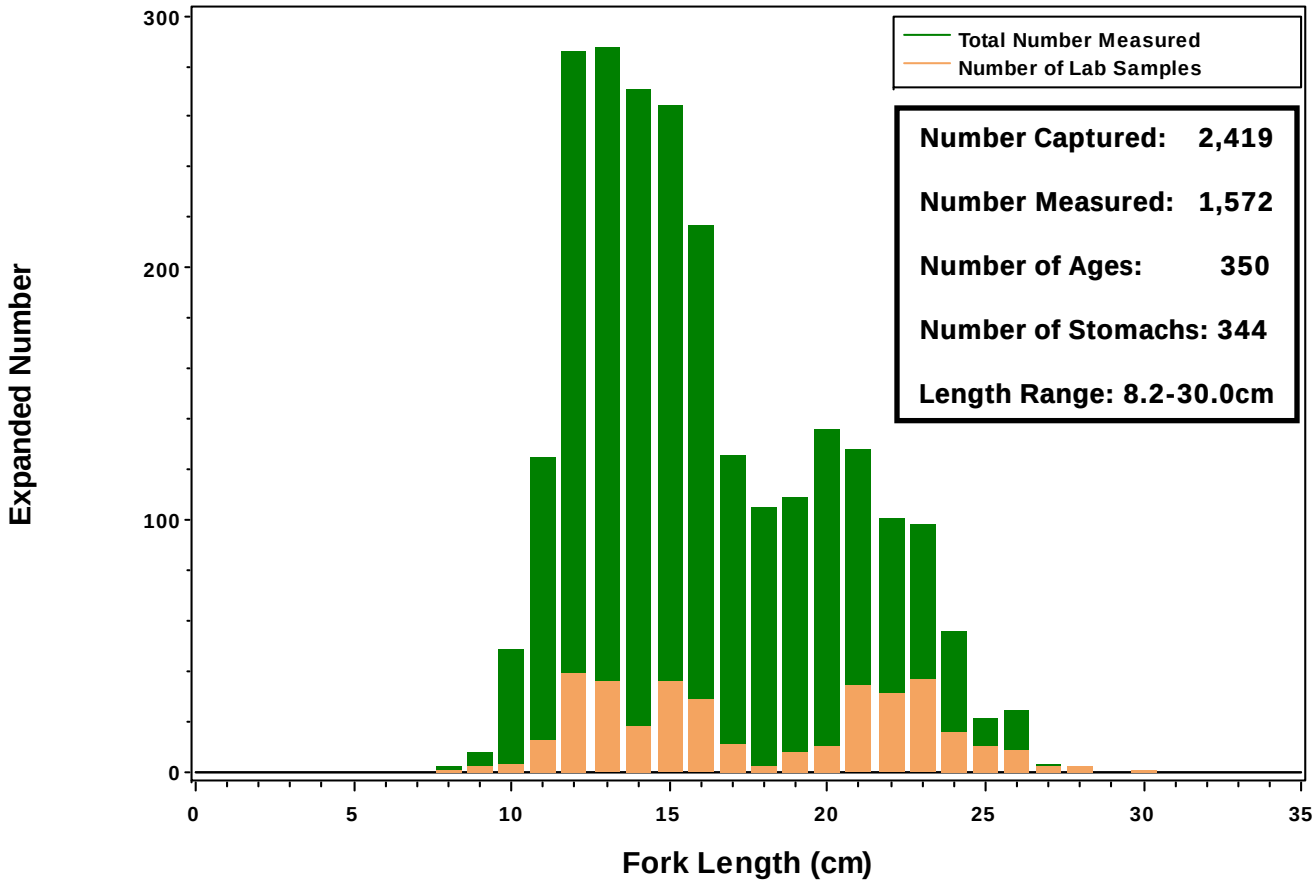
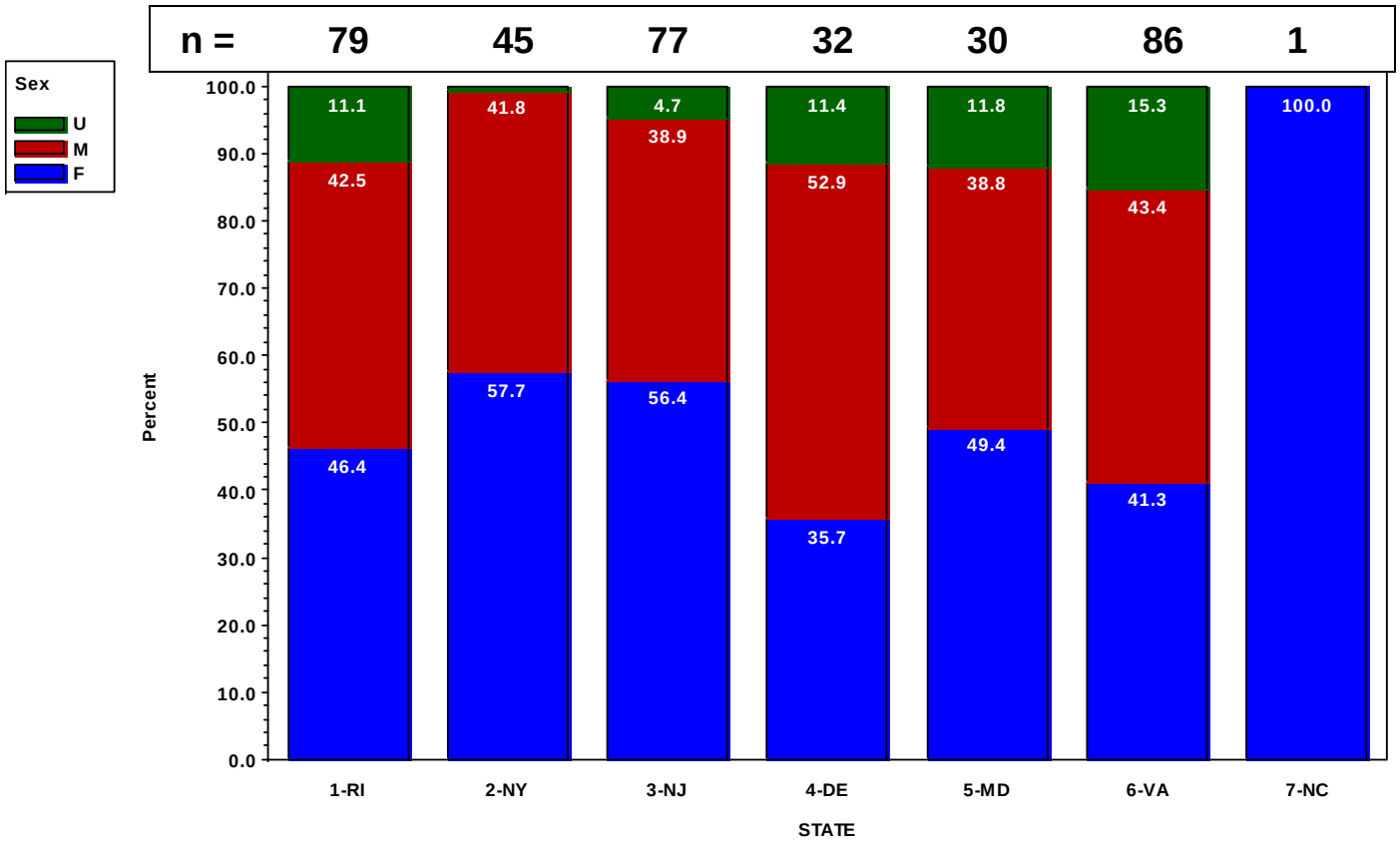


Figure 9. Sex ratios for alewife, by state.



American Lobster (Priority E)

Table 7. Number, biomass, minimum and maximum size of specimens captured, by state and region, for American lobster.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	458	75.115	35	96
RI	BI	43	8.588	35	107
NY	01				
NY	02				
NY	03	4	1.665	53	108
NY	04				
NY	05	9	1.928	43	86
NJ	06	4	1.955	71	108
NJ	07				
NJ	08				
DE	09				
MD	10				
VA	11				
VA	12				
VA	13	1	0.59	92	92
NC	14				
NC	15				

Figure 10. Geometric mean catch per area swept by state and overall, with summary catch rates, for American lobster.

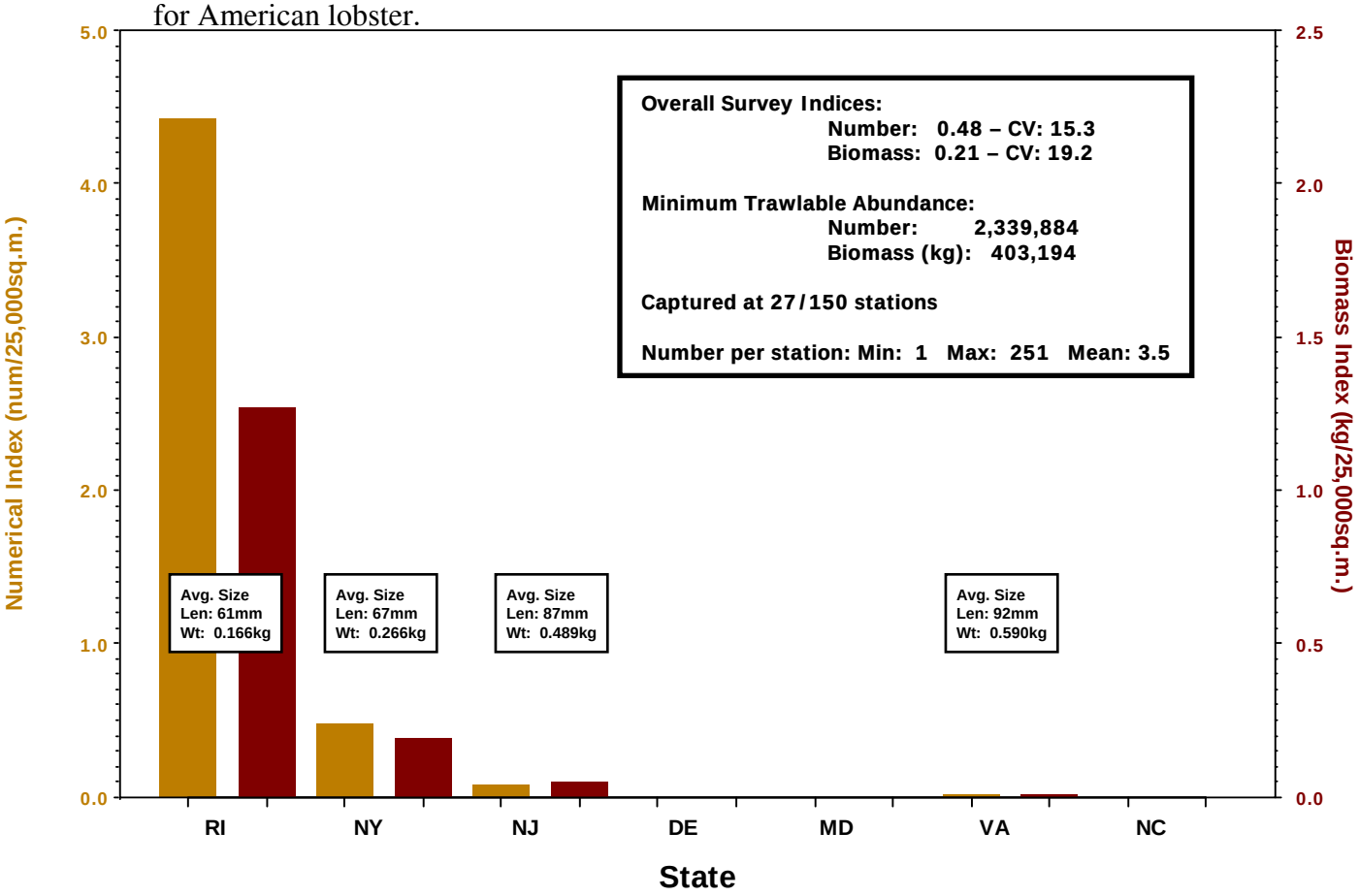


Figure 11. Length frequency histogram for American lobster.

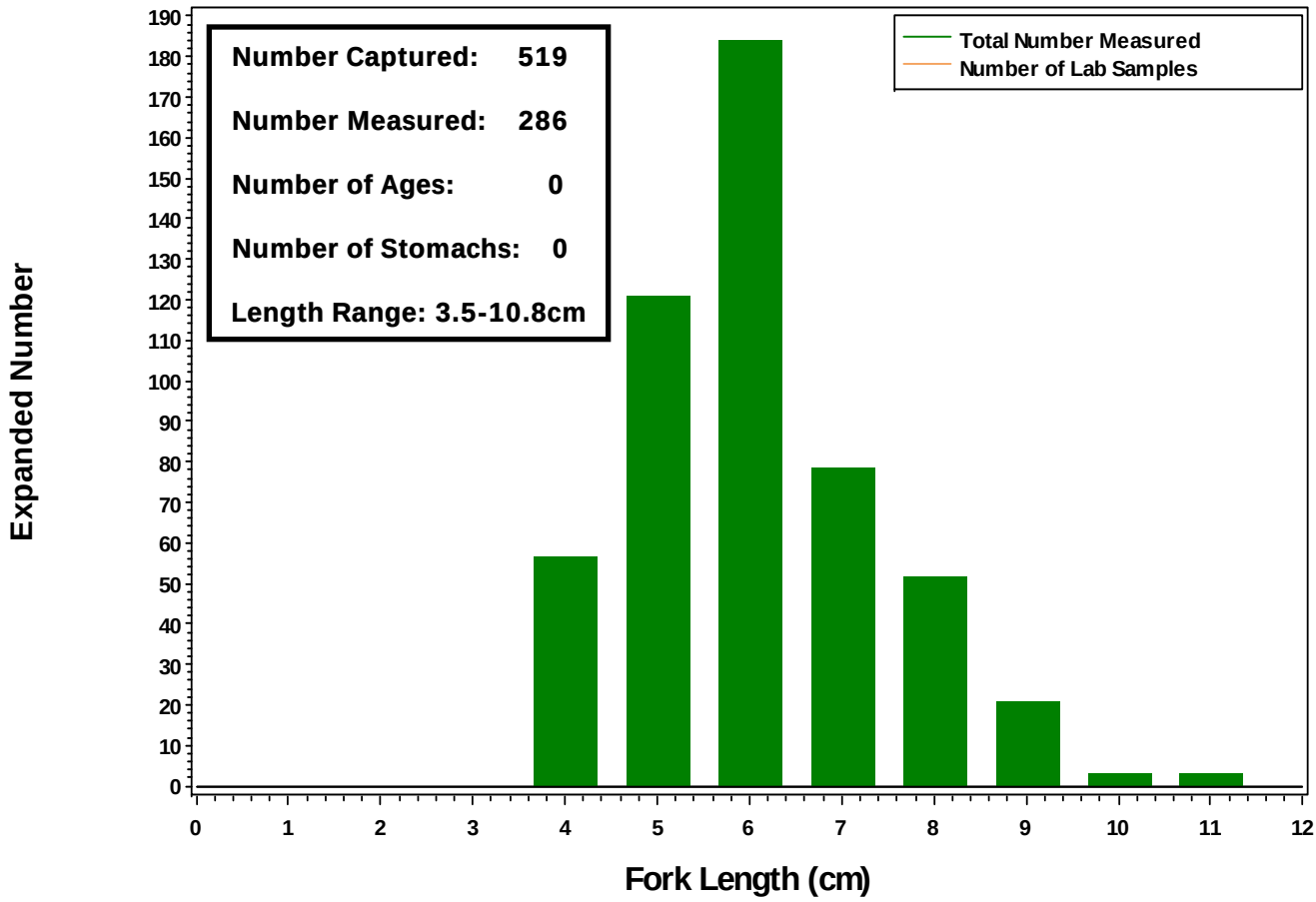
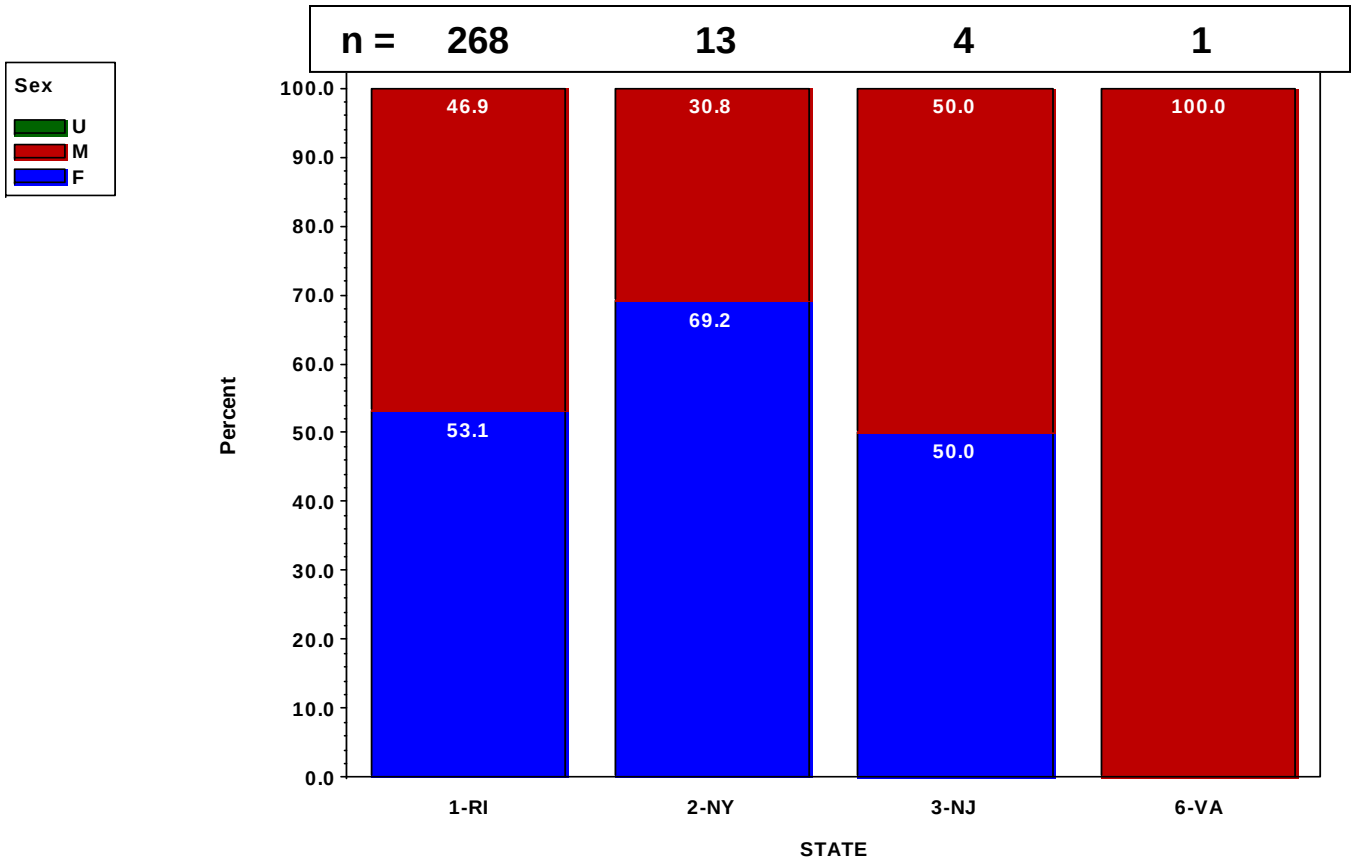


Figure 12. Sex ratios for American lobster, by state.



American Shad (Priority B)

Table 8. Number, biomass, minimum and maximum size of specimens captured, by state and region, for American shad.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	234	9.263	100	230
RI	BI	39	1.486	123	199
NY	01	47	1.852	117	178
NY	02	92	3.636	127	183
NY	03	14	0.425	125	194
NY	04	2	0.066	119	160
NY	05				
NJ	06	152	5.103	87	200
NJ	07	175	6.388	107	194
NJ	08	27	0.972	121	187
DE	09	85	2.856	107	235
MD	10	35	0.755	114	194
VA	11	190	5.16	94	215
VA	12	88	2.233	110	181
VA	13	17	0.41	99	178
NC	14	8	0.169	119	160
NC	15				

Figure 13. Geometric mean catch per area swept by state and overall, with summary catch rates, for American shad.

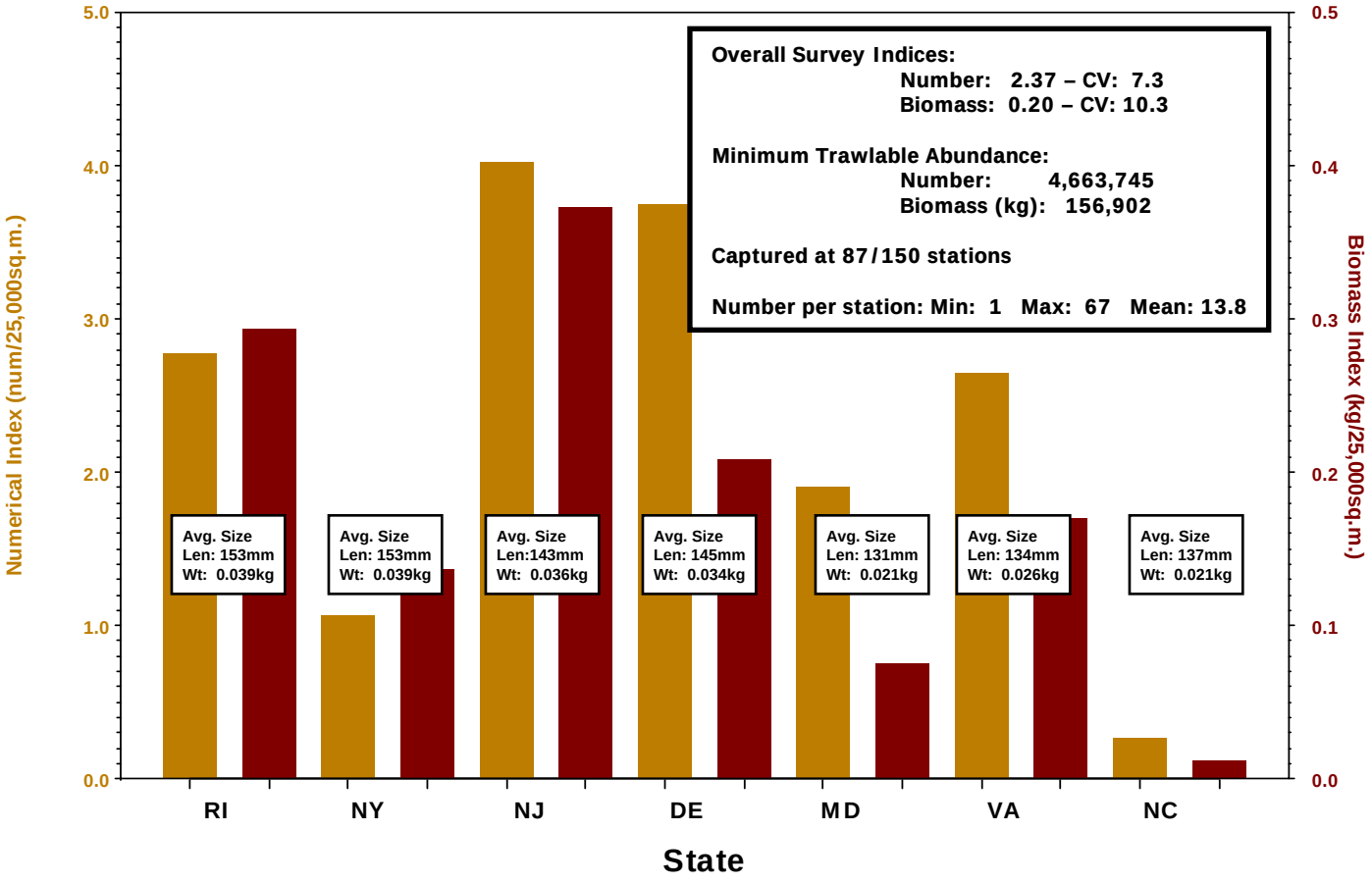


Figure 14. Length frequency histogram for American shad.

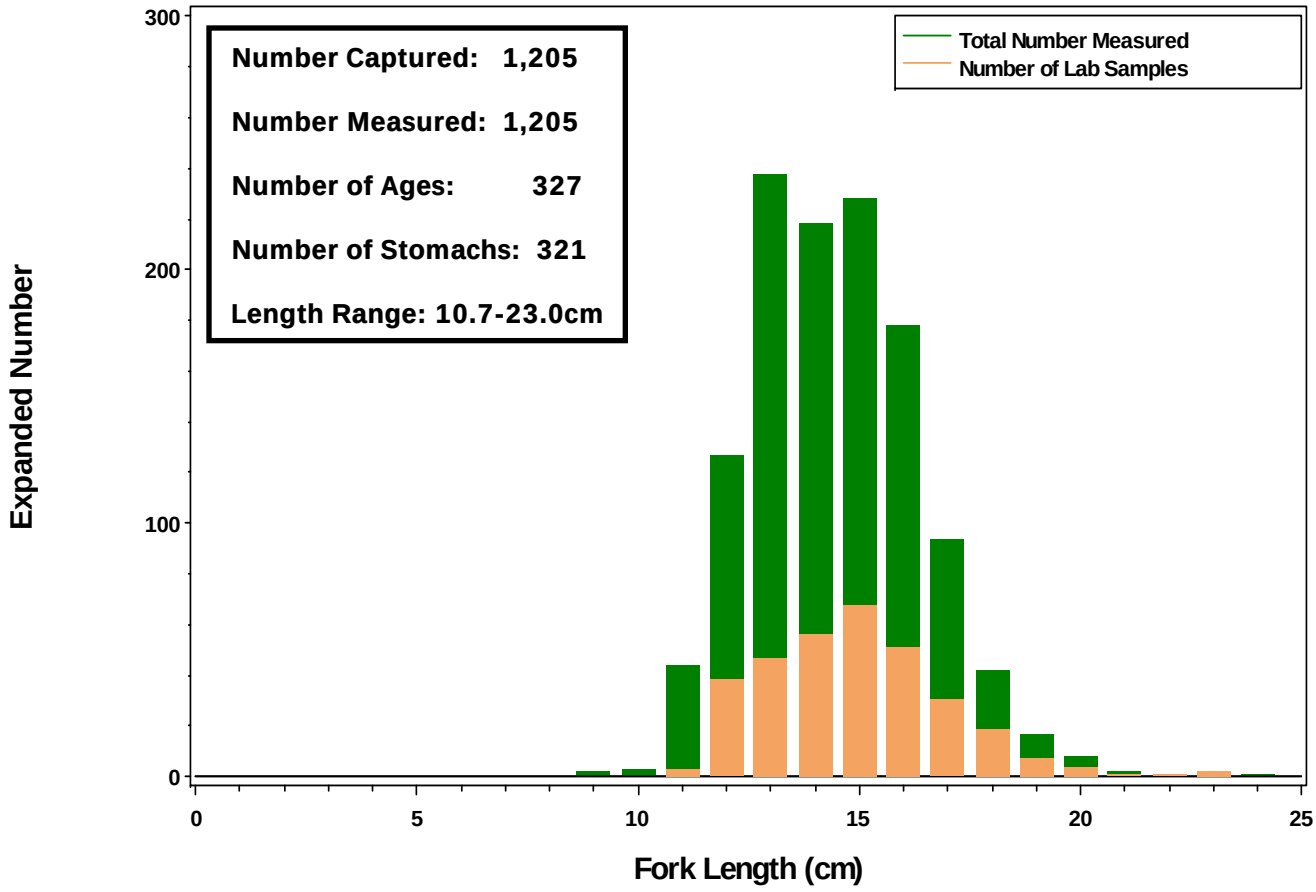
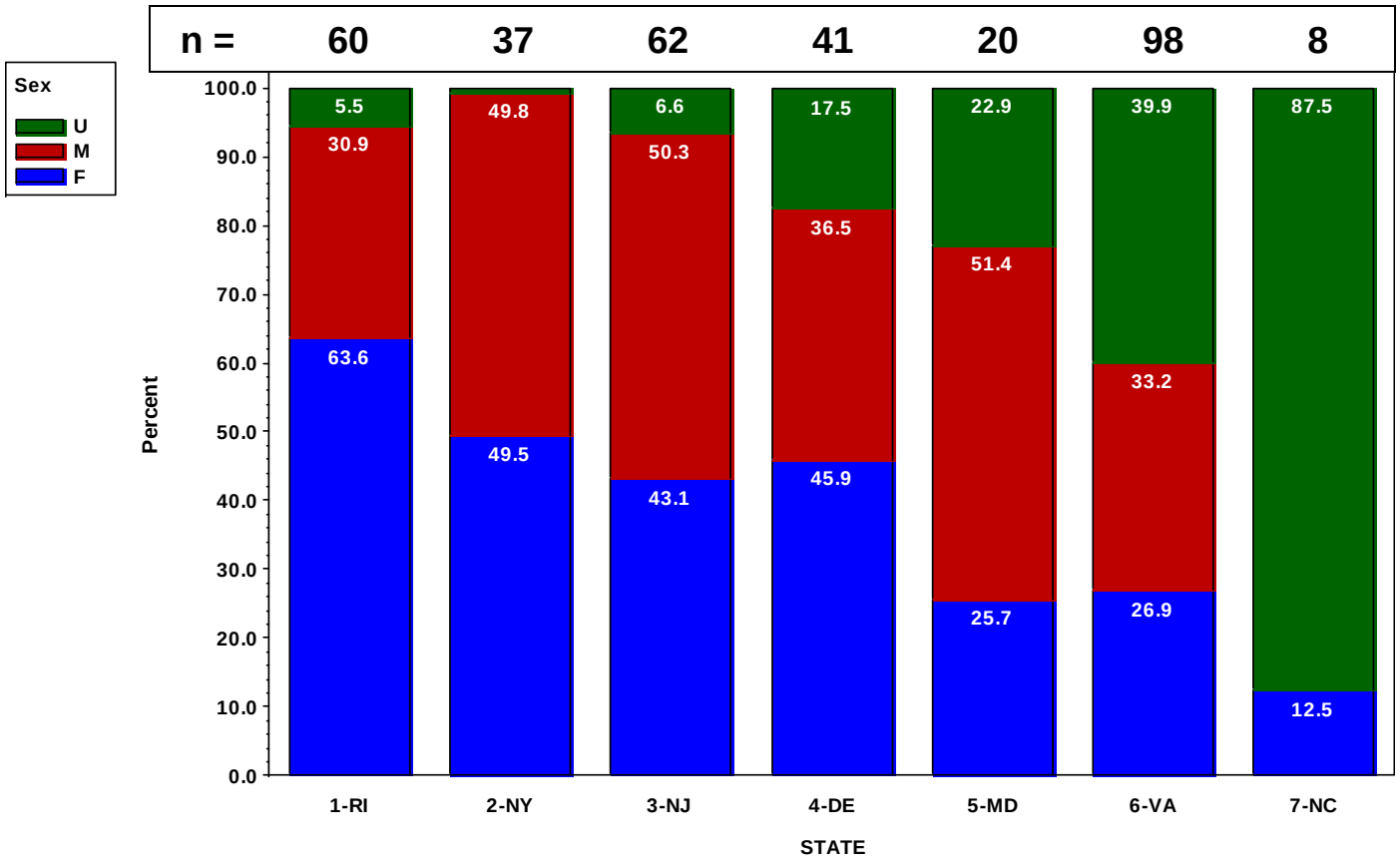


Figure 15. Sex ratios for American shad, by state.



Atlantic Croaker (Priority B)

Table 9. Number, biomass, minimum and maximum size of specimens captured, by state and region, for Atlantic croaker.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05				
NJ	06				
NJ	07	1	0.115	203	203
NJ	08	1	0.236	260	260
DE	09	2	0.225	219	220
MD	10	3	0.326	210	234
VA	11	55	0.732	65	249
VA	12	4	0.34	204	230
VA	13	49	5.09	183	240
NC	14	72	7.943	125	236
NC	15	280	9.98	95	177

Figure 16. Geometric mean catch per area swept by state and overall, with summary catch rates, for Atlantic croaker.

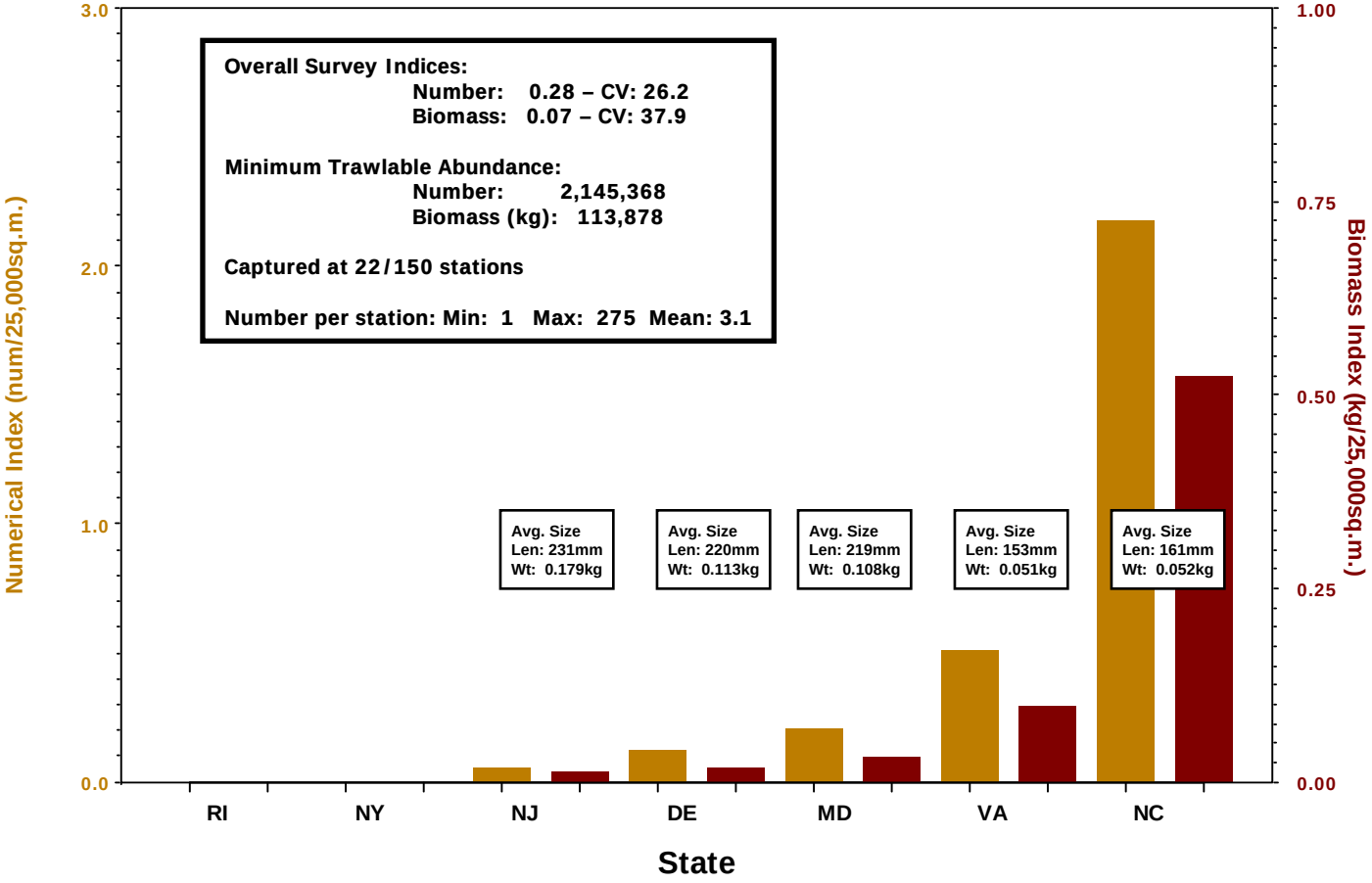


Figure 17. Length frequency histogram for Atlantic croaker.

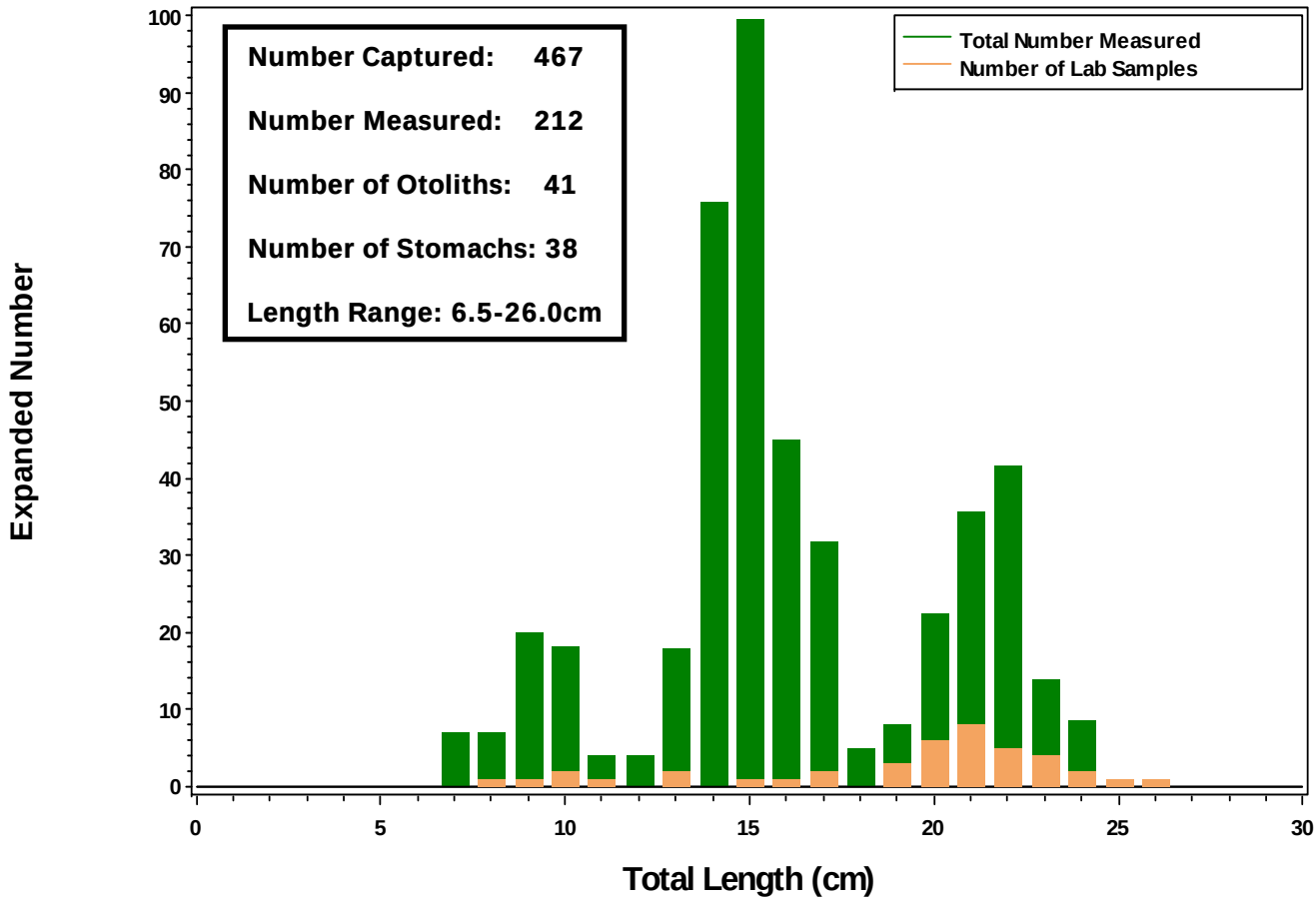
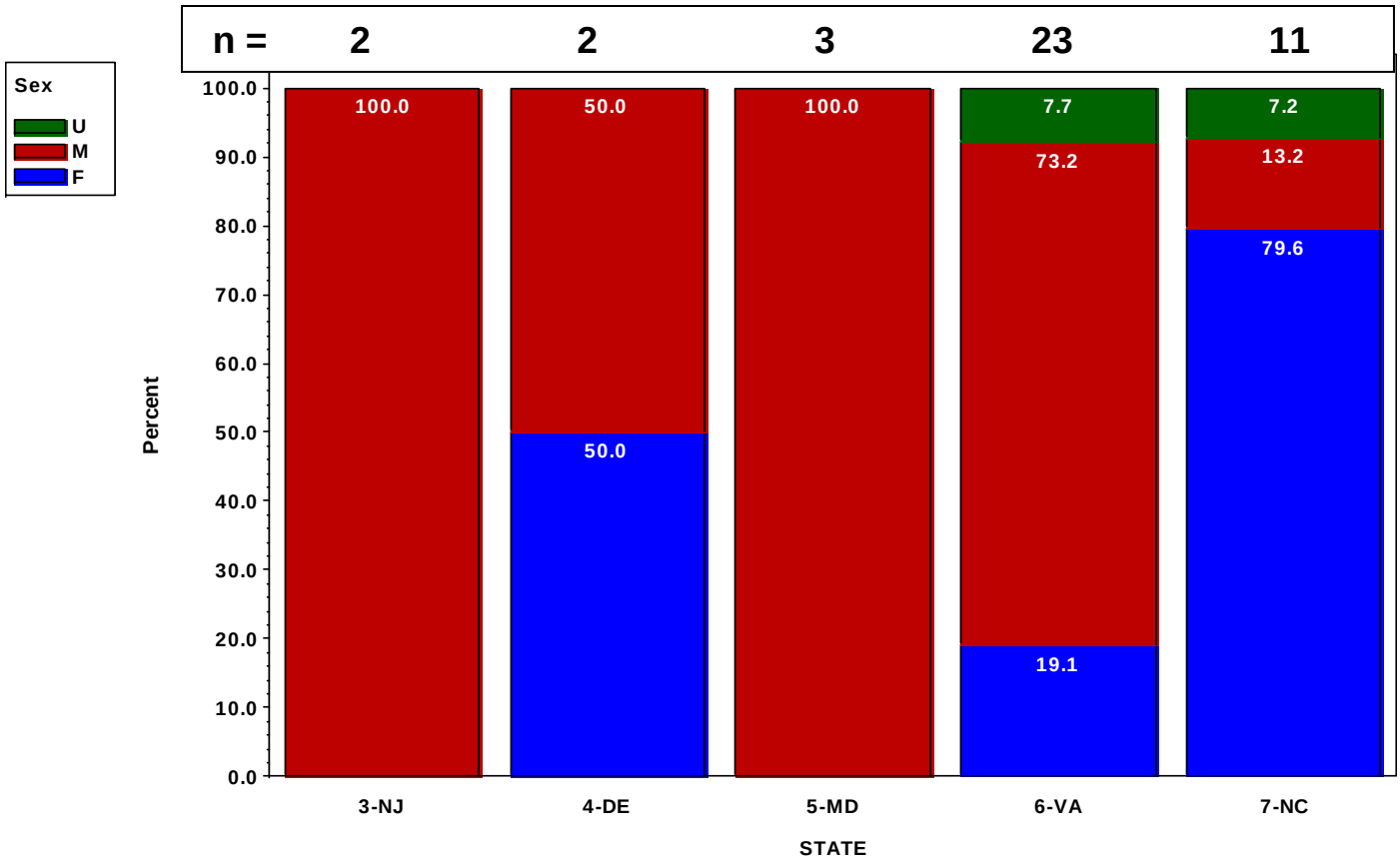


Figure 18. Sex ratios for Atlantic croaker by state.



Black Sea Bass (Priority A)

Table 10. Number, biomass, minimum and maximum size of specimens captured, by state and region, for black sea bass.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	86	50.243	214	599
RI	BI	7	7.726	303	573
NY	01	5	7.886	436	510
NY	02	20	9.574	95	507
NY	03	10	4.485	95	418
NY	04				
NY	05	1	0.474	310	310
NJ	06	3	0.639	103	313
NJ	07	3	0.055	82	99
NJ	08	9	1.149	86	281
DE	09	2	0.099	94	189
MD	10	12	1.463	69	259
VA	11	3	0.042	89	97
VA	12	3	0.03	66	80
VA	13	2	0.026	89	114
NC	14				
NC	15				

Figure 19. Geometric mean catch per area swept by state and overall, with summary catch rates, for black sea bass.

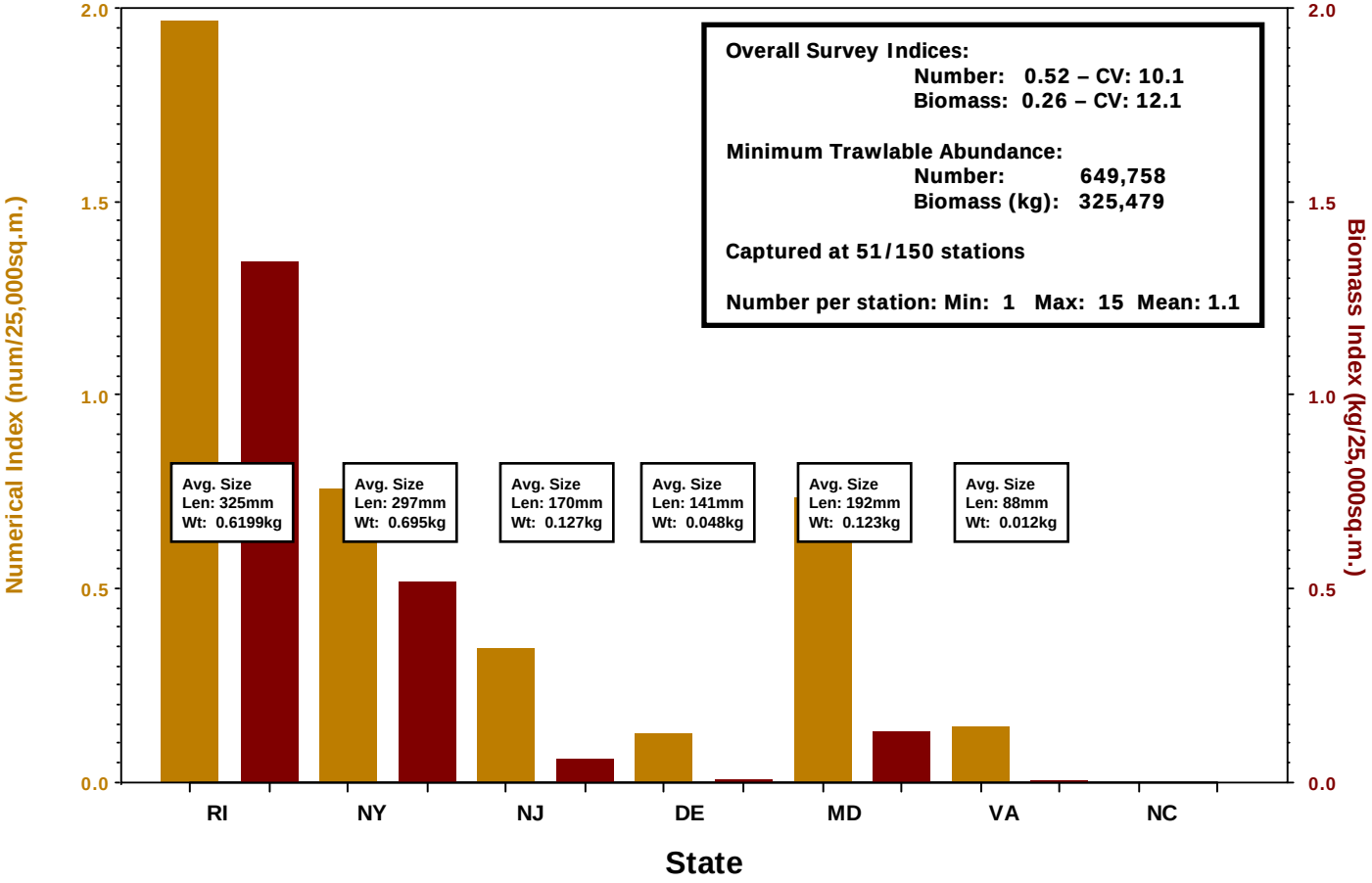


Figure 20. Length frequency histogram for black sea bass.

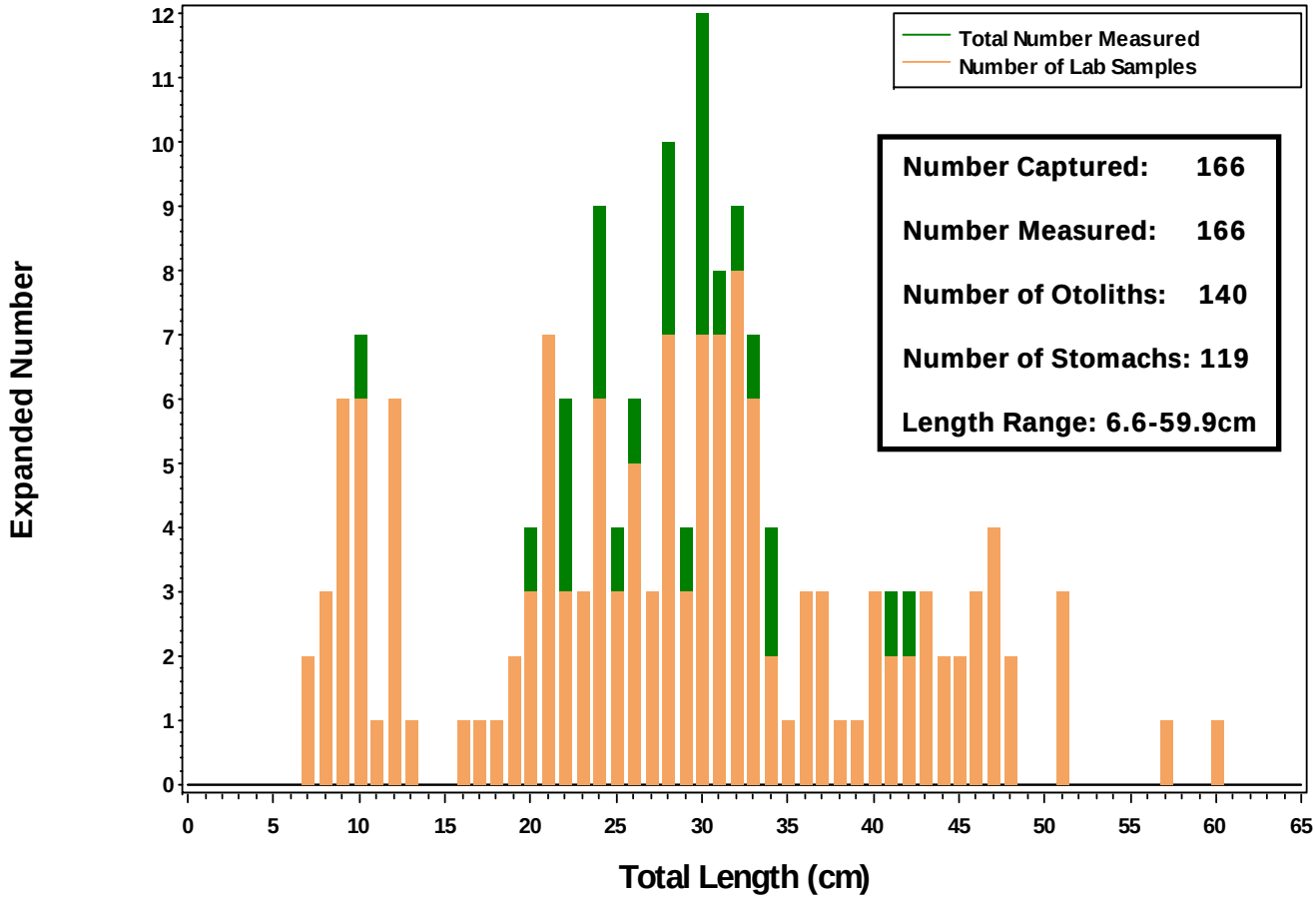
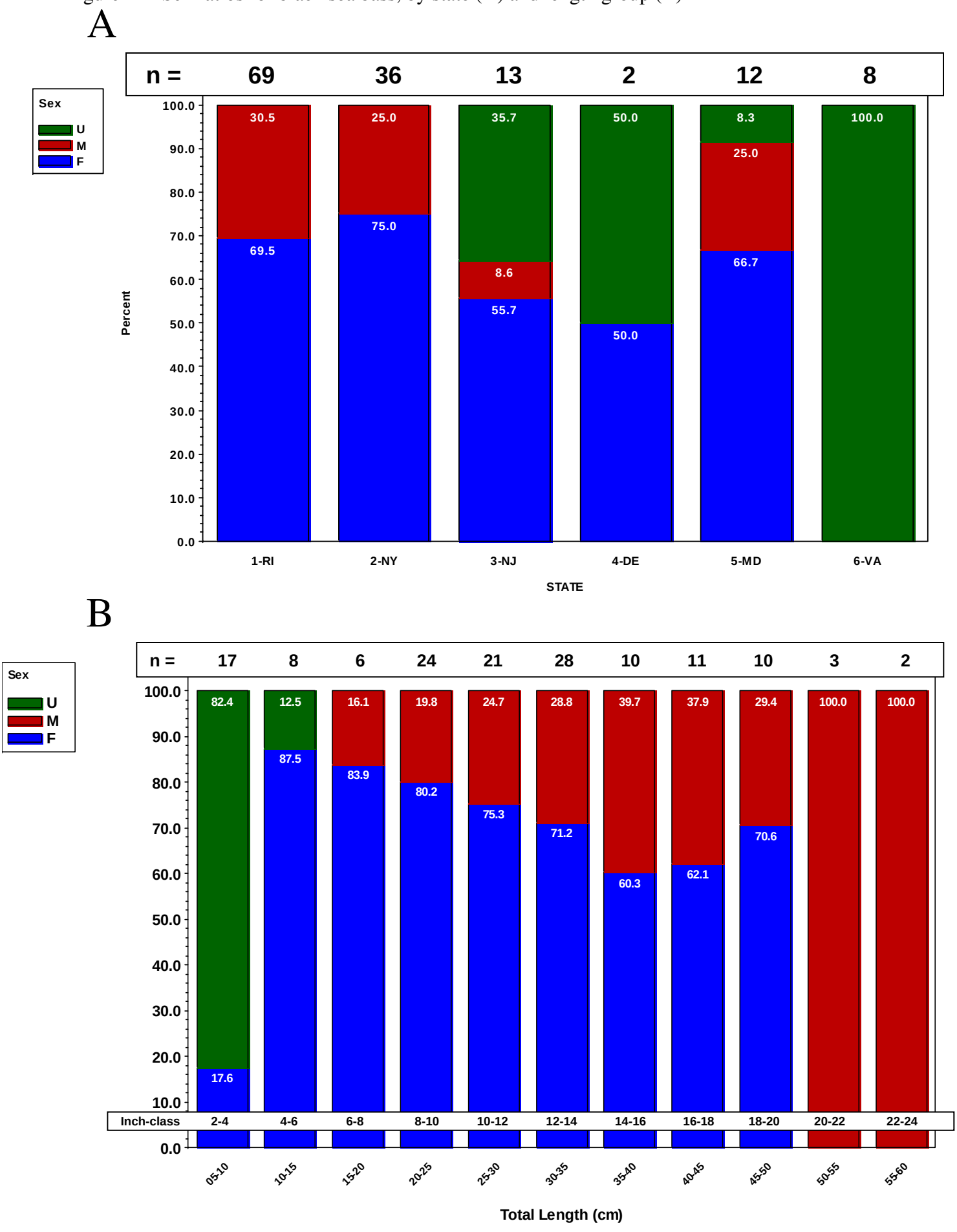


Figure 21. Sex ratios for black sea bass, by state (A) and length group (B).



Blueback Herring (Priority C)

Table 11. Number, biomass, minimum and maximum size of specimens captured, by state and region, for blueback herring.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	415	15.352	88	234
RI	BI	270	6.213	95	201
NY	01	3	0.114	157	179
NY	02	371	7.308	91	213
NY	03	278	3.06	79	133
NY	04	7	0.079	92	129
NY	05				
NJ	06	7	0.056	77	105
NJ	07	1528	19.871	81	213
NJ	08	195	1.459	75	123
DE	09	113	1.786	83	205
MD	10	207	2.854	86	198
VA	11	74	0.745	86	114
VA	12	146	1.532	82	169
VA	13	71	1.607	80	245
NC	14	6	0.087	100	130
NC	15	1	0.076	221	221

Figure 22. Geometric mean catch per area swept by state and overall, with summary catch rates, for blueback herring.

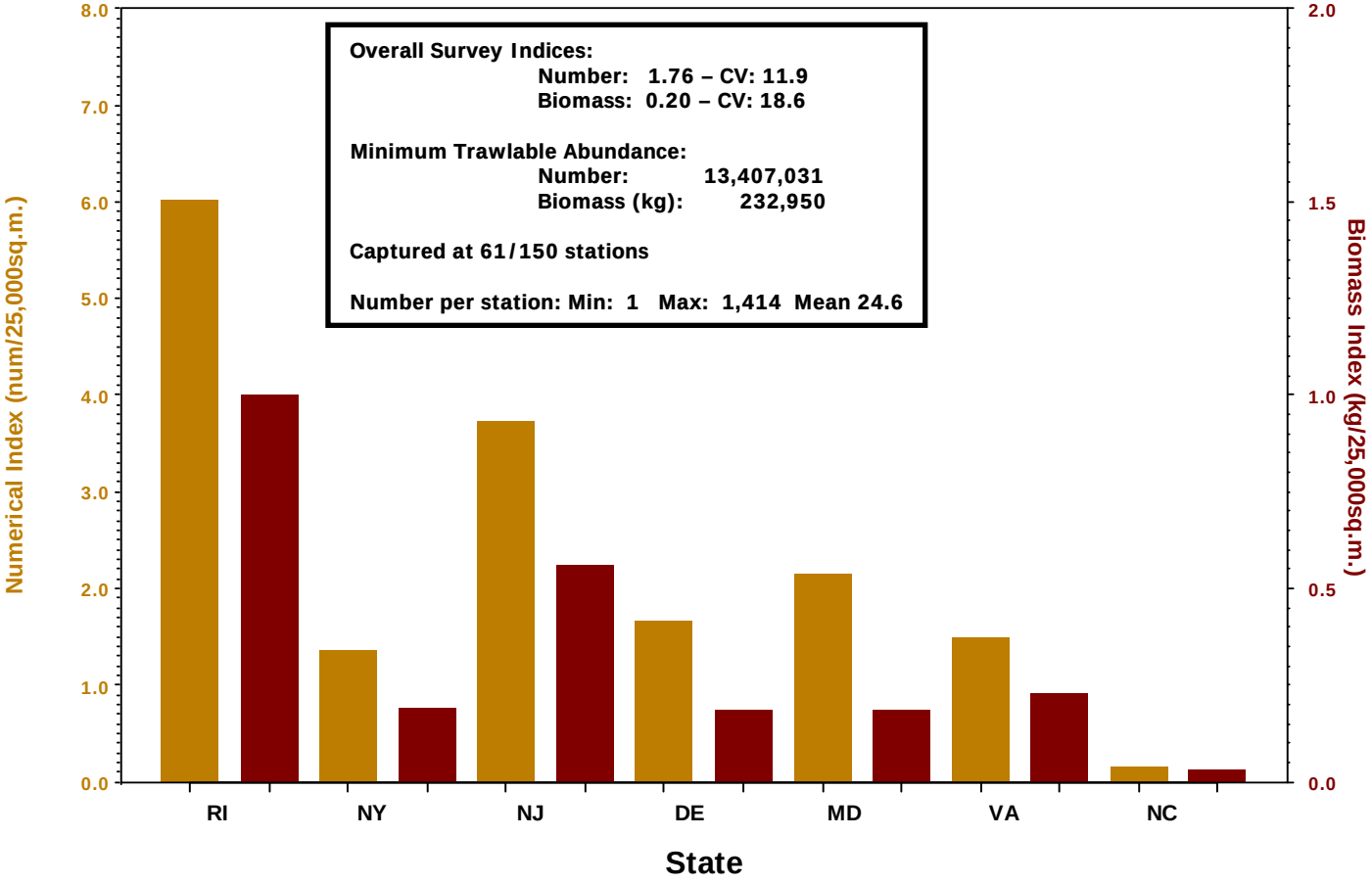


Figure 23. Length frequency histogram for blueback herring.

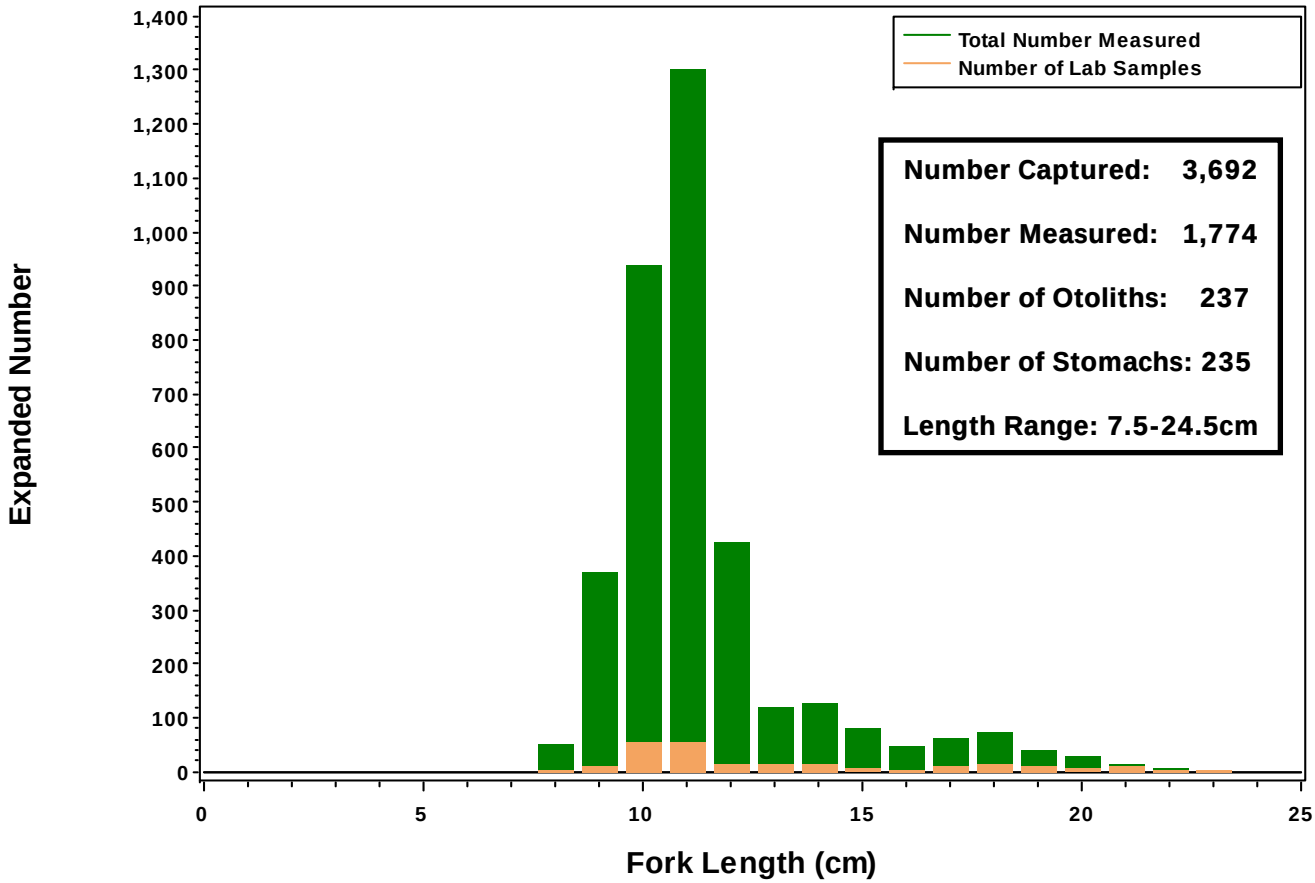
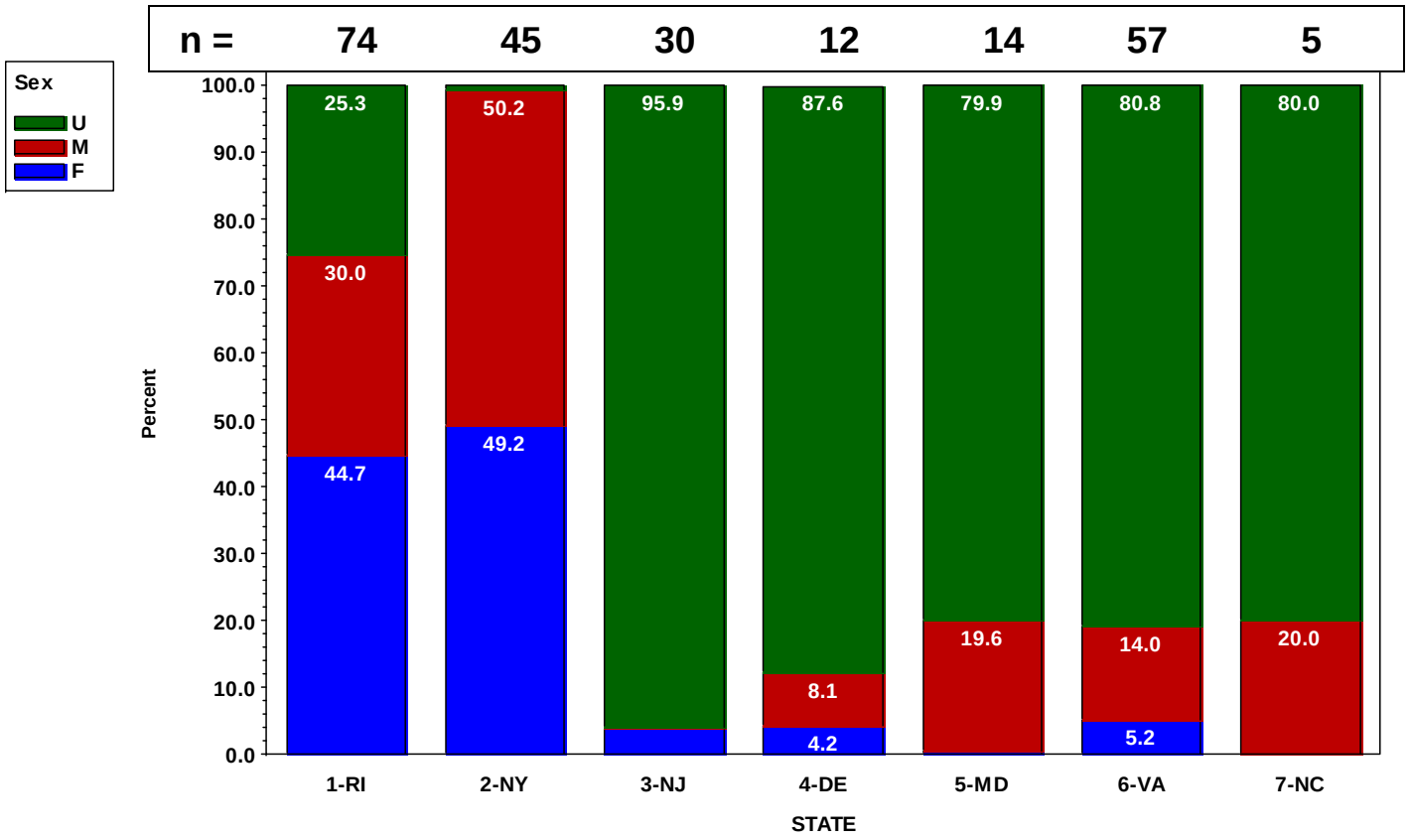
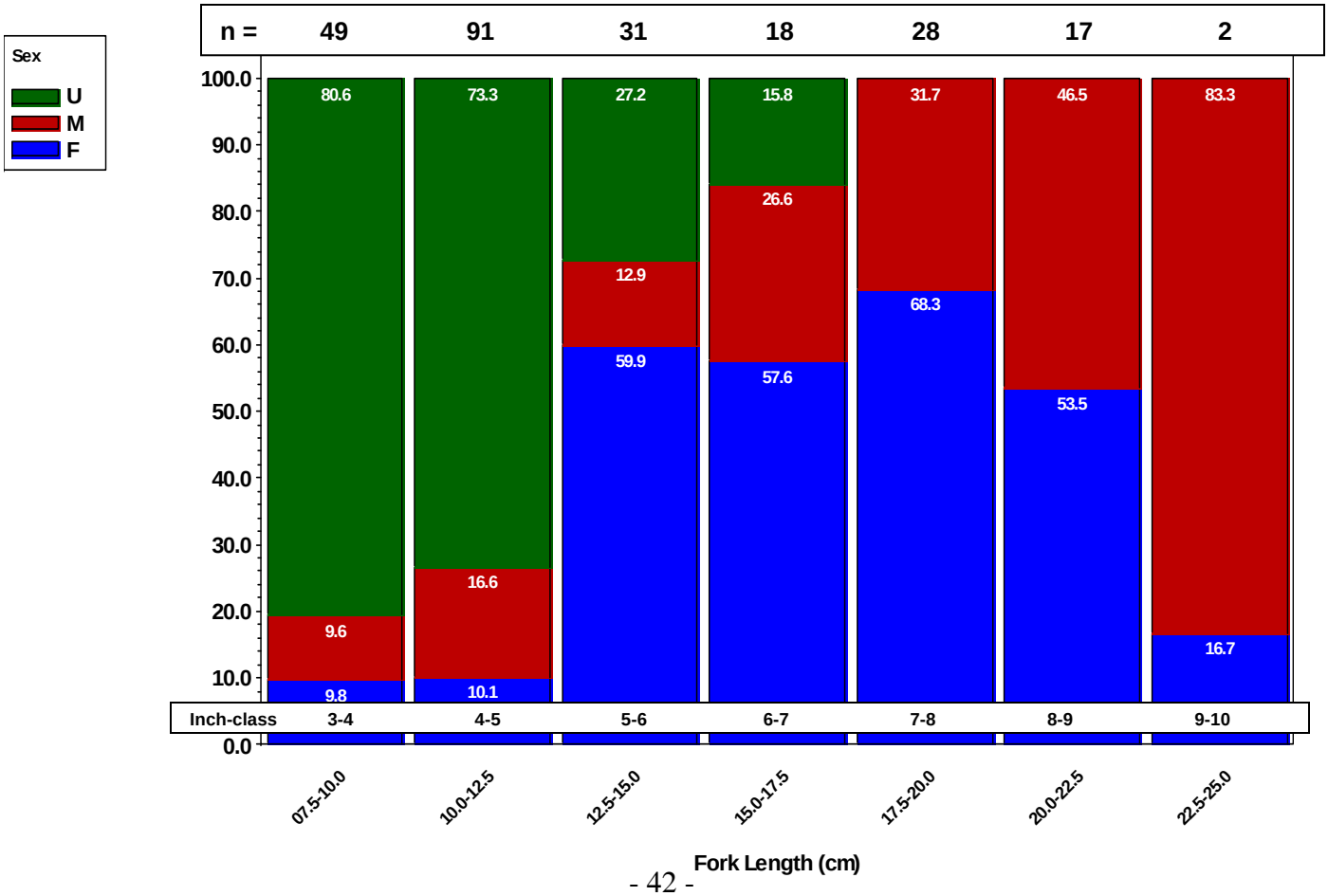


Figure 24. Sex ratios for blueback herring, by state (A) and length group (B).

A



B



Bluefish
(Priority A)

Table 12. Number, biomass, minimum and maximum size of specimens captured, by state and region, for bluefish.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	1	2.325	558	558
RI	BI	2	2.63	465	491
NY	01	1	2.266	558	558
NY	02	1	2.46	591	591
NY	03				
NY	04				
NY	05				
NJ	06				
NJ	07				
NJ	08				
DE	09				
MD	10				
VA	11				
VA	12				
VA	13	5	0.216	152	181
NC	14	18	0.7	143	179
NC	15	9	0.33	142	164

Figure 25. Geometric mean catch per area swept by state and overall, with summary catch rates, for bluefish.

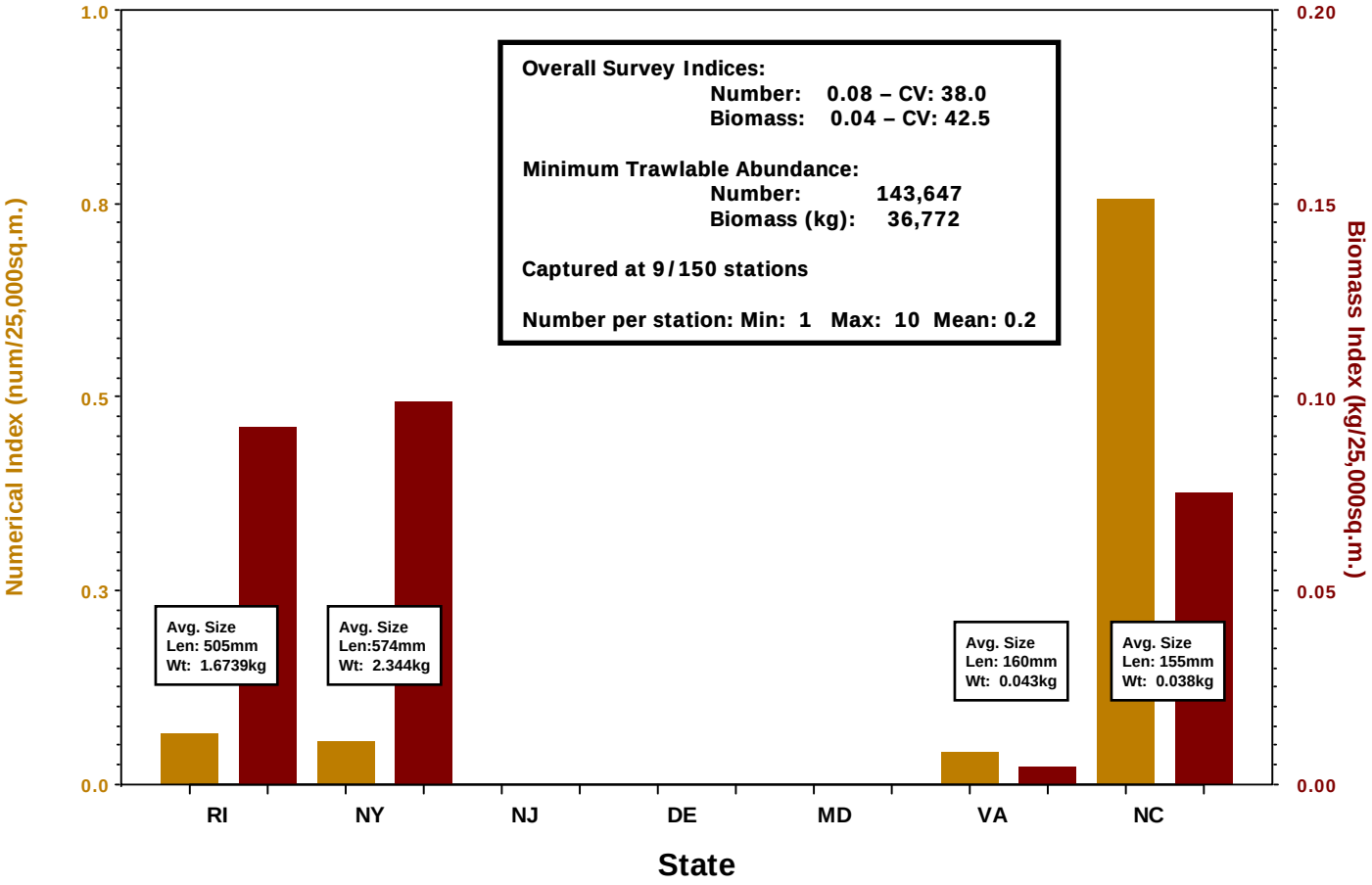


Figure 26. Length frequency histogram for bluefish.

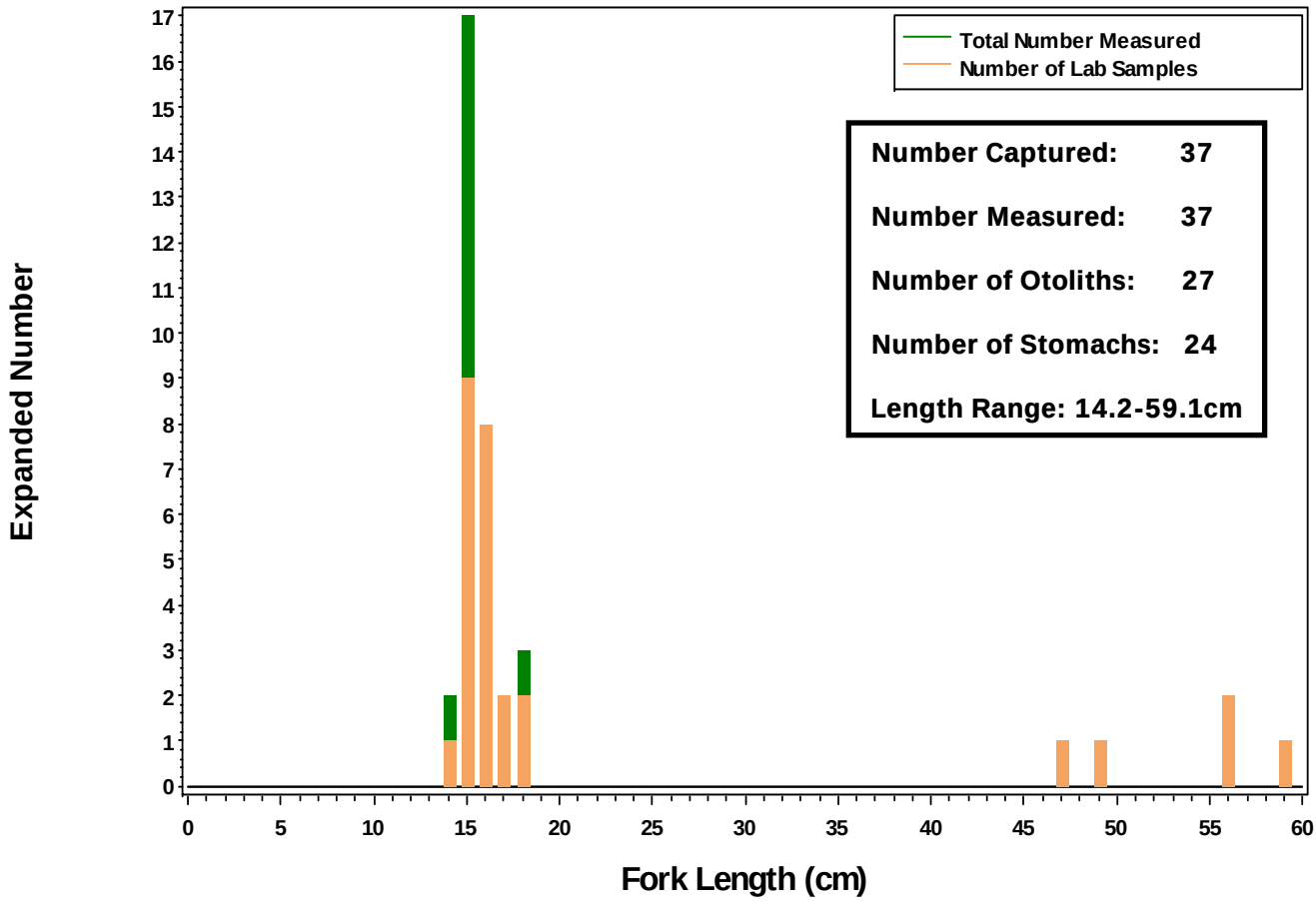
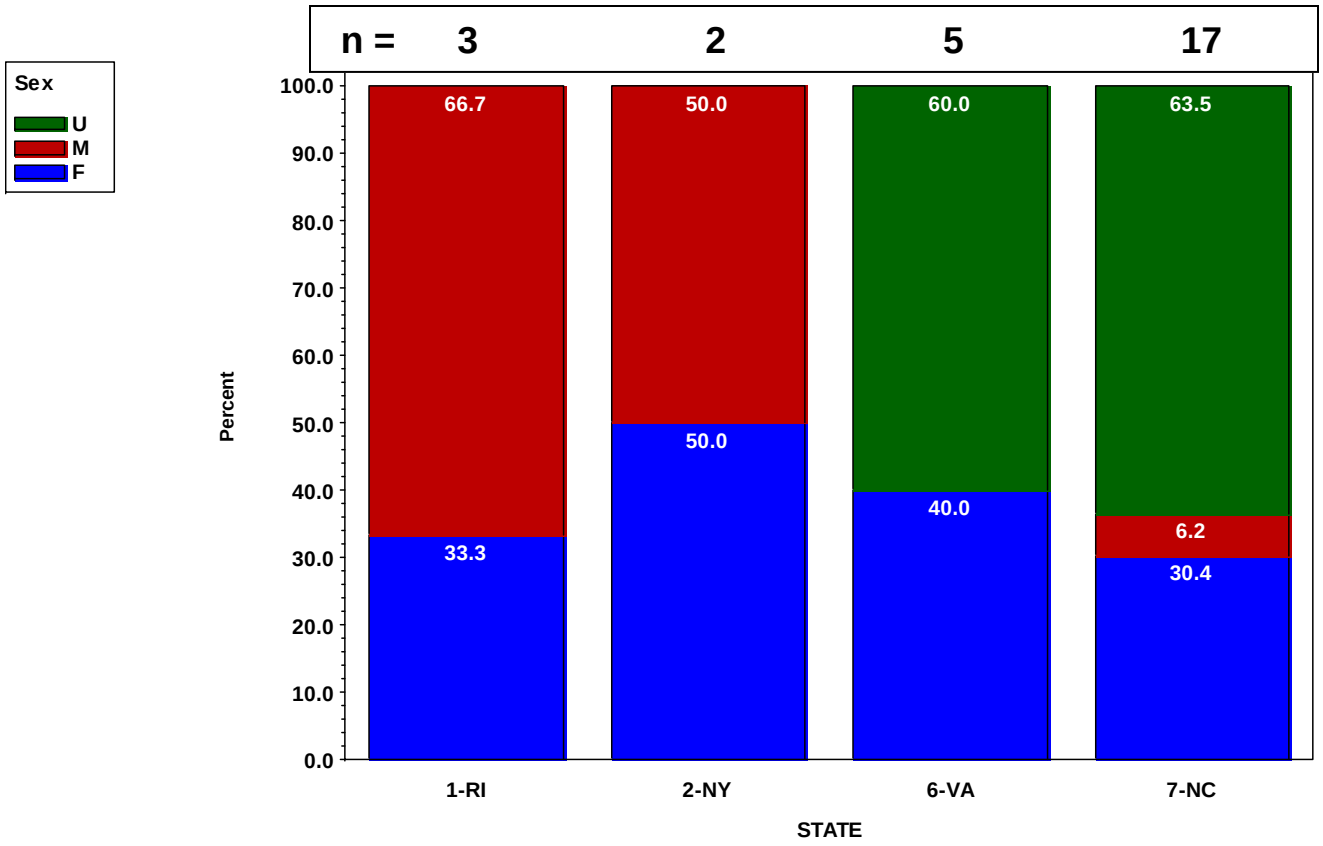


Figure 27. Sex ratios for bluefish, by state.



Bluntnose Stingray (Priority B)

Table 13. Number, biomass, minimum and maximum size of specimens captured, by state and region, for bluntnose stingray.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05				
NJ	06				
NJ	07				
NJ	08				
DE	09				
MD	10				
VA	11				
VA	12	2	3.908	545	648
VA	13	3	16.742	401	573
NC	14	68	233.94	329	561
NC	15	11	53.65	384	835

Figure 28. Geometric mean catch per area swept by state and overall, with summary catch rates, for bluntnose stingray.

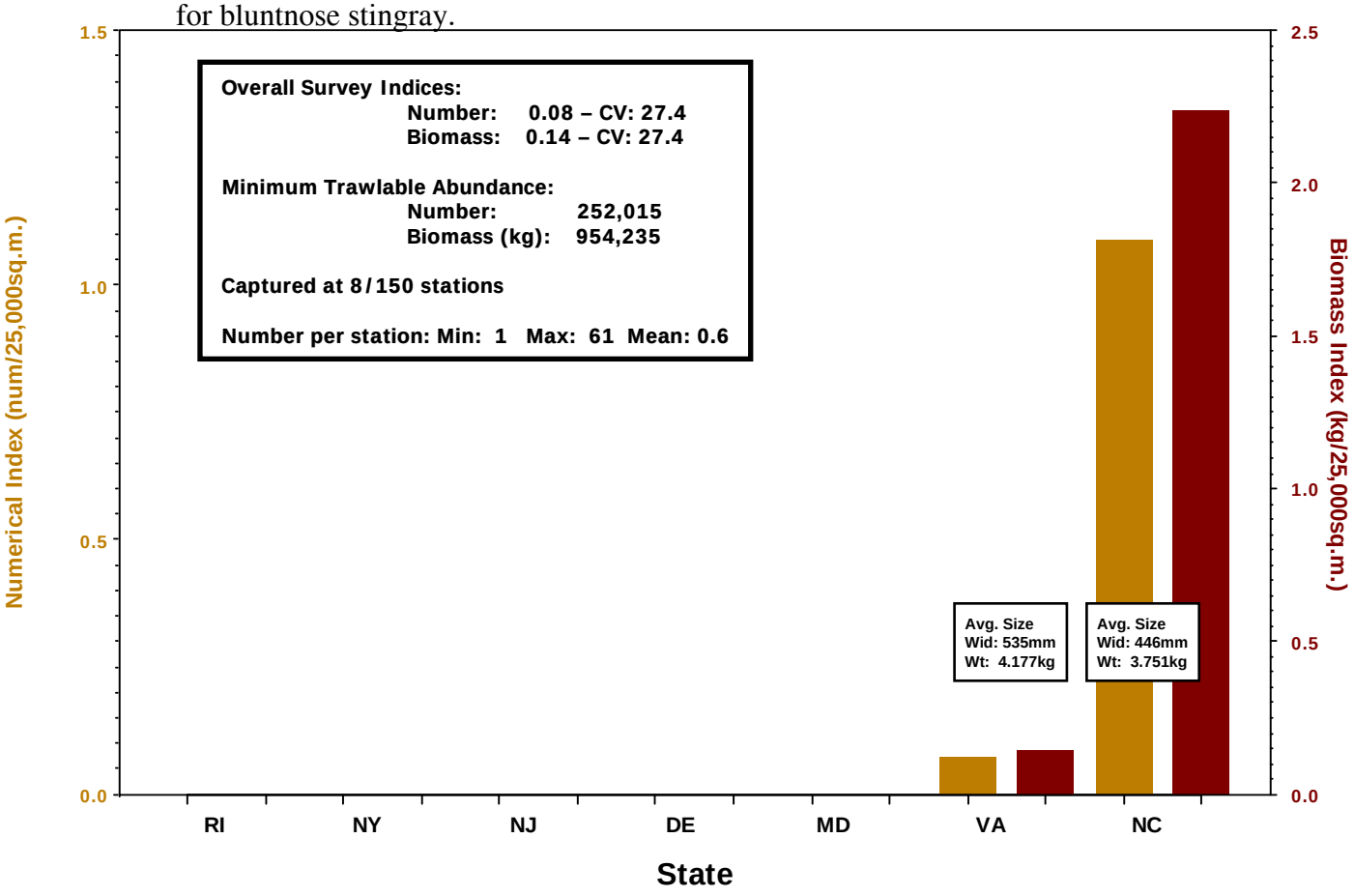
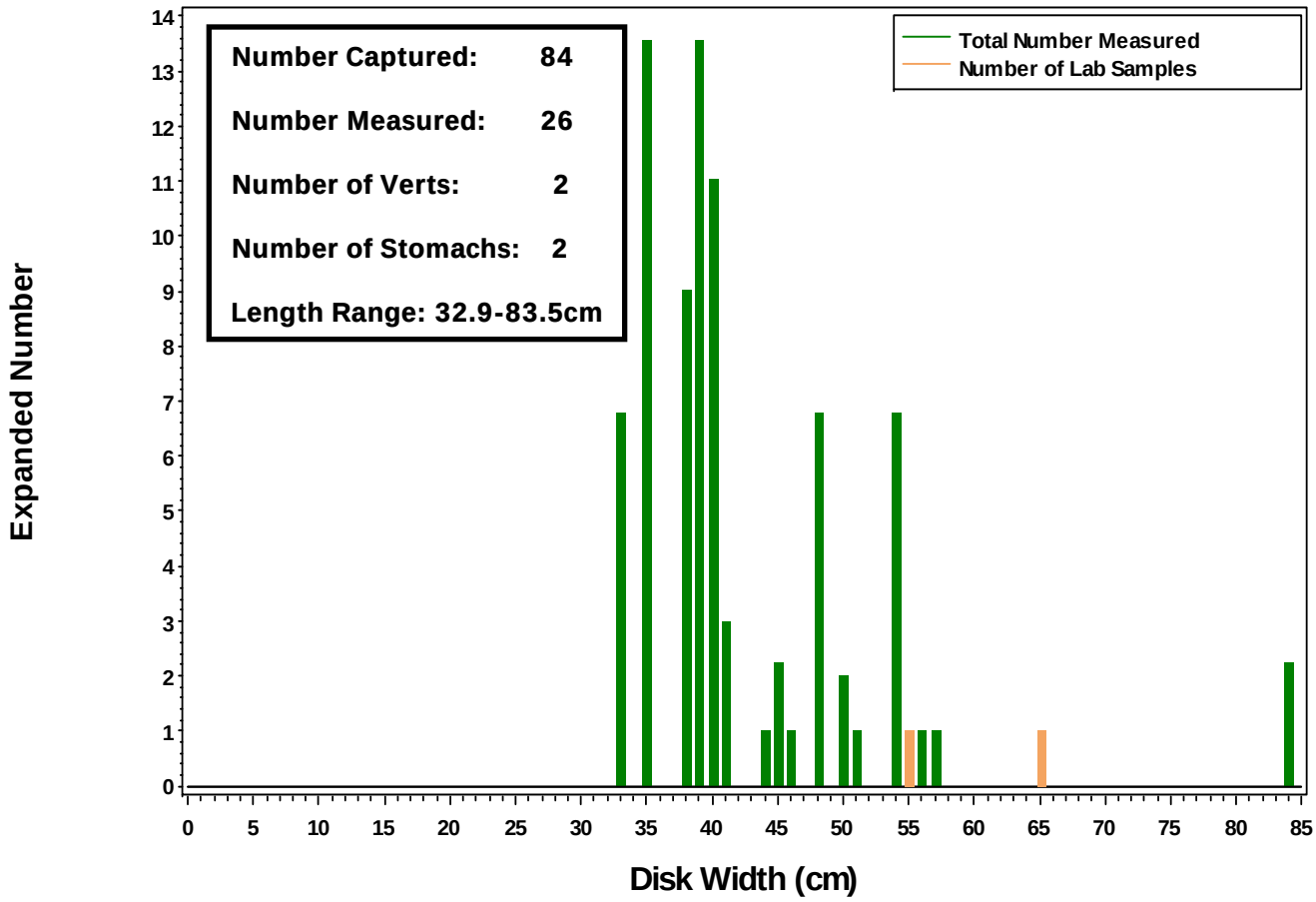


Figure 29. Width frequency histogram for bluntnose stingray.



Butterfish
(Priority A)

Table 14. Number, biomass, minimum and maximum size of specimens captured, by state and region, for butterfish.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	2,226	96.055	87	211
RI	BI	294	24.641	92	212
NY	01	66	6.046	105	188
NY	02	221	10.707	52	200
NY	03	330	10.241	65	187
NY	04	151	7.903	76	211
NY	05	34	1.77	51	188
NJ	06	1,115	27.387	28	216
NJ	07	1,660	39.738	27	197
NJ	08	1,016	19.724	30	191
DE	09	1,692	33.605	22	187
MD	10	2,822	43.81	29	180
VA	11	9,789	137.3152	25	188
VA	12	8,683	40.809	32	169
VA	13	16,865	145.044	21	175
NC	14	541	40.616	98	172
NC	15	237	3.803	31	157

Figure 30. Geometric mean catch per area swept by state and overall, with summary catch rates, for butterfish.

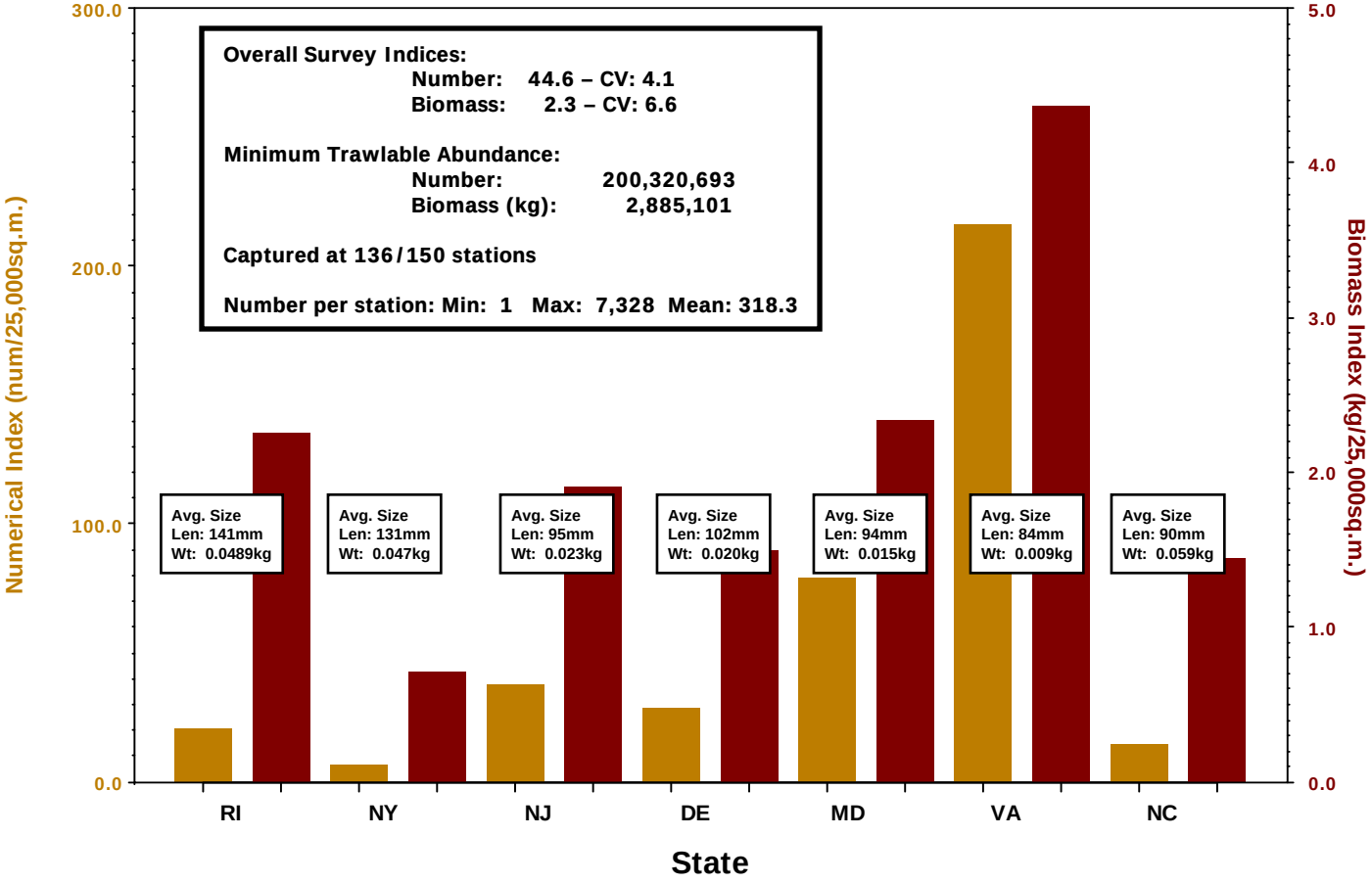


Figure 31. Length frequency histogram for butterfish.

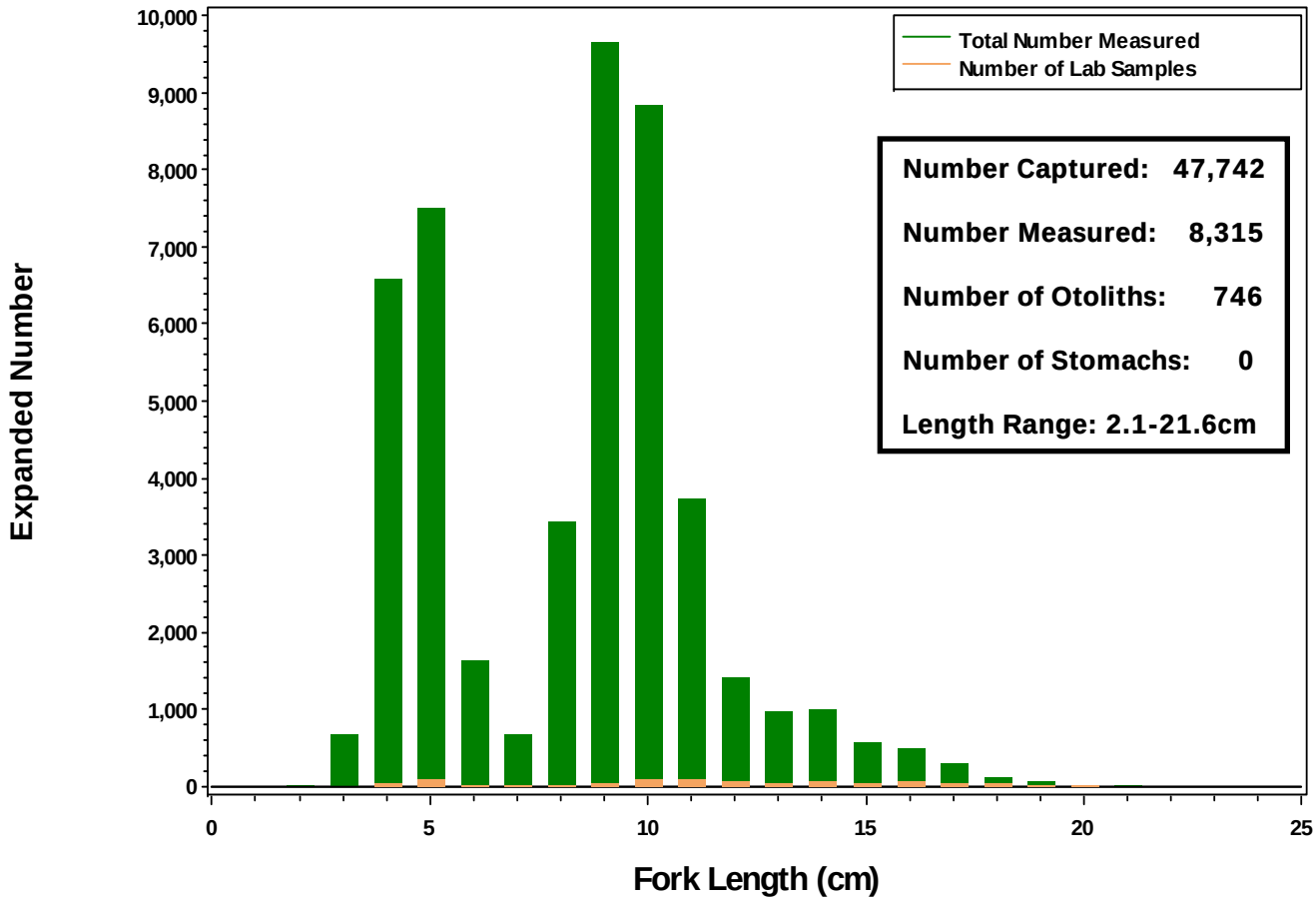
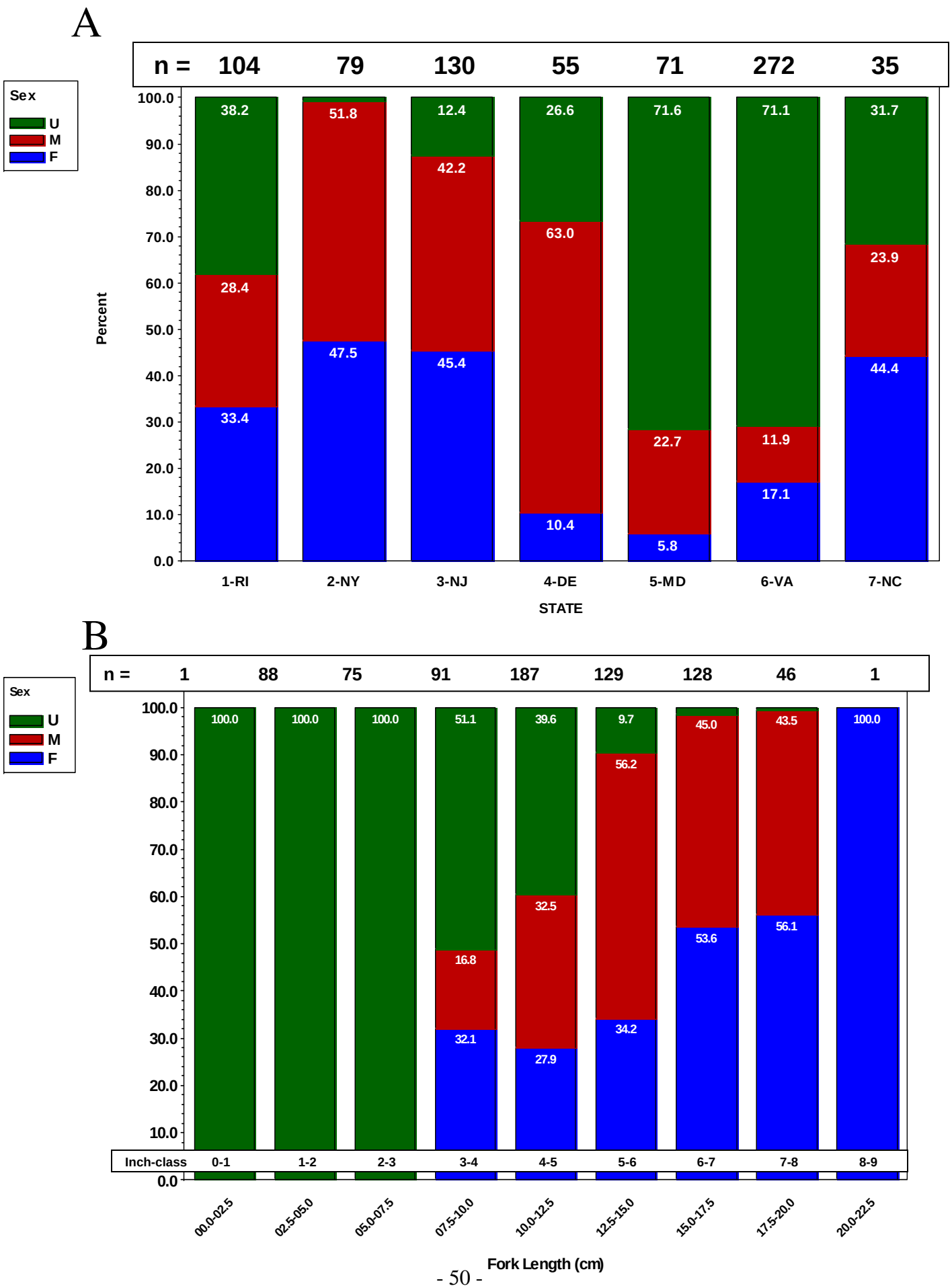


Figure 32. Sex ratios for butterfish, by state (A) and length group (B).



Clearnose Skate (Priority B)

Table 15. Number, biomass, minimum and maximum size of specimens captured, by state and region, for clearnose skate.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05	4	6.886	407	445
NJ	06	9	12.9	313	430
NJ	07	43	88.298	392	468
NJ	08	50	66.634	281	453
DE	09	85	105.155	269	465
MD	10	138	157.256	287	463
VA	11	304	312.046	132	488
VA	12	402	399.984	248	472
VA	13	1,294	1892.369	253	511
NC	14	655	883.59	161	494
NC	15	232	308.968	196	498

Figure 33. Geometric mean catch per area swept by state and overall, with summary catch rates, for clearnose skate.

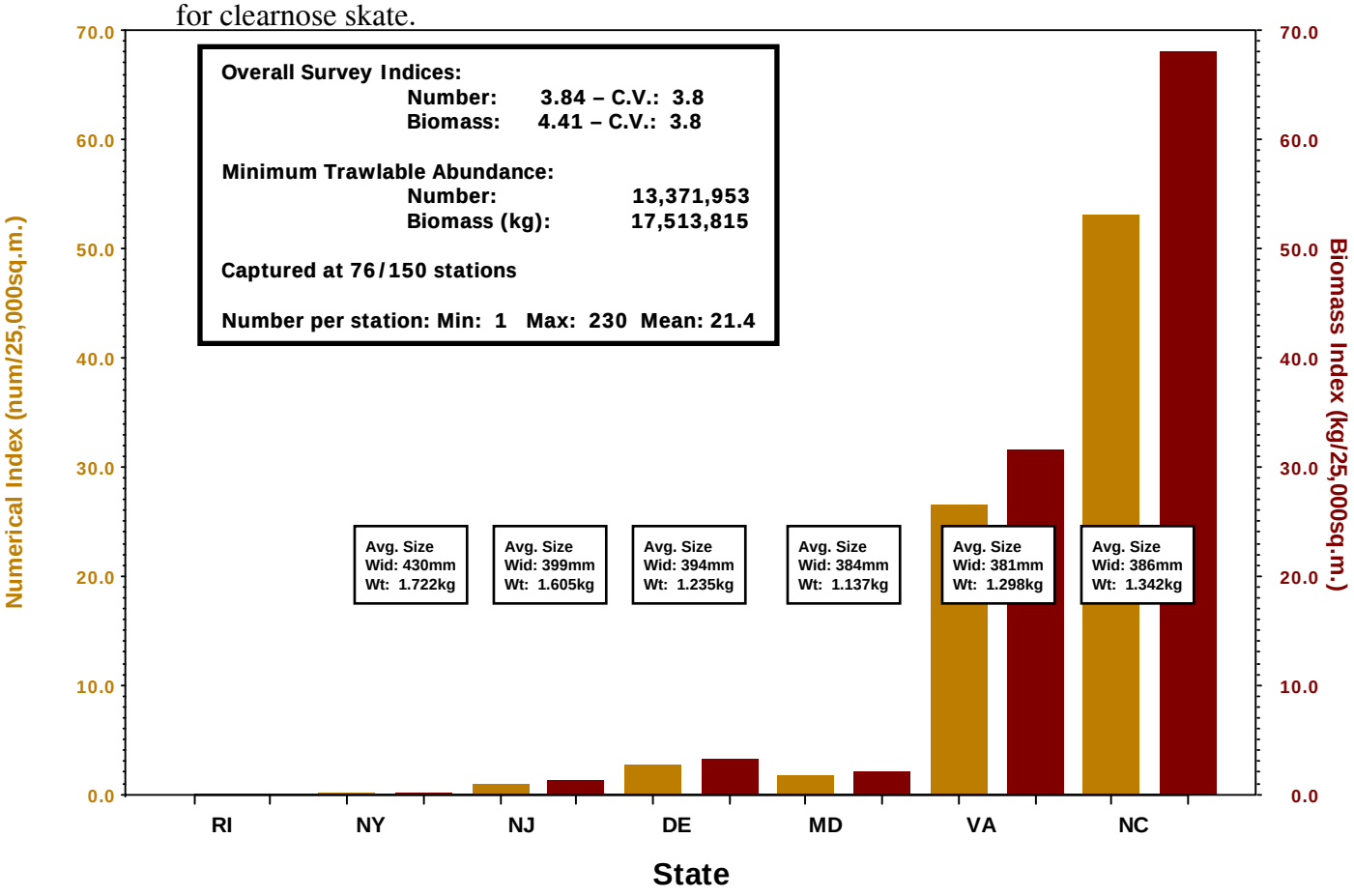


Figure 34. Width frequency histogram for clearnose skate.

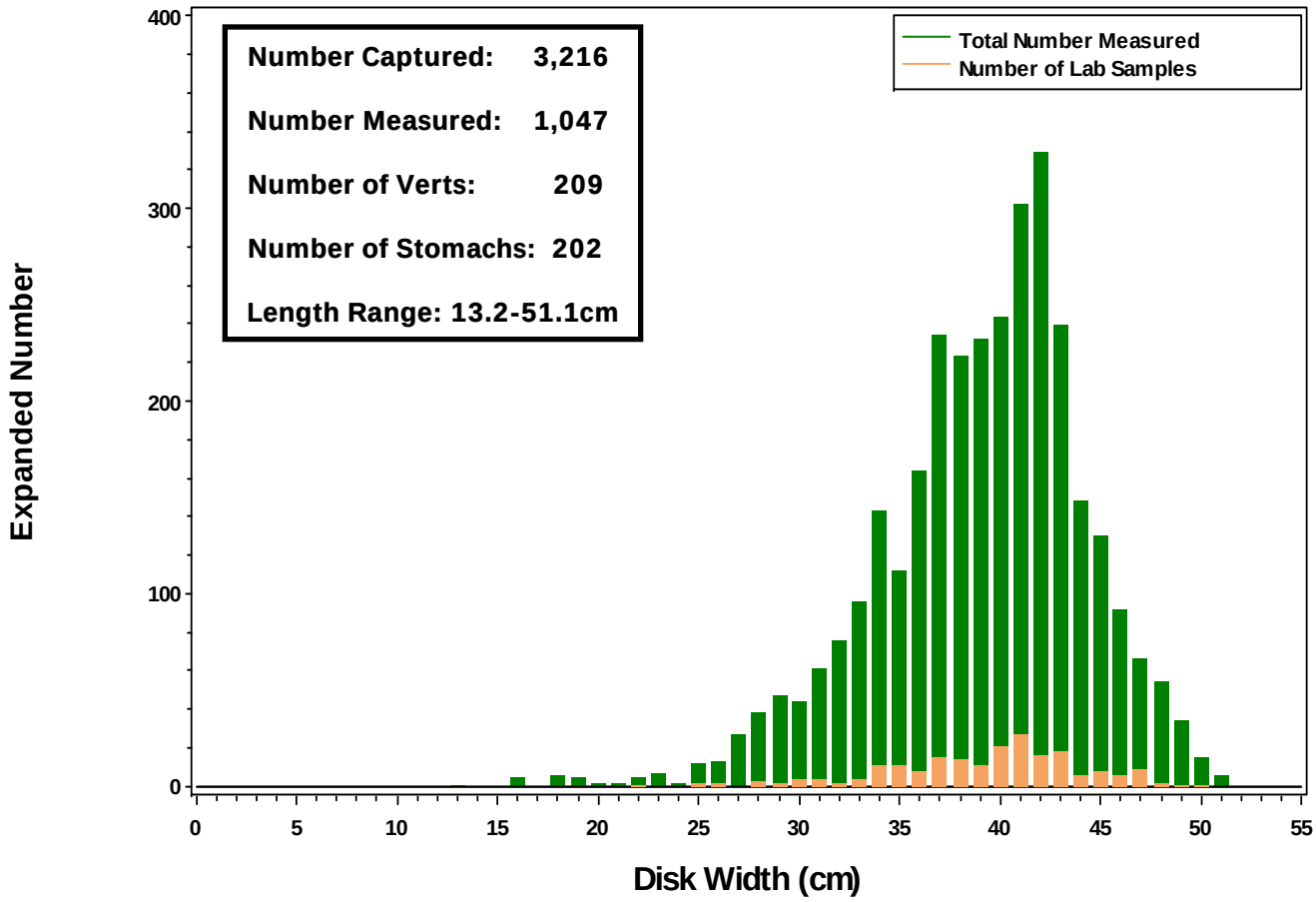
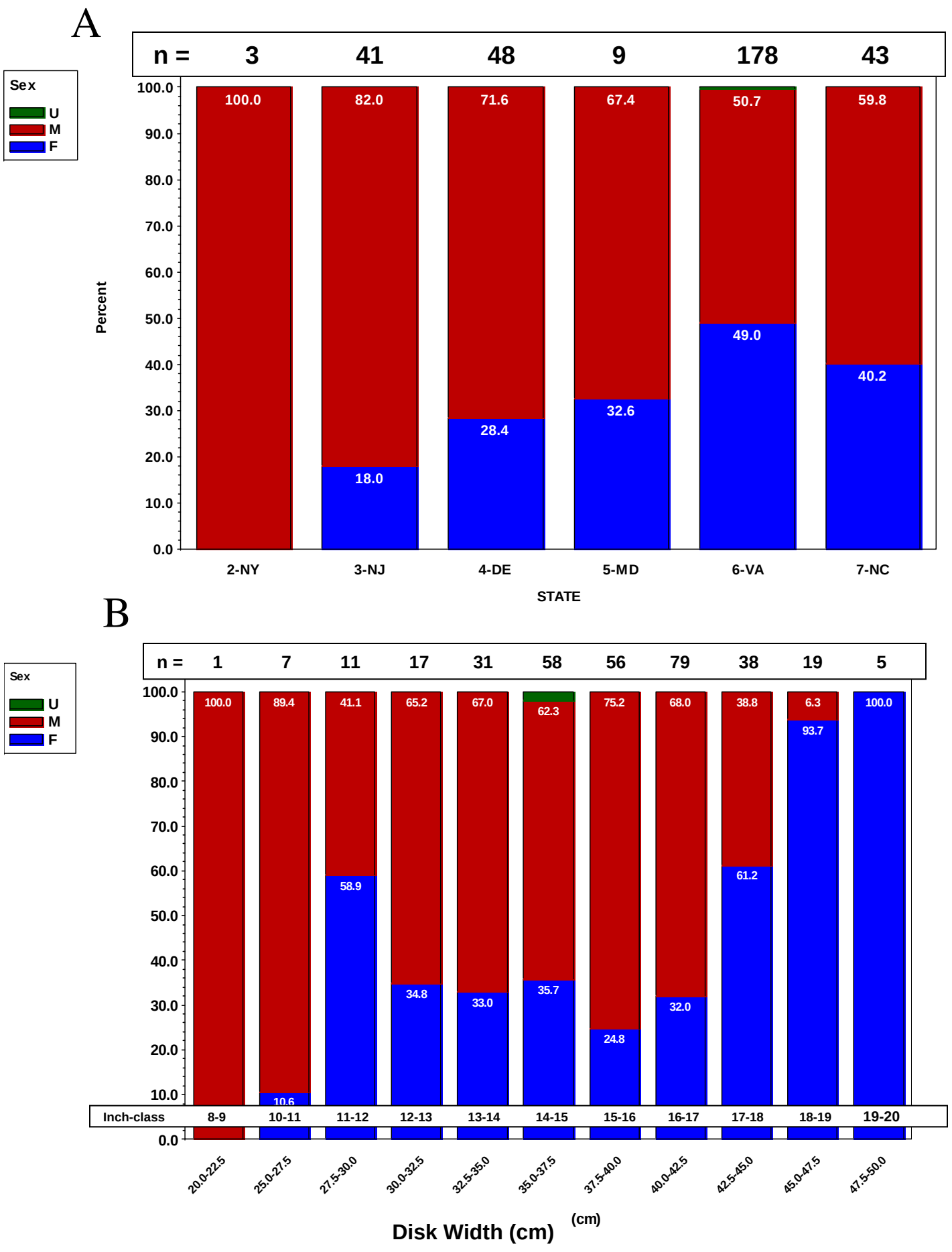


Figure 35. Sex ratios for clearnose skate, by state (A) and width group (B).



Horseshoe Crab (Priority E)

Table 16. Number, biomass, minimum and maximum size of specimens captured, by state and region, for horseshoe crab.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03	7	9.362	146	301
NY	04	16	22.029	159	276
NY	05	18	28.04	117	323
NJ	06	1	3.35	297	297
NJ	07	51	70.81	165	293
NJ	08	89	126.746	112	323
DE	09	385	443.901	99	323
MD	10	307	226.644	83	293
VA	11	195	160.525	106	308
VA	12	60	62.804	121	327
VA	13	24	36.451	156	308
NC	14	28	23.547	144	267
NC	15	20	15.356	139	215

Figure 36. Geometric mean catch per area swept by state and overall, with summary catch rates, for horseshoe crab.

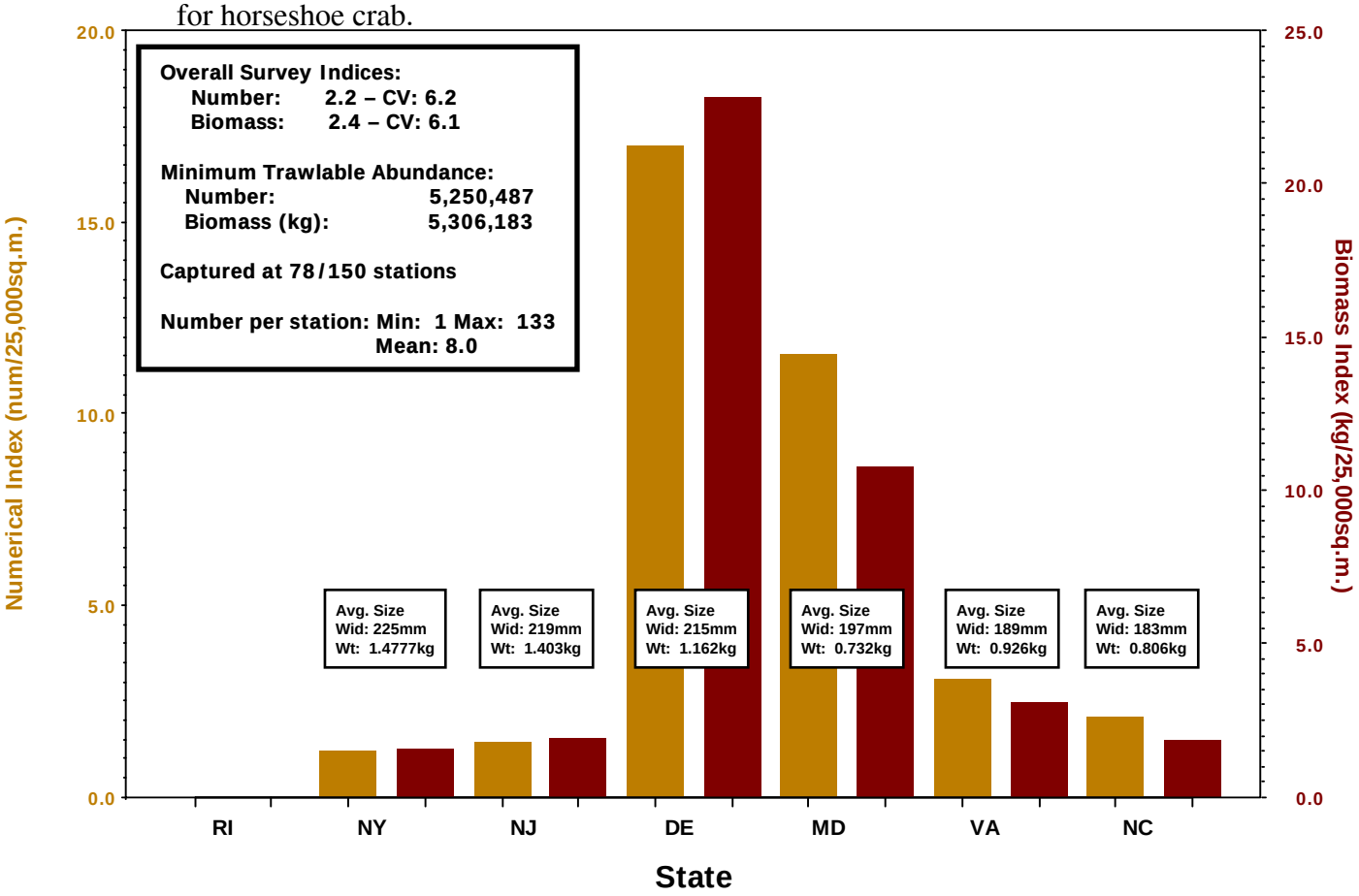


Figure 37. Width frequency histogram for horseshoe crab.

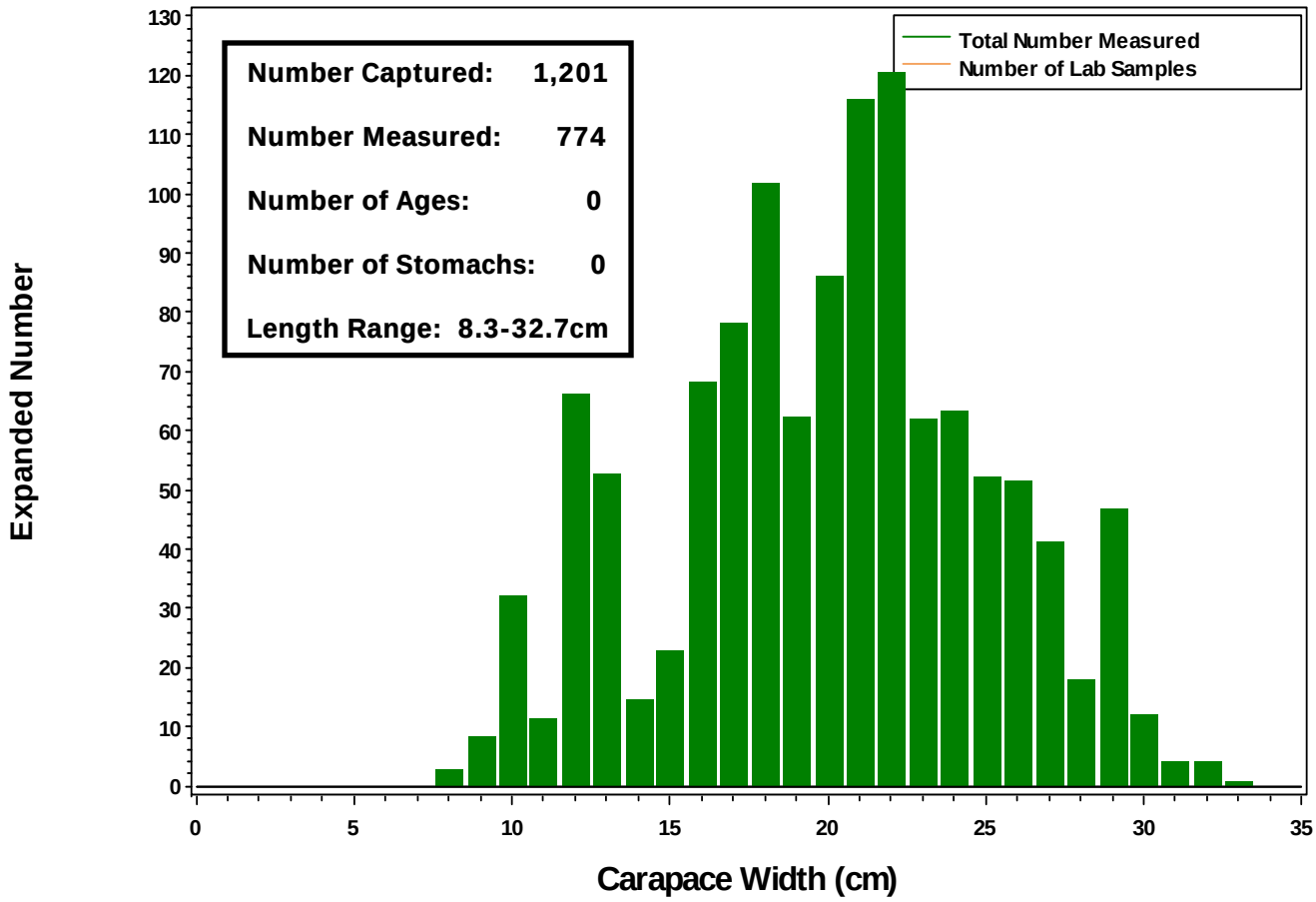
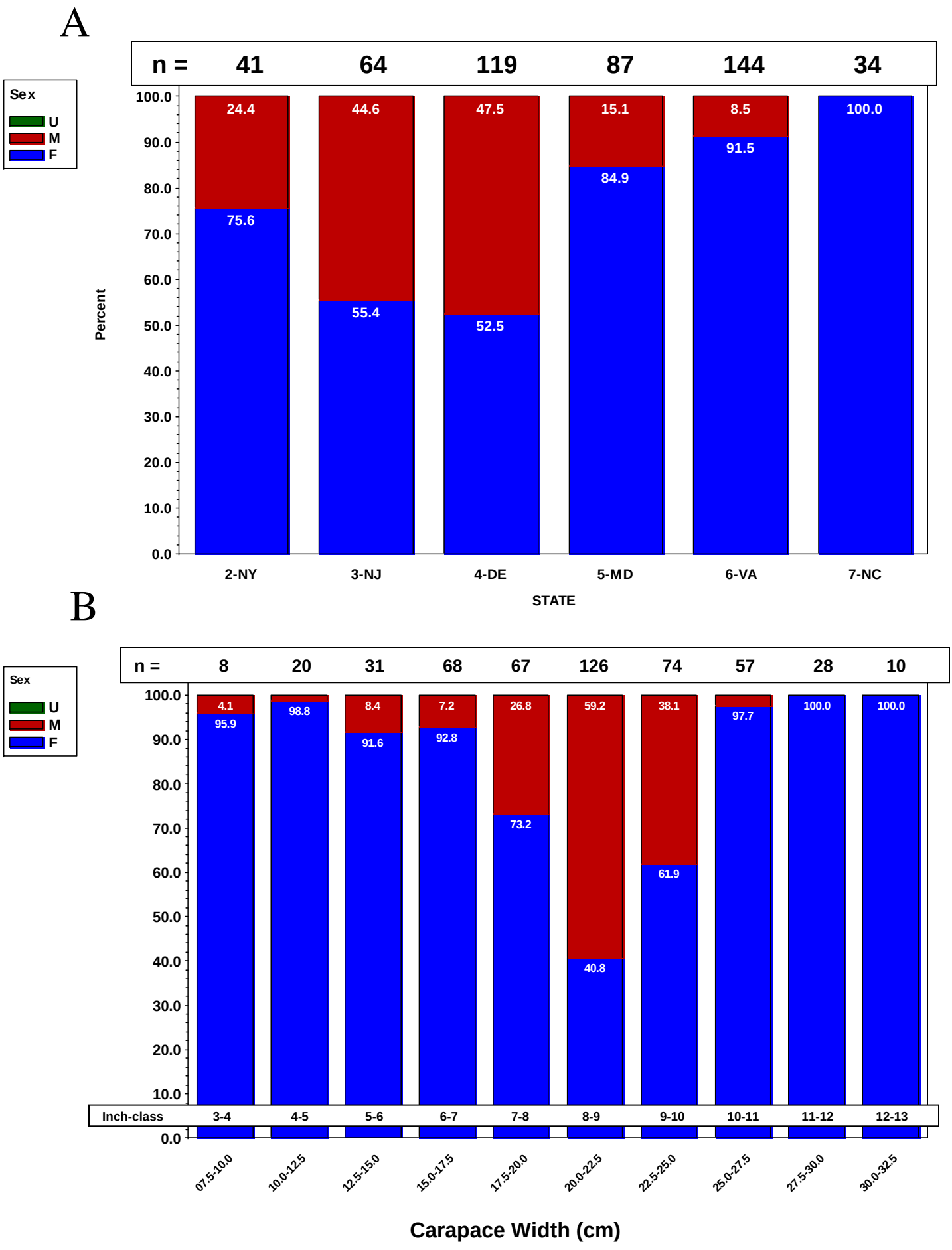


Figure 38. Sex ratios for horseshoe crab, by state (A) and width group (B).



Kingfish spp. (Priority D)

Table 17. Number, biomass, minimum and maximum size of specimens captured, by state and region, for kingfish.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04	1	0.155	265	265
NY	05	1	0.246	264	264
NJ	06	100	17.89	221	302
NJ	07	25	4.227	217	326
NJ	08	12	2.361	233	295
DE	09	8	2.037	239	344
MD	10	55	10.35	242	315
VA	11	91	16.668	176	347
VA	12	80	12.648	200	323
VA	13	183	31.421	119	305
NC	14	4,955	507.957	80	296
NC	15	1,127	93.875	99	294

Figure 39. Geometric mean catch per area swept by state and overall, with summary catch rates, for kingfish.

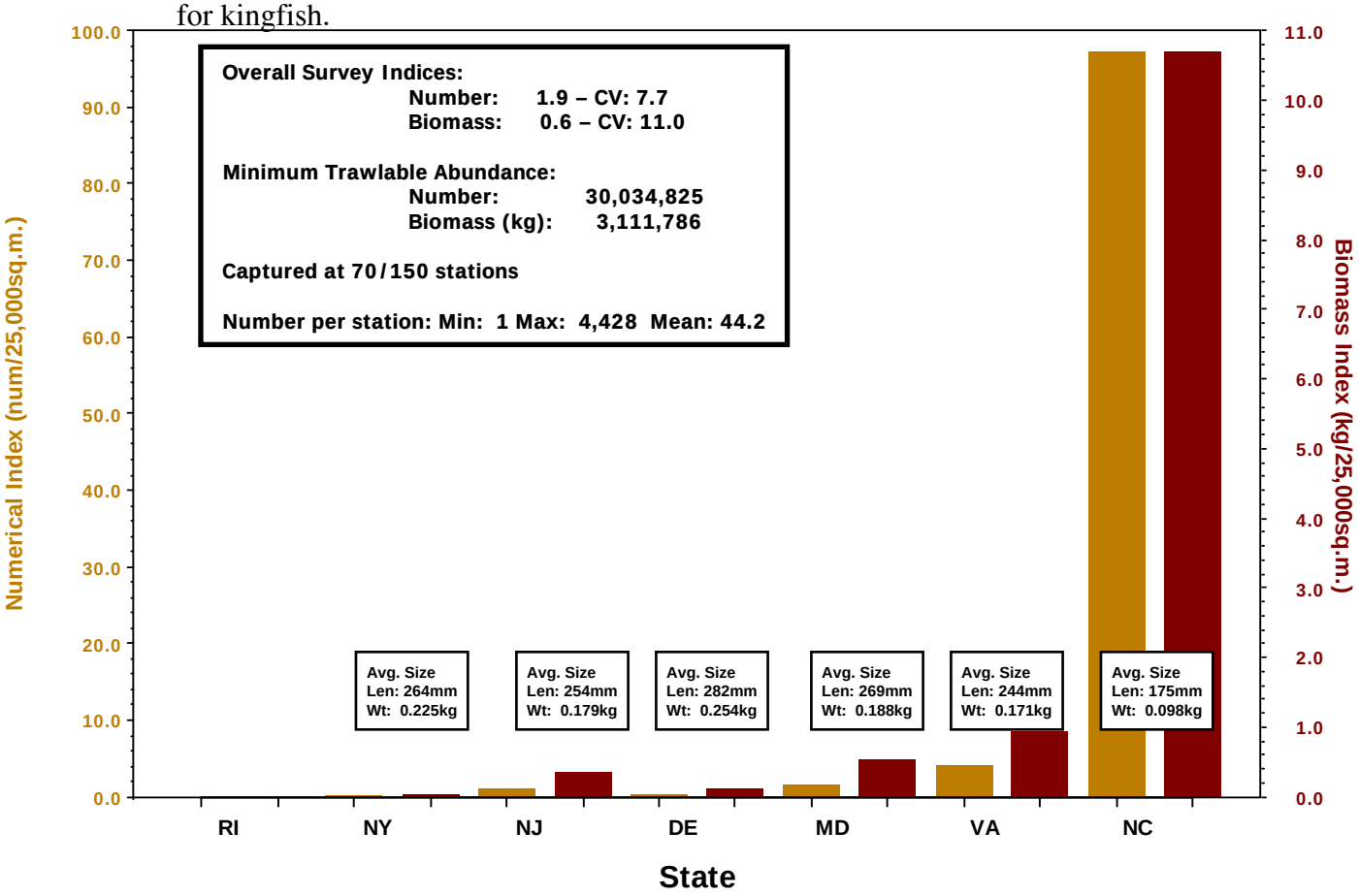
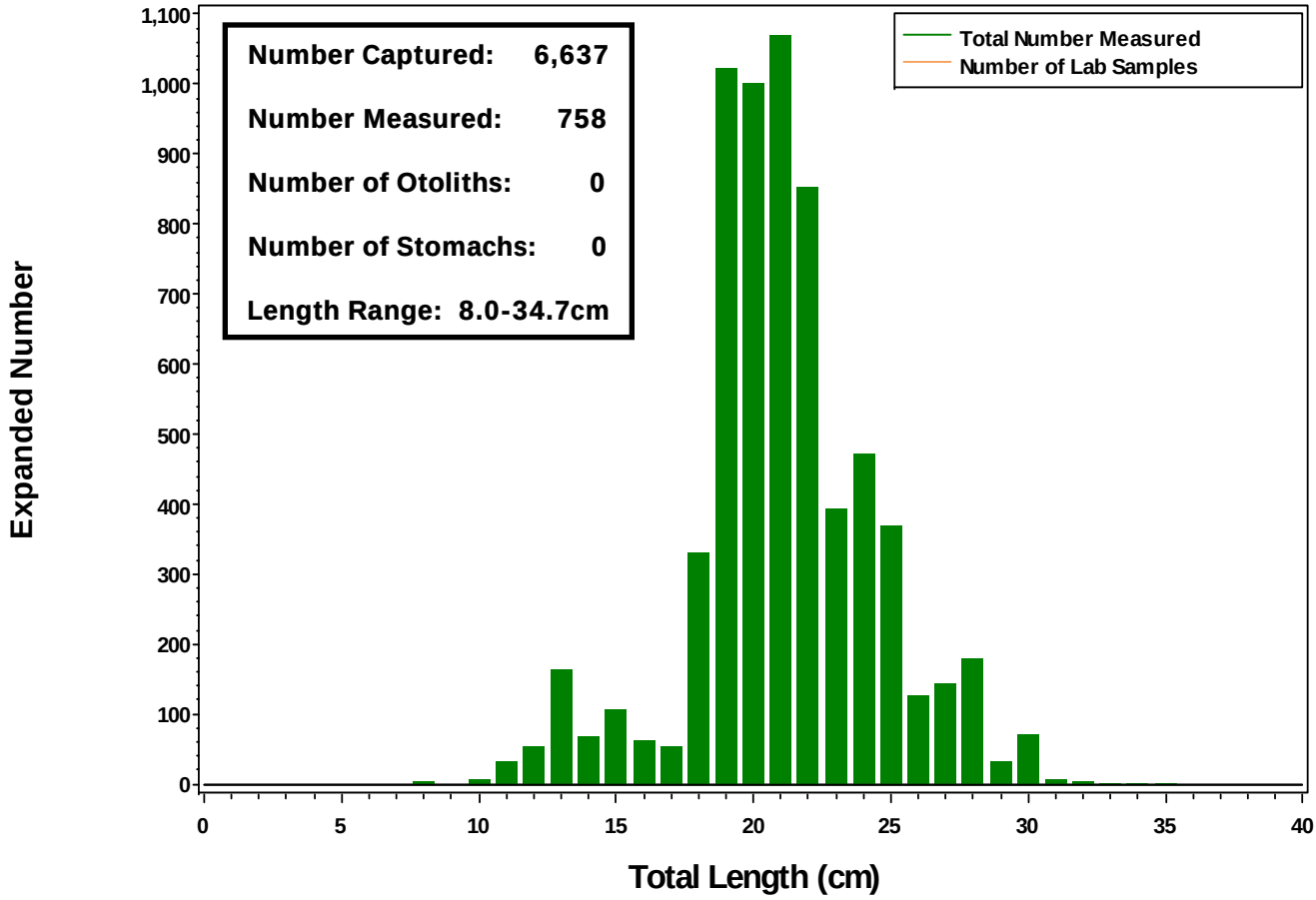


Figure 40. Length frequency histogram for kingfish.



Little Skate
(Priority B)

Table 18. Number, biomass, minimum and maximum size of specimens captured, by state and region, for little skate.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	2,304	1471.594	163	524
RI	BI	1,009	621.192	124	295
NY	01	62	29.347	197	513
NY	02	230	147.319	180	512
NY	03	2,442	1310.858	193	293
NY	04	609	326.495	154	284
NY	05	281	163.351	184	303
NJ	06	470	291.461	173	296
NJ	07	1,321	773.03	185	299
NJ	08	543	364.417	176	473
DE	09	284	165.218	179	309
MD	10	172	109.084	202	305
VA	11	134	81.05	221	302
VA	12	12	12.056	252	432
VA	13	3	1.94	266	295
NC	14				
NC	15				

Figure 41. Geometric mean catch per area swept by state and overall, with summary catch rates, for little skate.

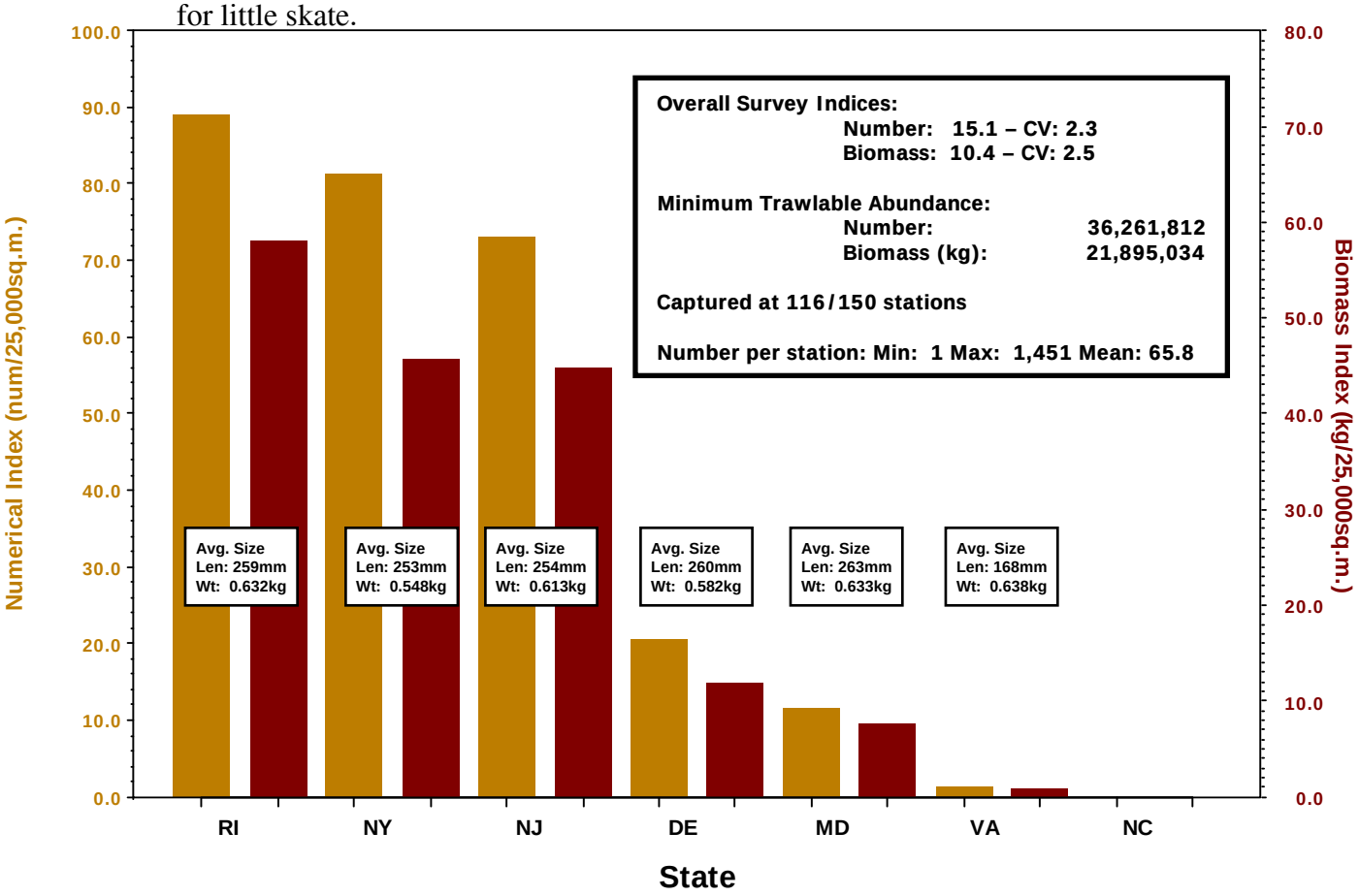


Figure 42. Width frequency histogram for little skate.

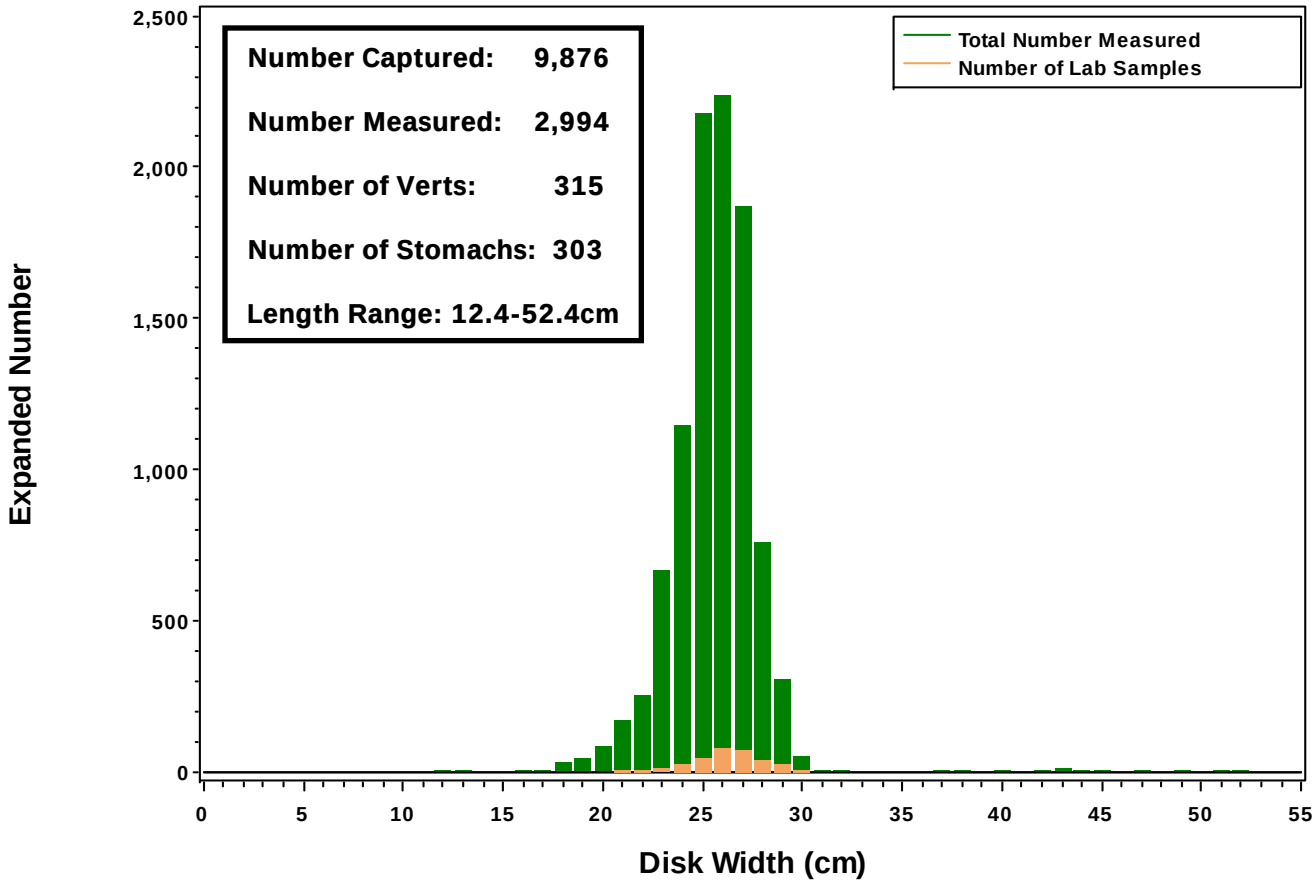
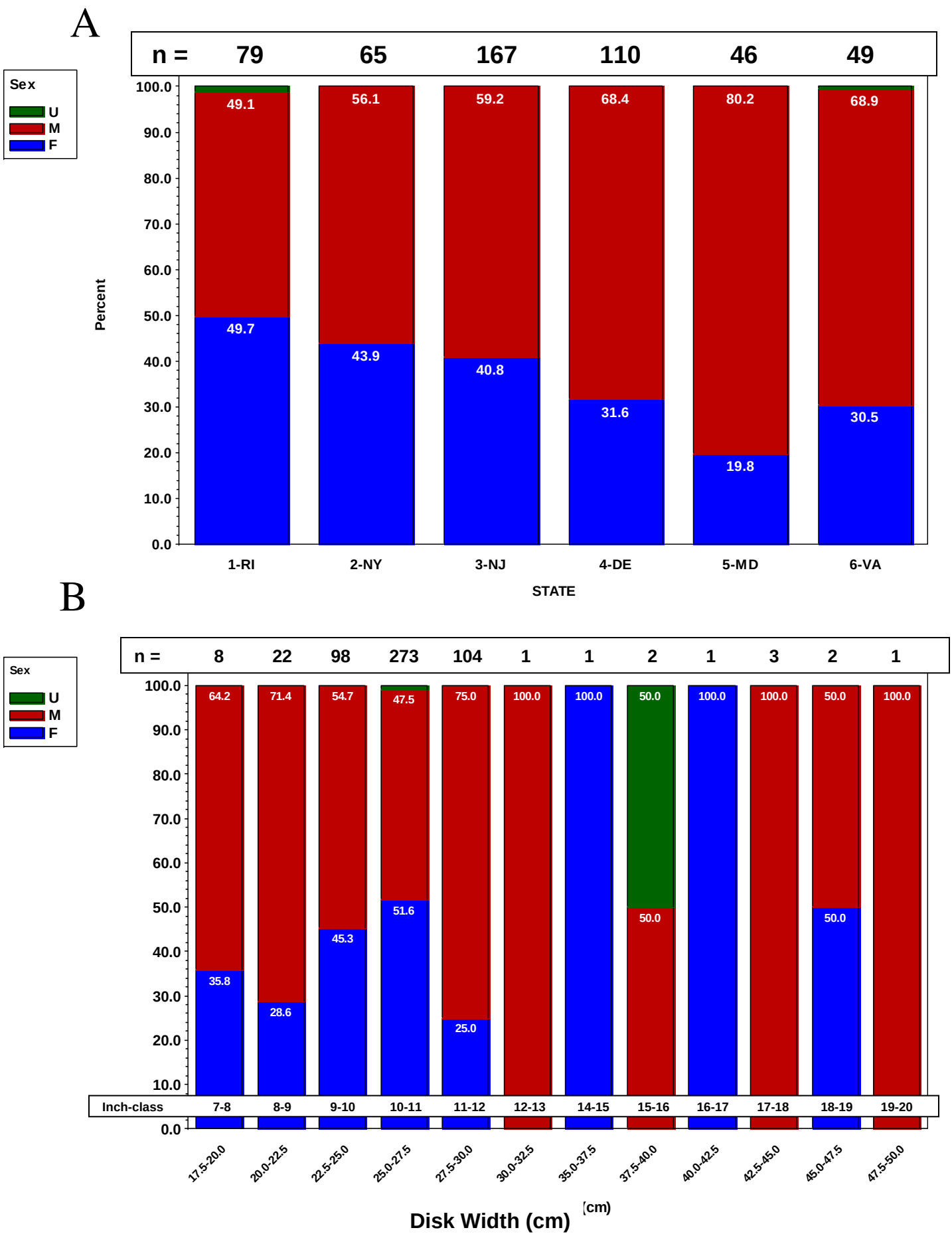


Figure 43. Sex ratios for little skate, by state (A) and width group (B).



Loligo Squid (Priority E)

Table 19. Number, biomass, minimum and maximum size of specimens captured, by state and region, for Loligo squid.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	966	76.158	34	282
RI	BI	702	38.793	25	235
NY	01	847	8.425	22	243
NY	02	1,179	9.671	19	242
NY	03	2,449	40.487	25	233
NY	04	1,279	64.72	24	265
NY	05	604	18.155	28	249
NJ	06	1,386	36.378	20	226
NJ	07	1,908	55.64	11	254
NJ	08	1,794	112.226	20	277
DE	09	2,525	172.436	27	256
MD	10	1,359	74.841	28	281
VA	11	353	8.814	27	209
VA	12	826	17.1	28	225
VA	13	1,123	35.83	23	224
NC	14	235	6.326	41	169
NC	15	14	0.166	40	91

Figure 44. Geometric mean catch per area swept by state and overall, with summary catch rates, for Loligo squid.

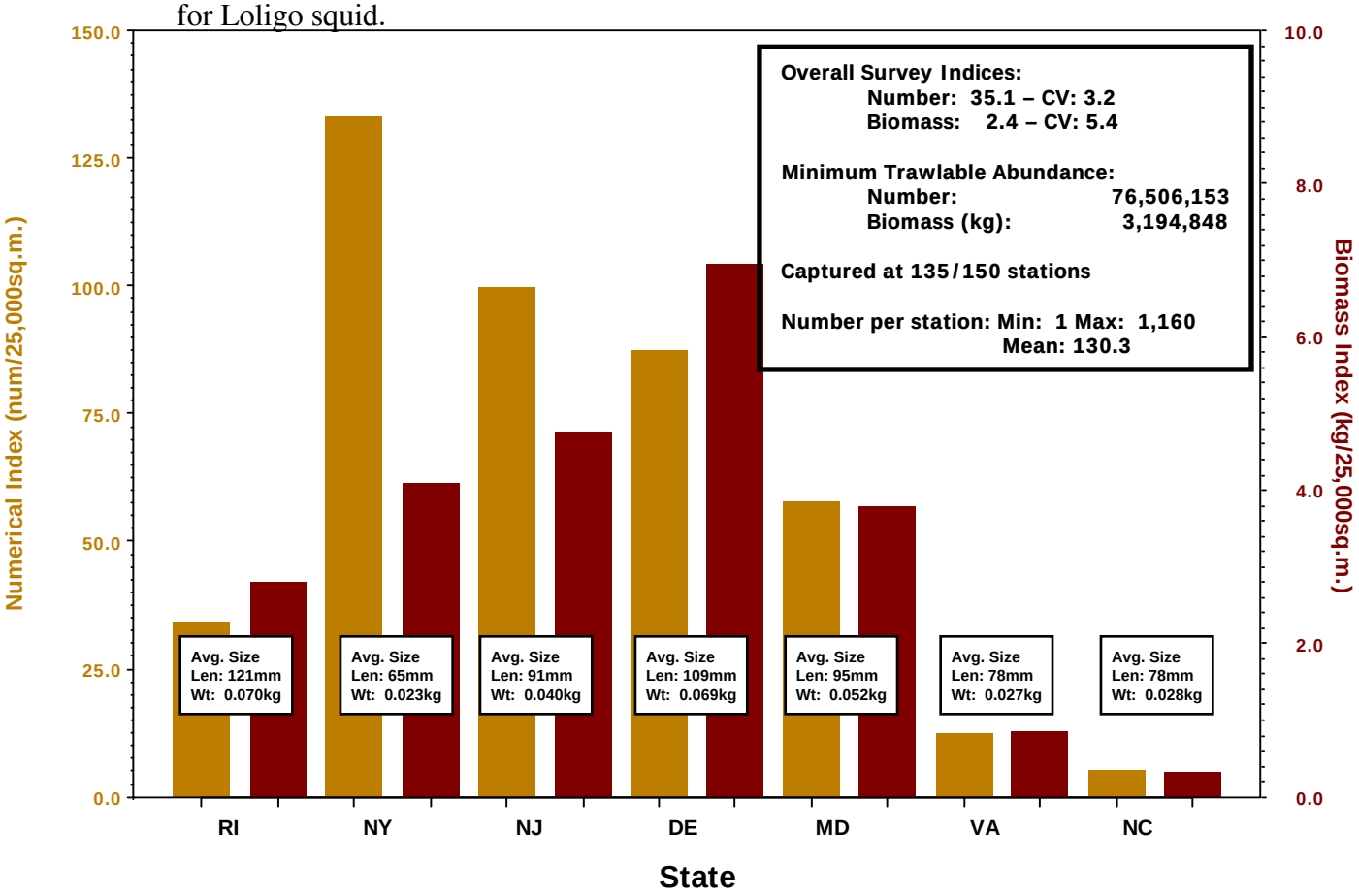
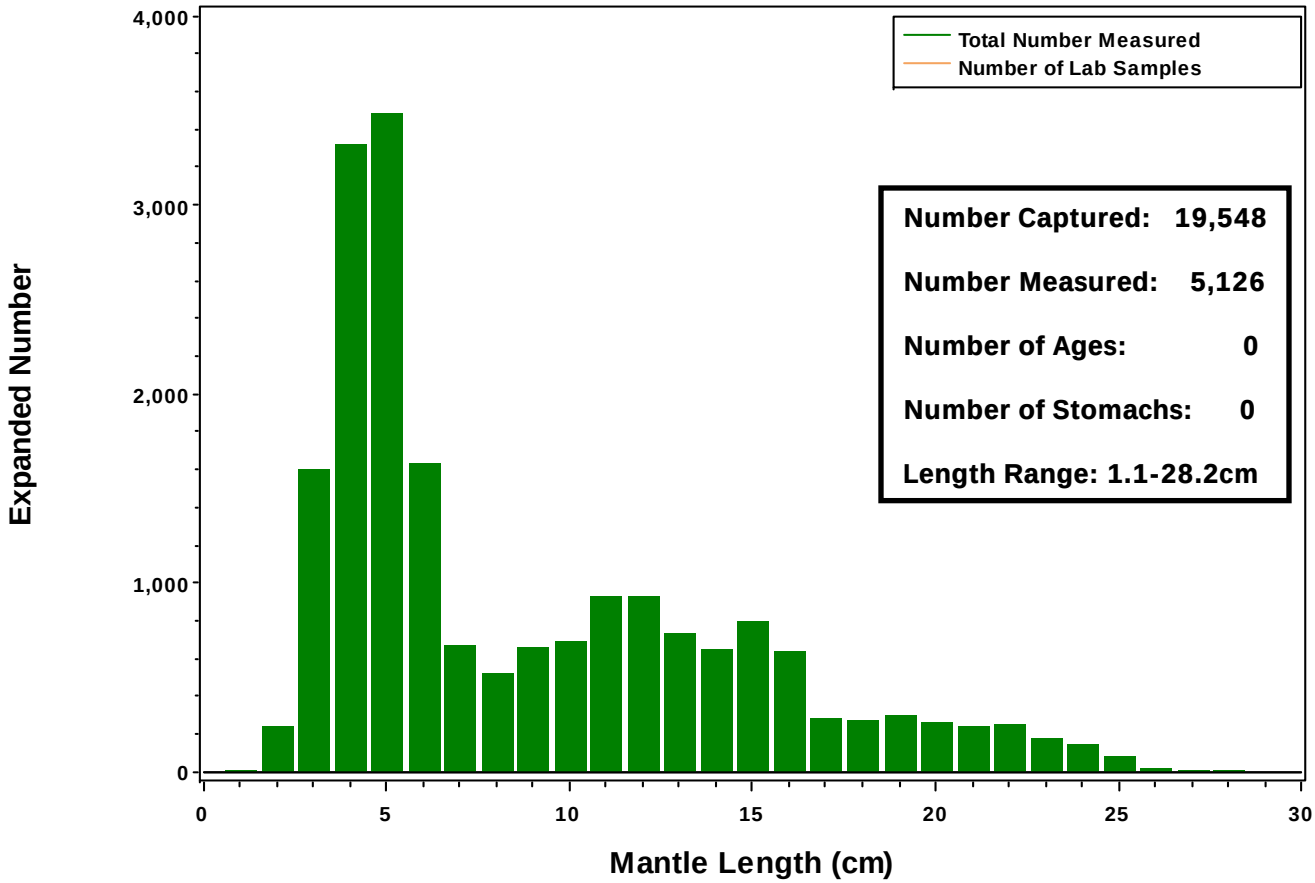


Figure 45. Length frequency histogram for Loligo squid.



Red Hake
(Priority D)

Table 20. Number, biomass, minimum and maximum size of specimens captured, by state and region, for red hake.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	1,169	151.784	106	446
RI	BI	89	6	116	409
NY	01	1	0.02	47	47
NY	02	1	0.01	102	102
NY	03	2	0.616	321	362
NY	04				
NY	05				
NJ	06				
NJ	07	66	3.526	133	245
NJ	08	23	1.21	129	239
DE	09	25	1.03	118	237
MD	10	75	3.604	108	242
VA	11	9	0.329	141	217
VA	12	4	0.25	148	238
VA	13				
NC	14				
NC	15				

Figure 46. Geometric mean catch per area swept by state and overall, with summary catch rates, for red hake.

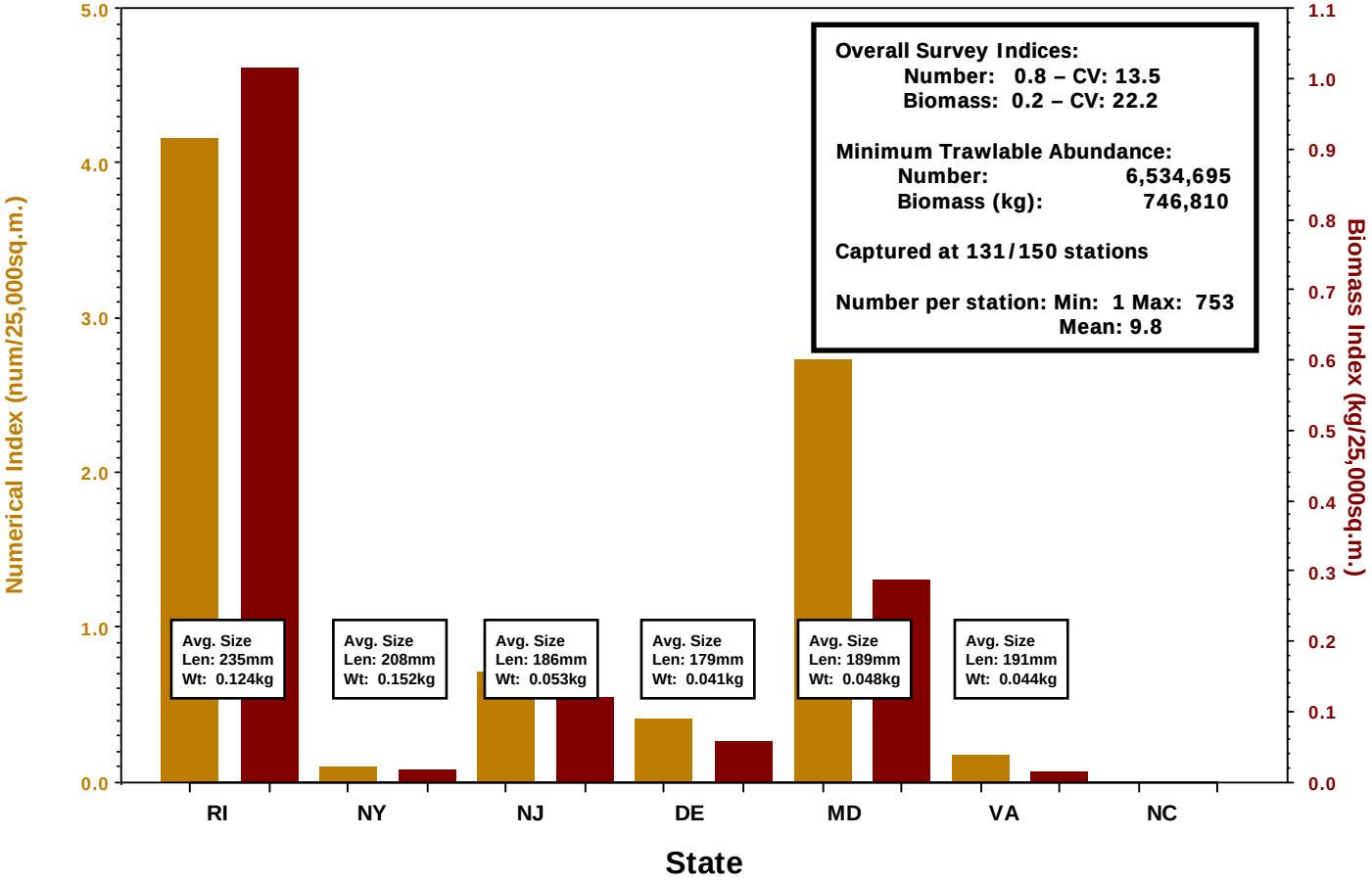
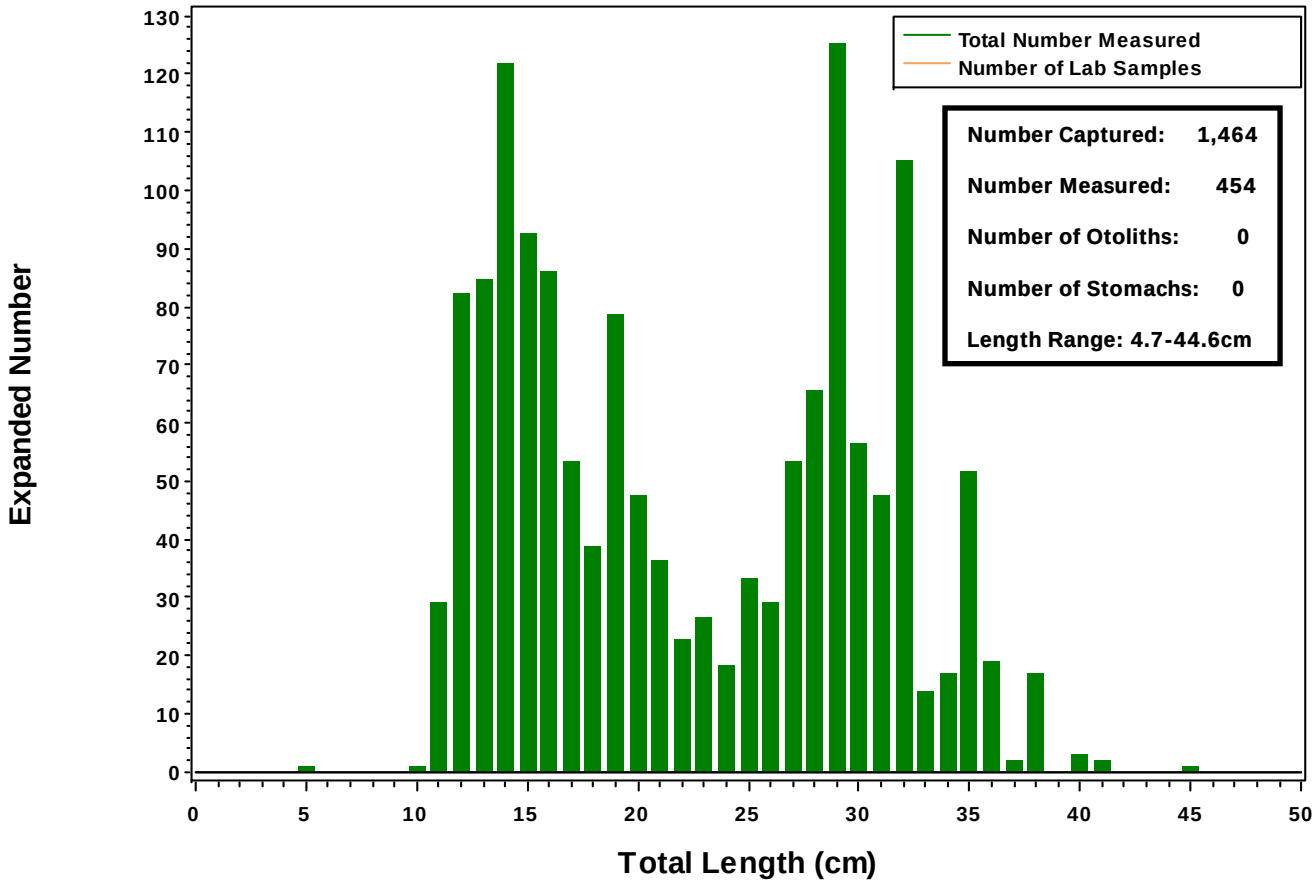


Figure 47. Length frequency histogram for red hake.



Scup
(Priority A)

Table 21. Number, biomass, minimum and maximum size of specimens captured, by state and region, for scup.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	2,117	343.712	103	350
RI	BI	958	140.9099	98	372
NY	01	28	6.52	74	330
NY	02	672	42.016	73	286
NY	03	470	69.998	80	349
NY	04	267	14.266	68	284
NY	05	191	6.629	76	276
NJ	06	27,140	388.396	54	200
NJ	07	8,190	102.263	55	198
NJ	08	5,965	76.855	39	254
DE	09	4,176	46.137	58	175
MD	10	879	9.545	64	129
VA	11	61	1.088	65	125
VA	12	186	2.993	63	124
VA	13	322	4.544	31	130
NC	14	3	0.056	91	109
NC	15	4	0.14	110	136

Figure 48. Geometric mean catch per area swept by state and overall, with summary catch rates, for scup.

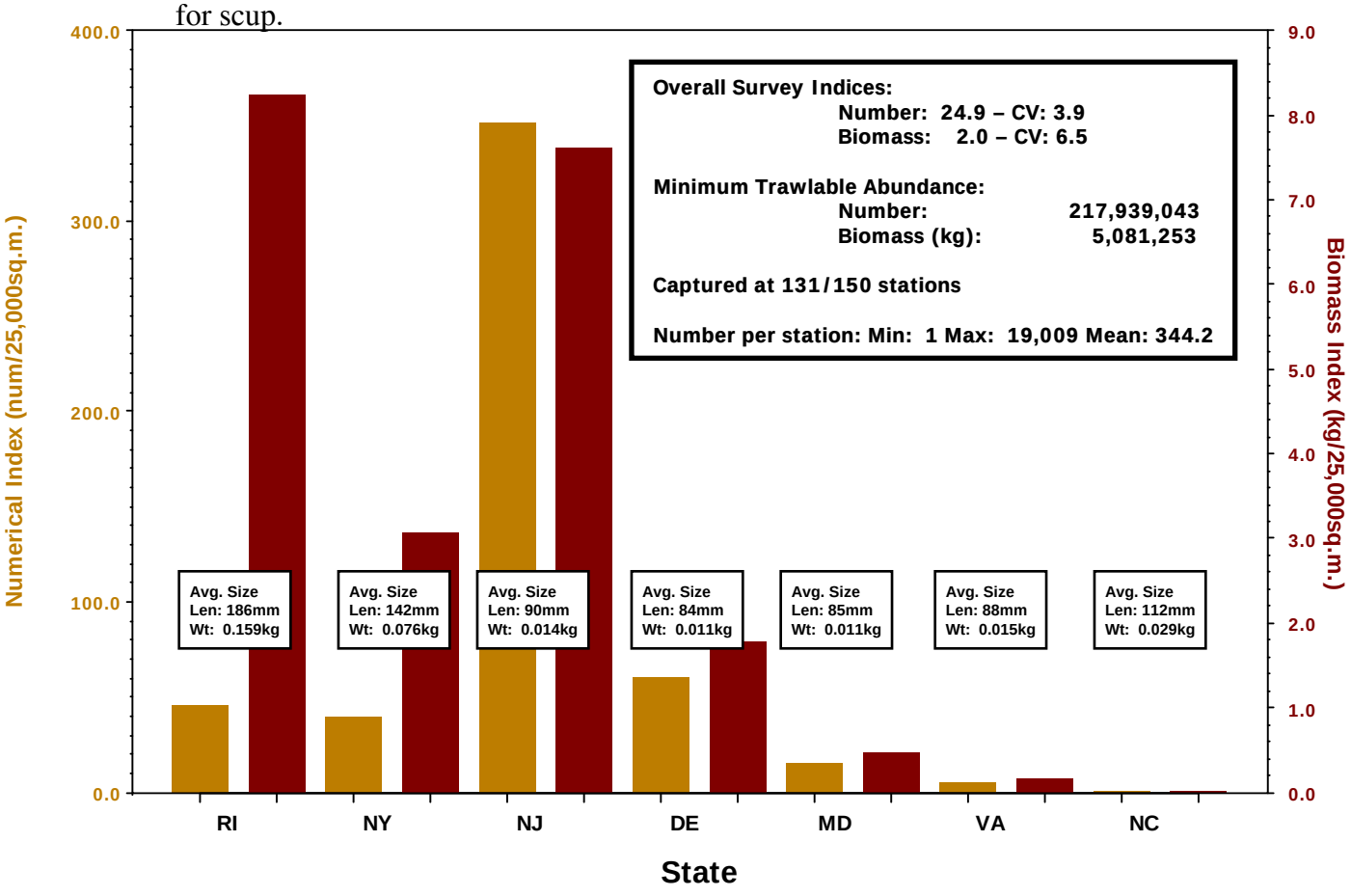


Figure 49. Length frequency histogram for scup (inset presents larger fish on a readable scale).

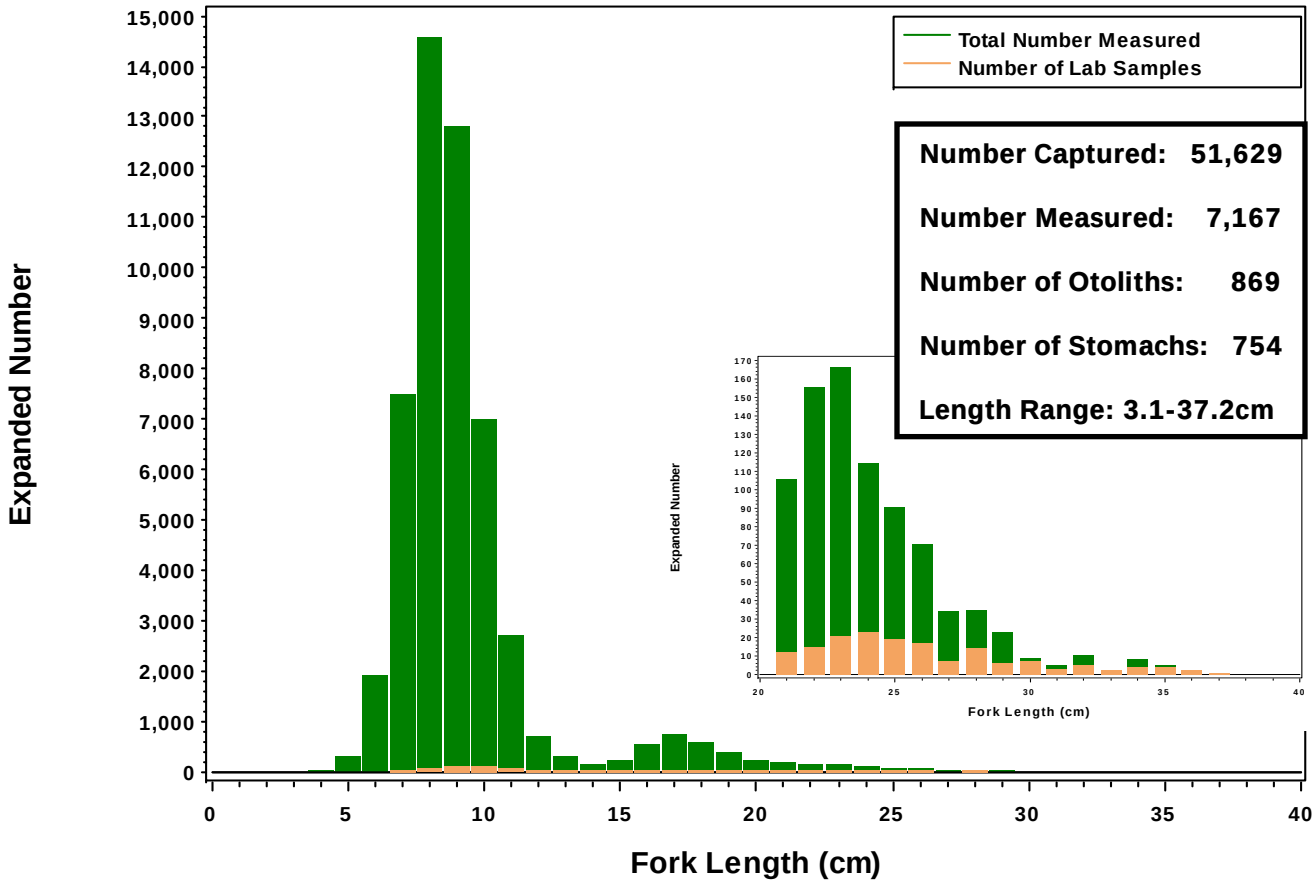
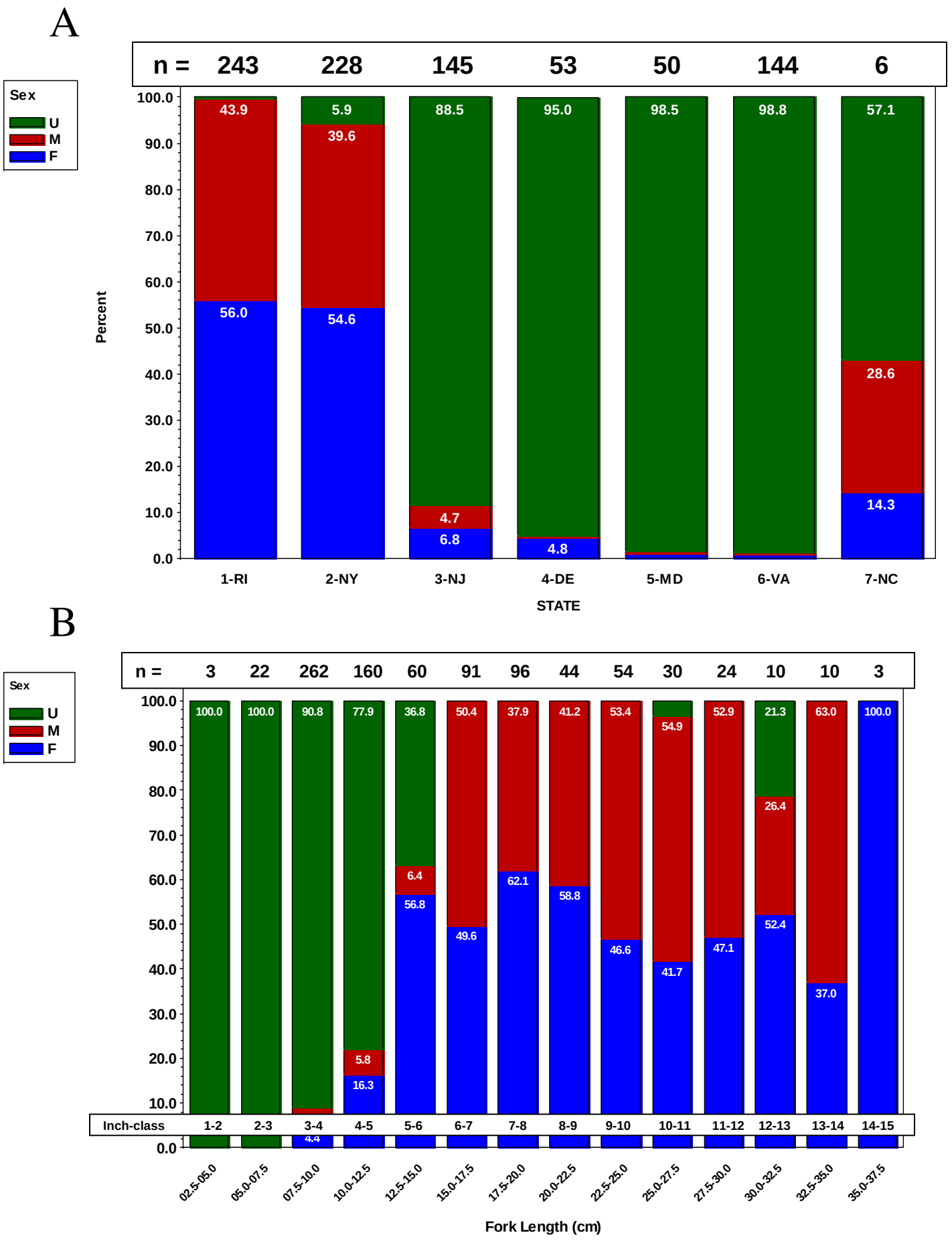


Figure 50. Sex ratios for scup by state (A) and length group (B).



Silver Hake (Whiting) (Priority A)

Table 22. Number, biomass, minimum and maximum size of specimens captured, by state and region, for silver hake.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	20,061	375.57	52	401
RI	BI	7,349	146.553	58	313
NY	01	2	0.015	102	108
NY	02	185	2.114	79	172
NY	03	287	3.067	88	158
NY	04	12	0.2	97	125
NY	05	5	0.06	88	129
NJ	06	89	1.115	61	194
NJ	07	161	2.917	79	190
NJ	08	24	0.583	100	235
DE	09	58	1.452	87	210
MD	10	170	4.908	102	215
VA	11	358	11.056	99	203
VA	12	2	0.152	198	203
VA	13	2	0.052	149	186
NC	14				
NC	15				

Figure 51. Geometric mean catch per area swept by state and overall, with summary catch rates, for silver hake.

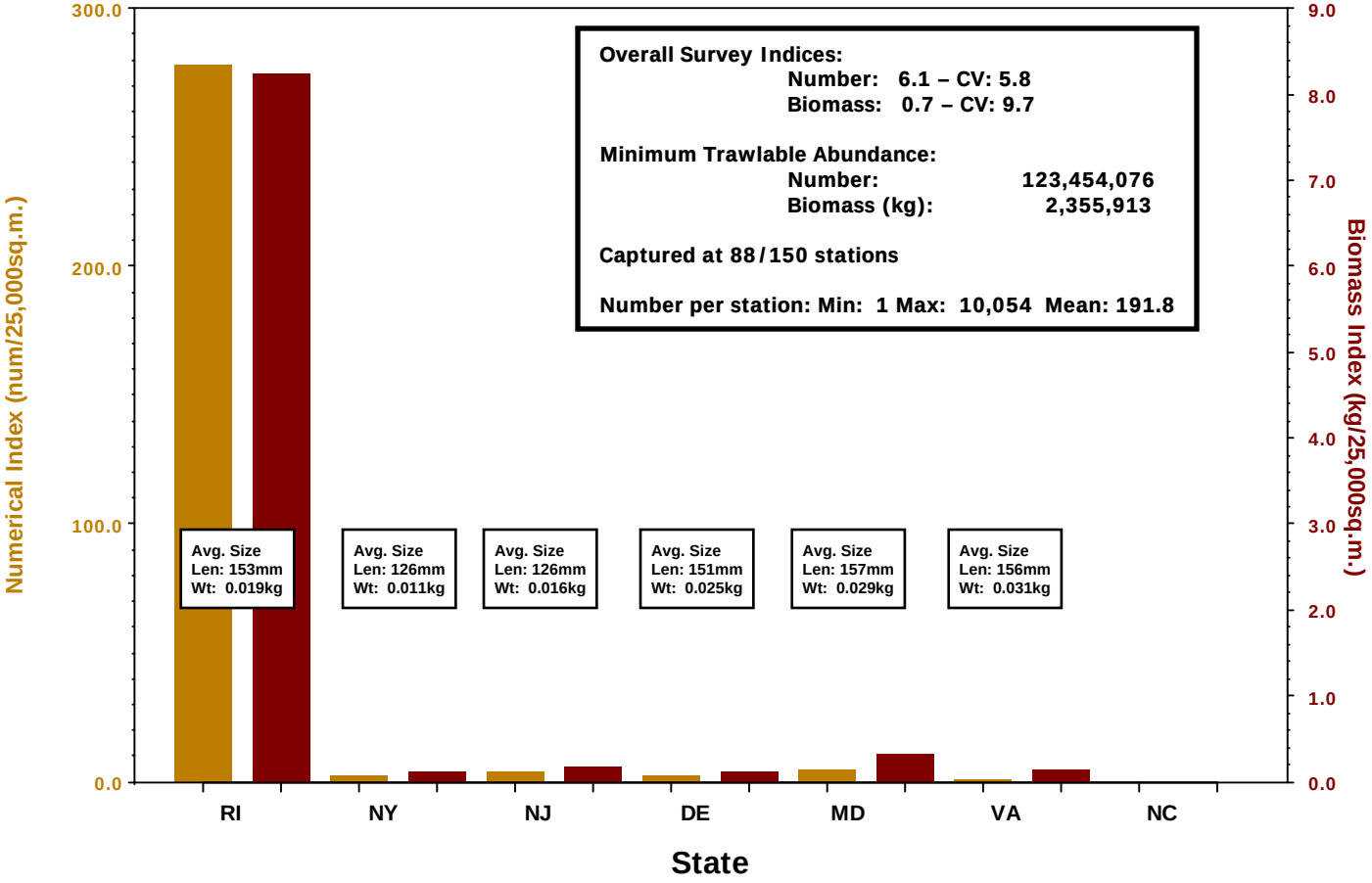


Figure 52. Length frequency histogram for silver hake.

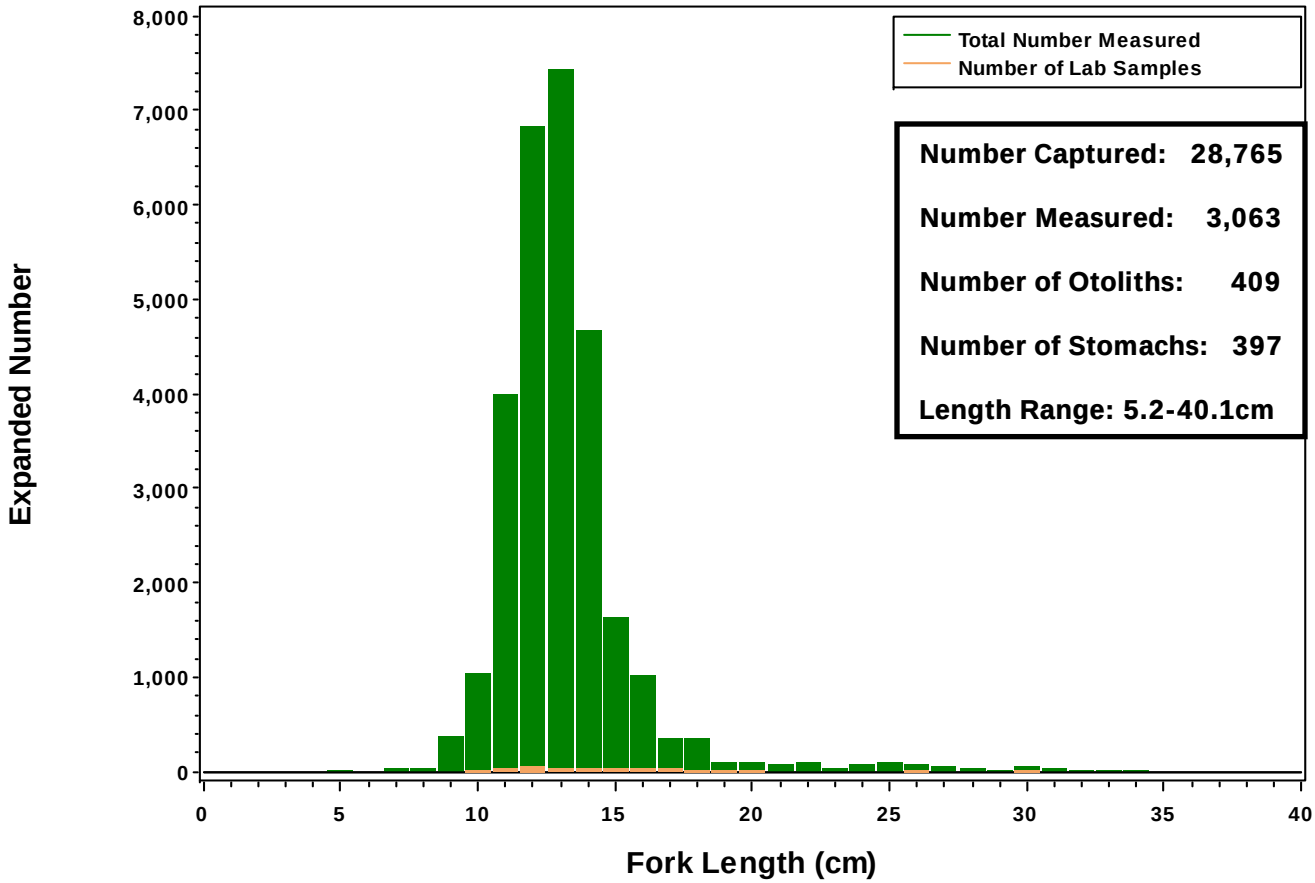
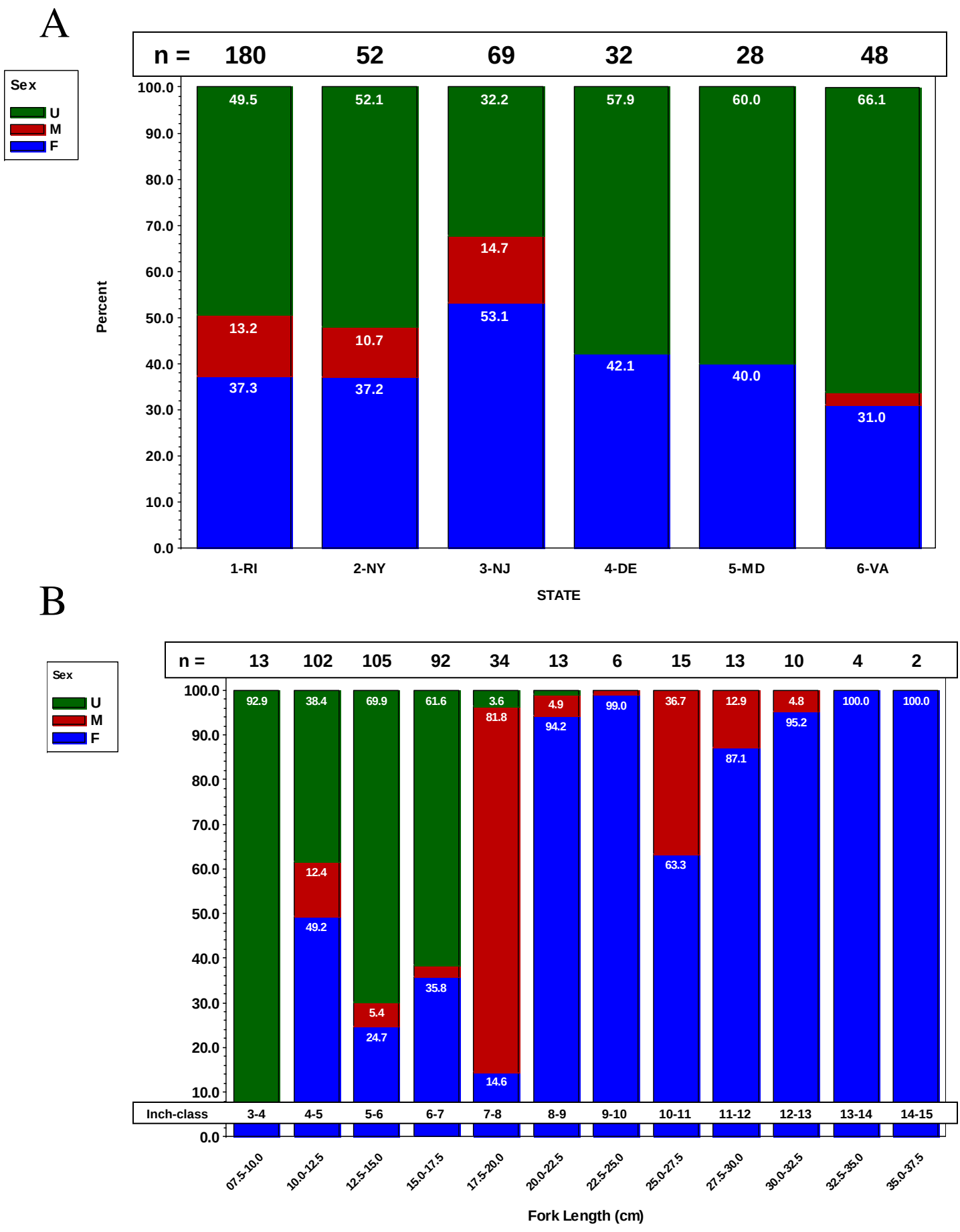


Figure 53. Sex ratios for silver hake by state (A) and length group (B).



Silver Perch
(Priority D)

Table 23. Number, biomass, minimum and maximum size of specimens captured, by state and region, for silver perch.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05				
NJ	06	7	0.525	157	198
NJ	07	1	0.045	143	143
NJ	08	2	0.085	144	158
DE	09	23	1.079	137	185
MD	10	42	1.695	117	177
VA	11	2	0.072	127	157
VA	12				
VA	13	269	11.226	107	203
NC	14	2,295	75.345	95	183
NC	15	22	0.713	100	194

Figure 54. Geometric mean catch per area swept by state and overall, with summary catch rates, for silver perch.

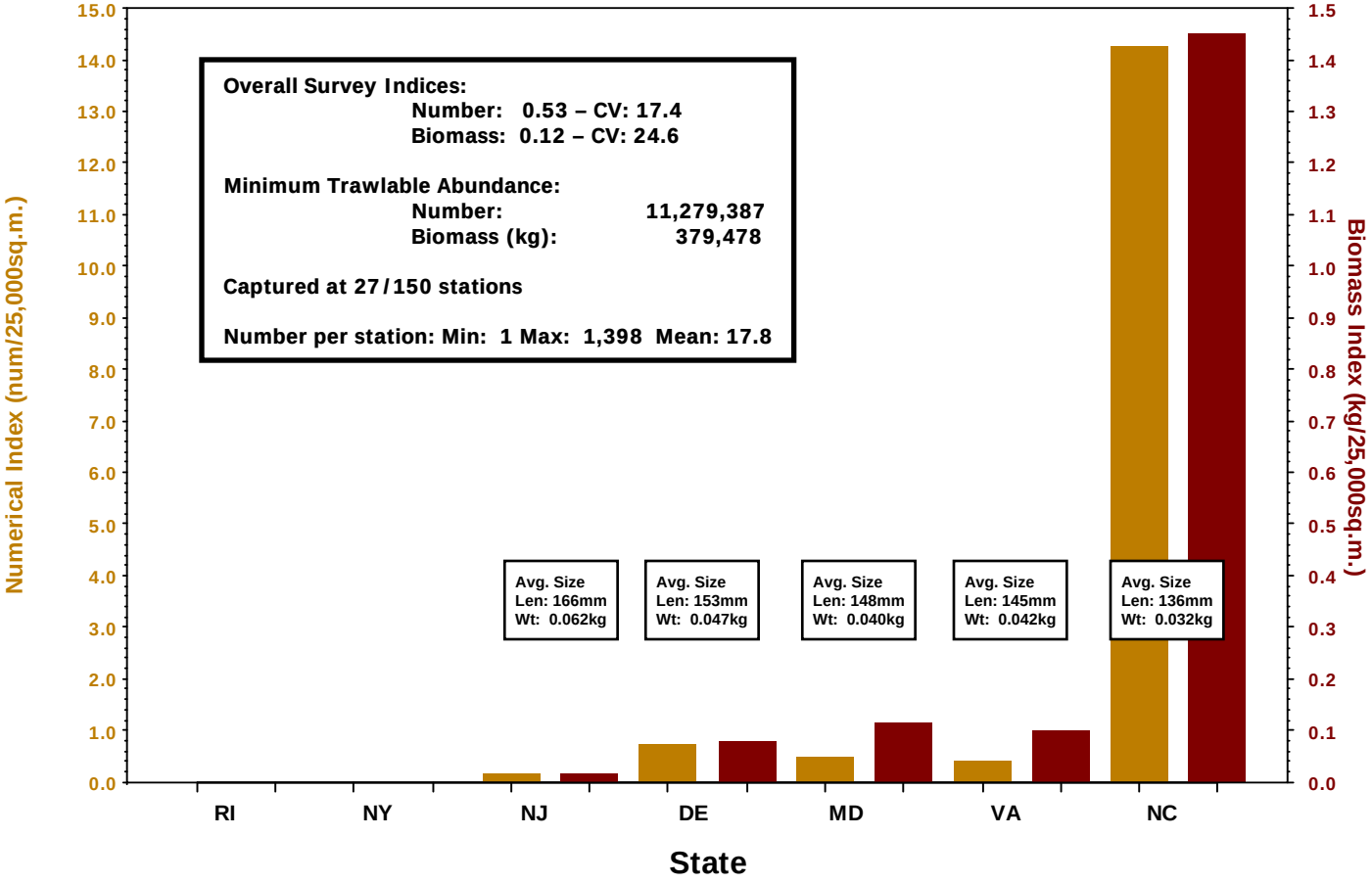
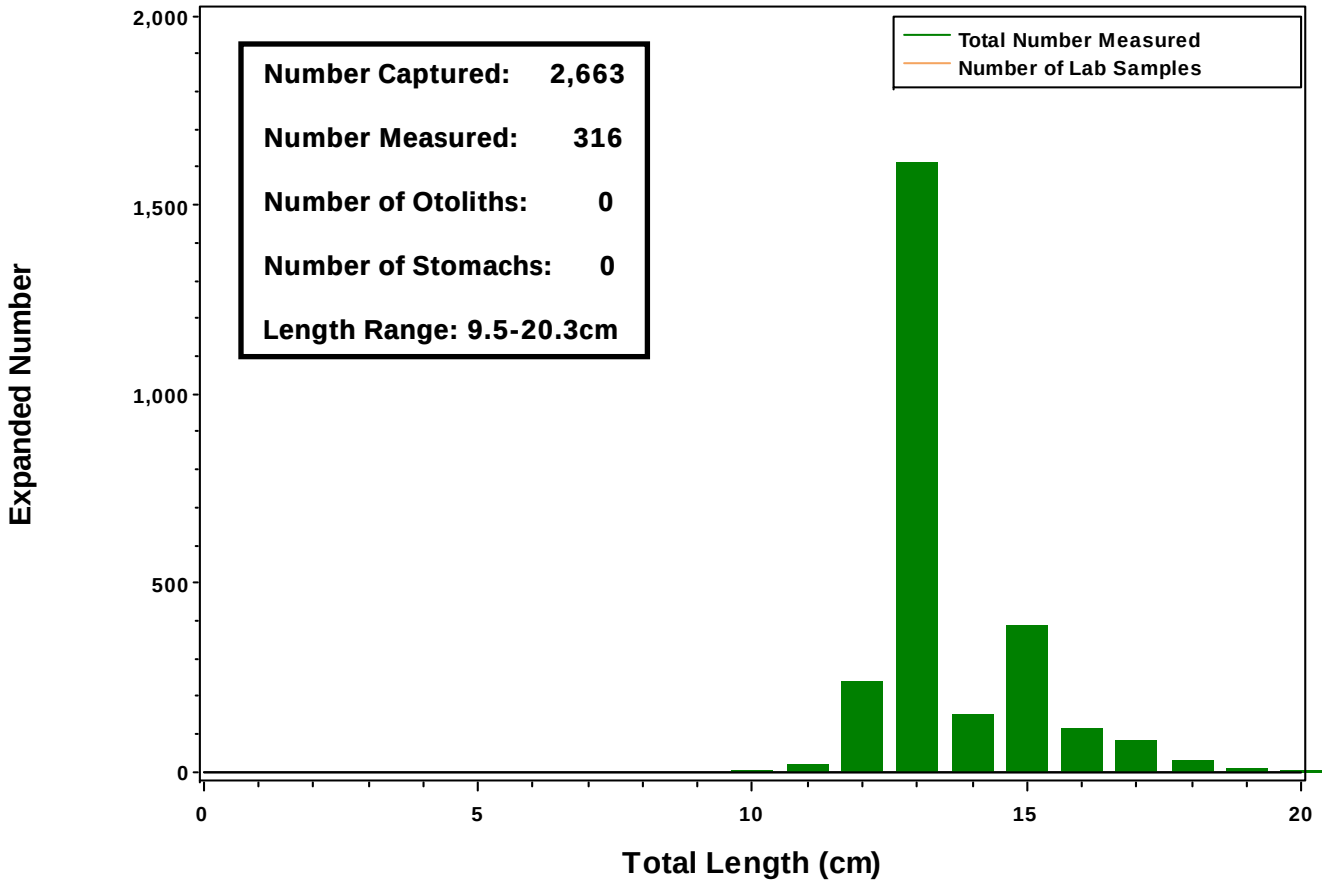


Figure 55. Length frequency histogram for silver perch.



Smooth Dogfish (Priority B)

Table 24. Number, biomass, minimum and maximum size of specimens captured, by state and region, for smooth dogfish.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	14	42.642	690	820
RI	BI	2	4.6	709	723
NY	01	3	7.389	666	761
NY	02	1	2.768	765	765
NY	03	8	22.795	687	793
NY	04	6	18.156	686	860
NY	05	4	13.508	652	788
NJ	06	30	78.52	519	890
NJ	07	79	191.358	450	884
NJ	08	75	206.32	572	900
DE	09	105	291.94	453	870
MD	10	136	373.177	464	900
VA	11	209	585.388	472	1000
VA	12	35	114.268	386	935
VA	13	97	273.61	430	1090
NC	14	104	224.344	421	870
NC	15	19	50.896	468	855

Figure 56. Geometric mean catch per area swept by state and overall, with summary catch rates, for smooth dogfish.

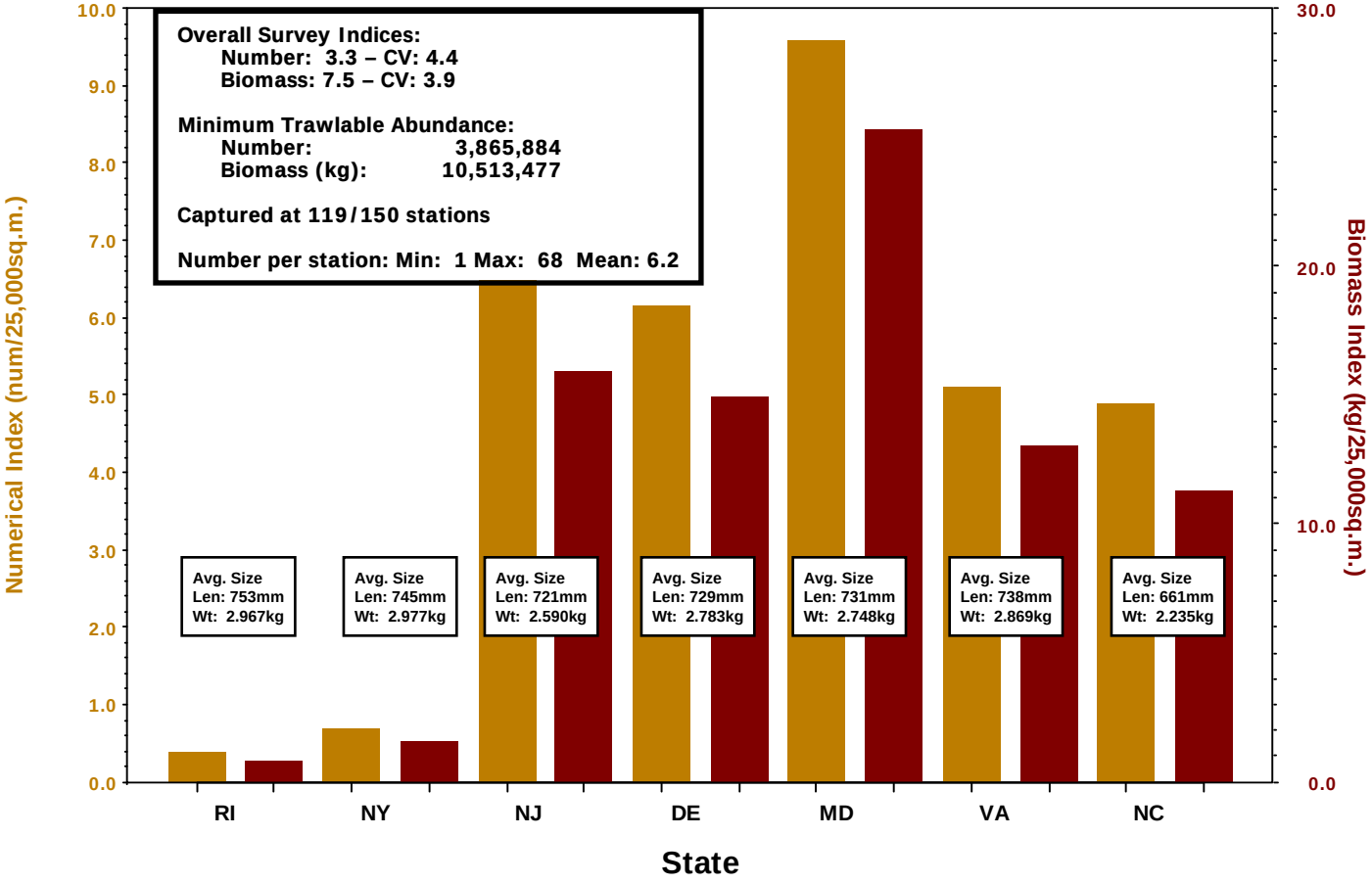


Figure 57. Length frequency histogram for smooth dogfish.

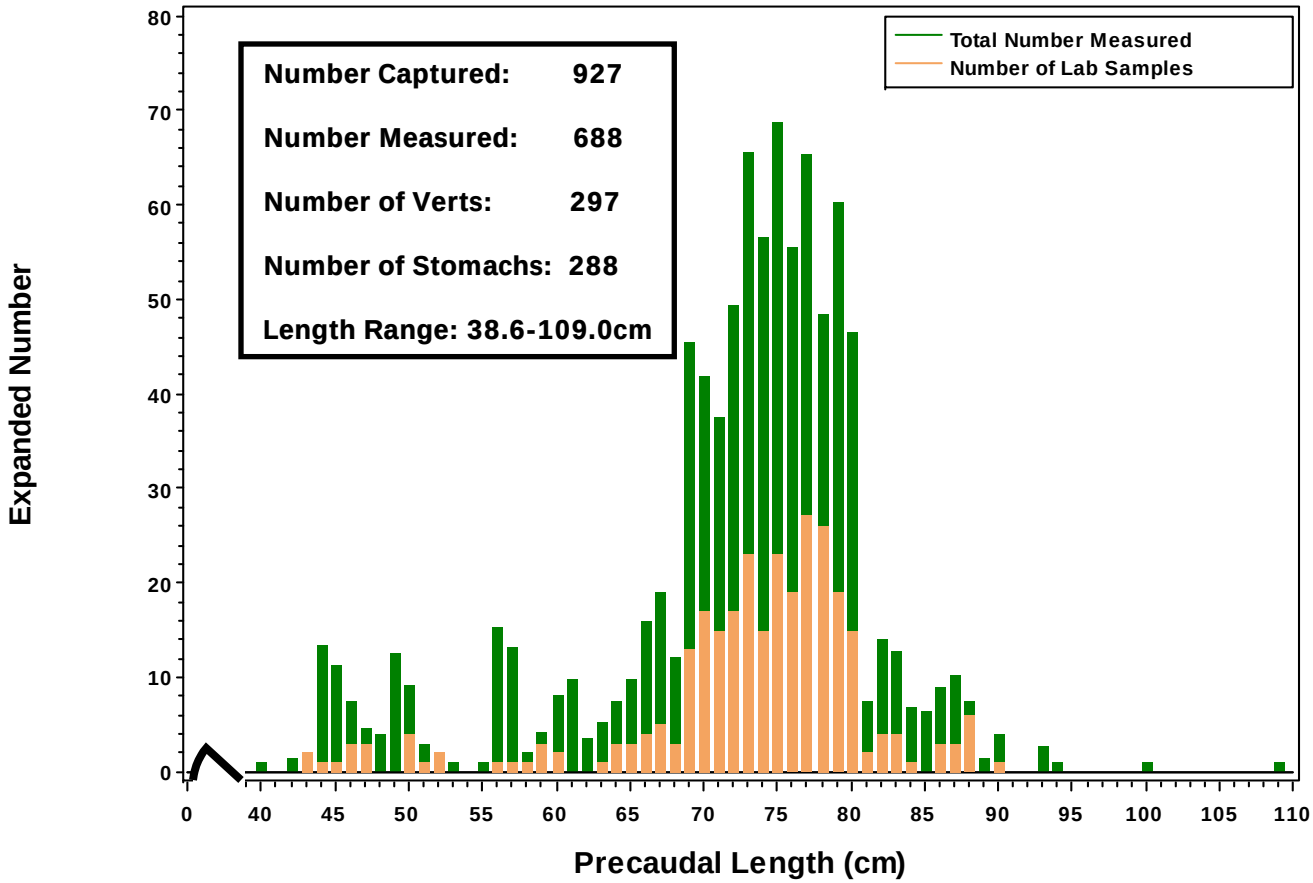
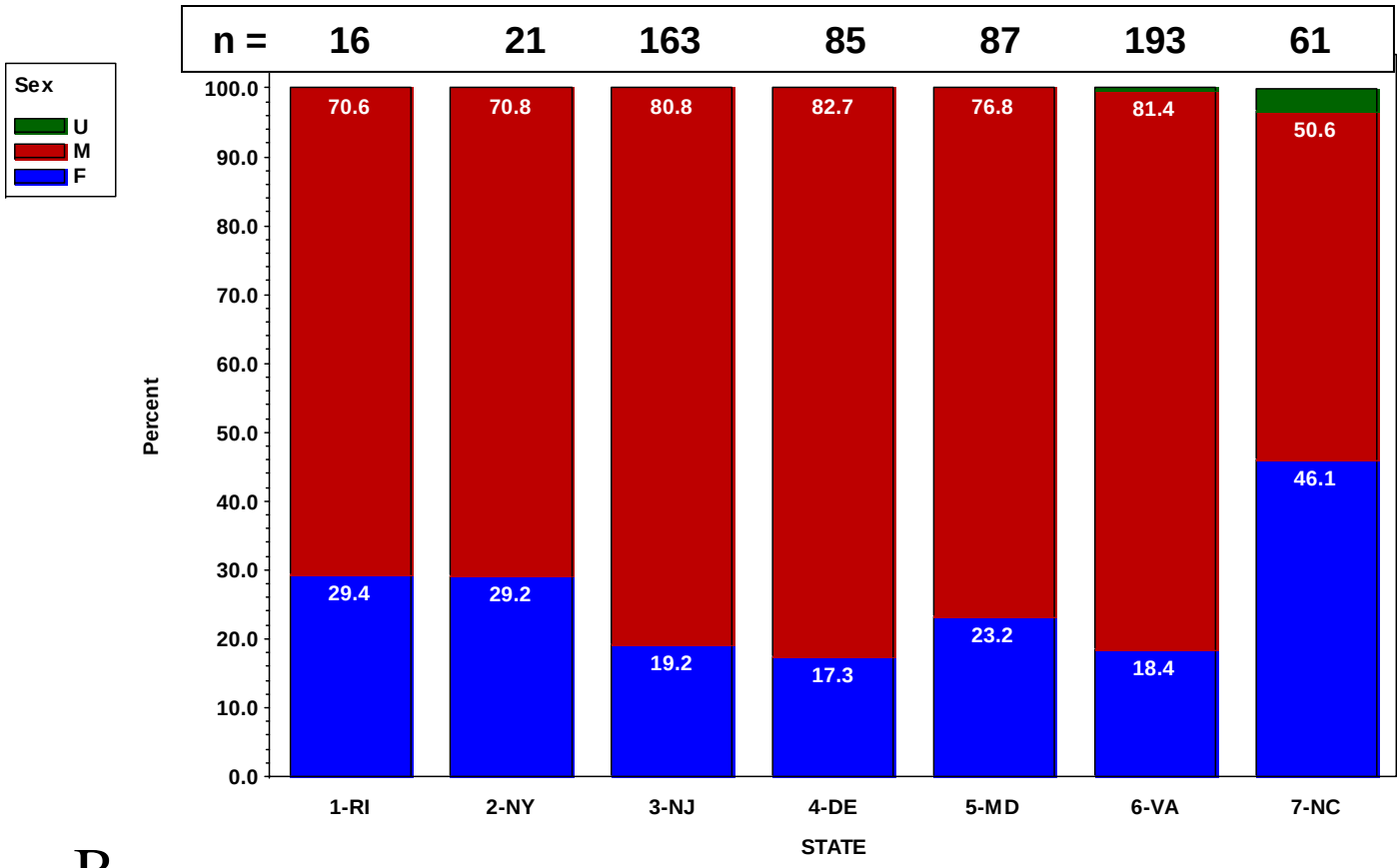
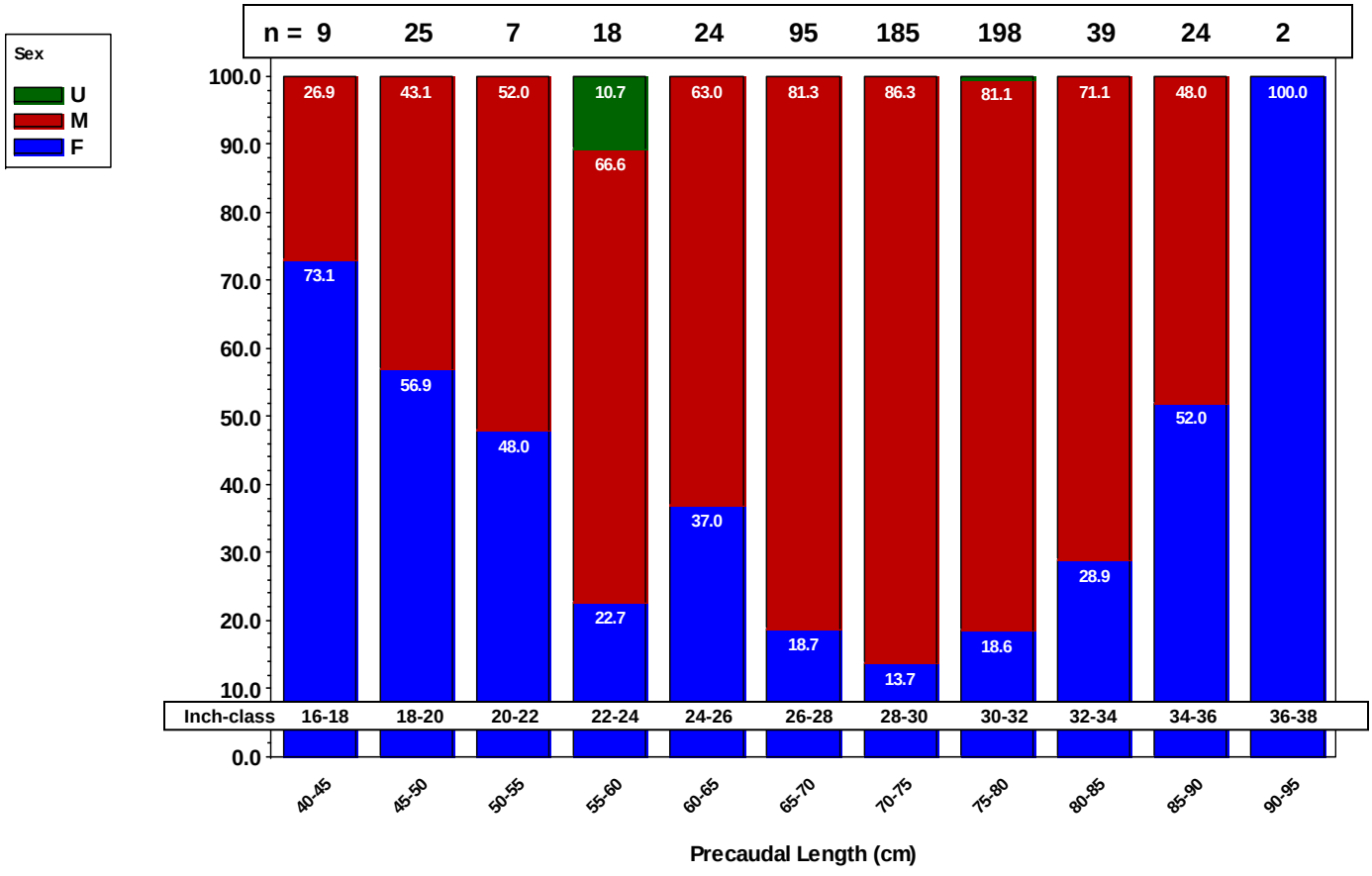


Figure 58. Sex ratios for smooth dogfish by state (A) and length group (B).

A



B



Spot
(Priority B)

Table 25. Number, biomass, minimum and maximum size of specimens captured, by state and region, for spot.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05				
NJ	06				
NJ	07				
NJ	08				
DE	09				
MD	10	7	0.242	125	144
VA	11	3	0.126	131	142
VA	12				
VA	13	1,381	54.542	113	197
NC	14	26,214	960.866	107	190
NC	15	956	43.415	106	183

Figure 59. Geometric mean catch per area swept by state and overall, with summary catch rates, for spot.

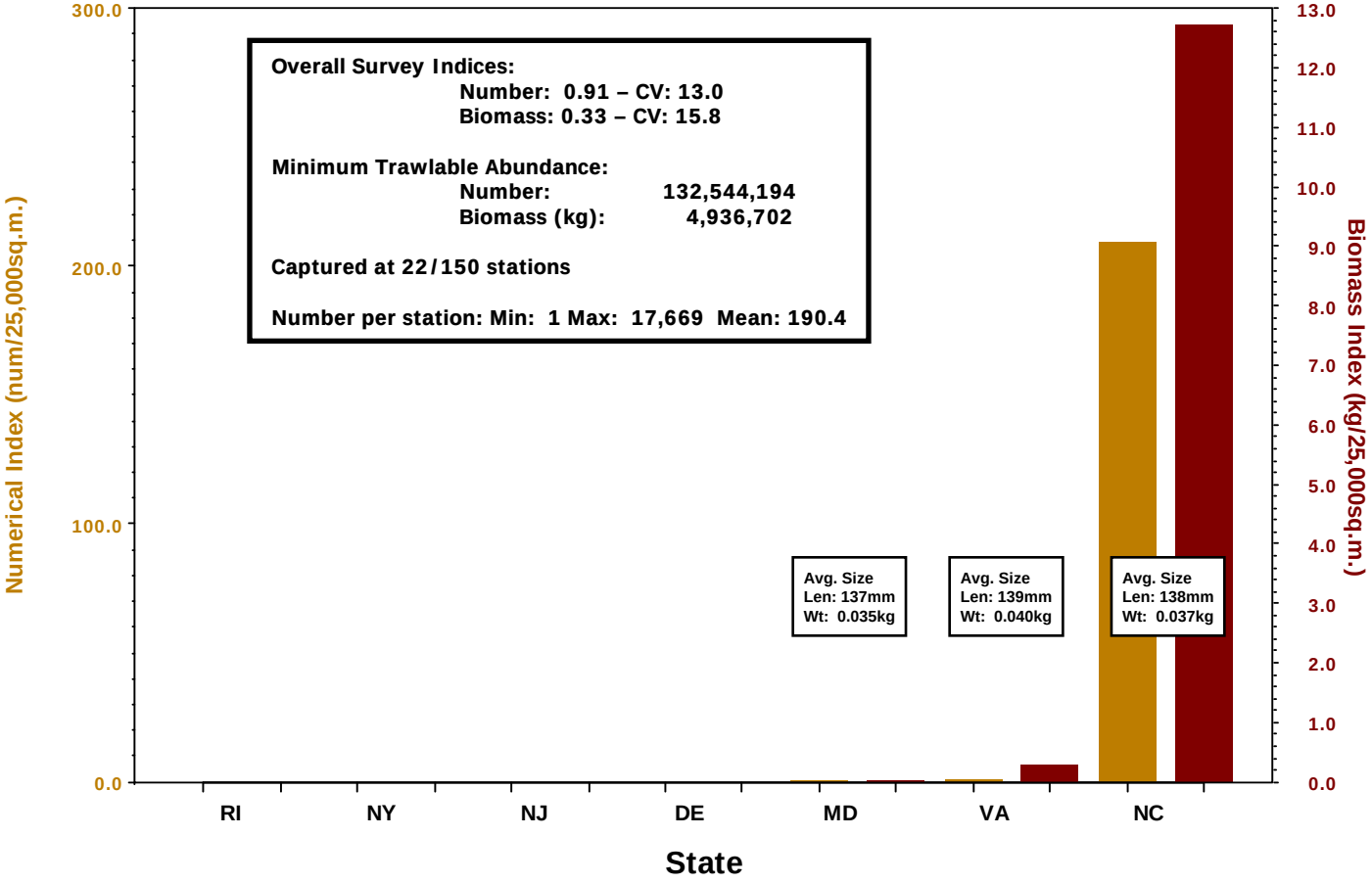


Figure 60. Length frequency histogram for spot.

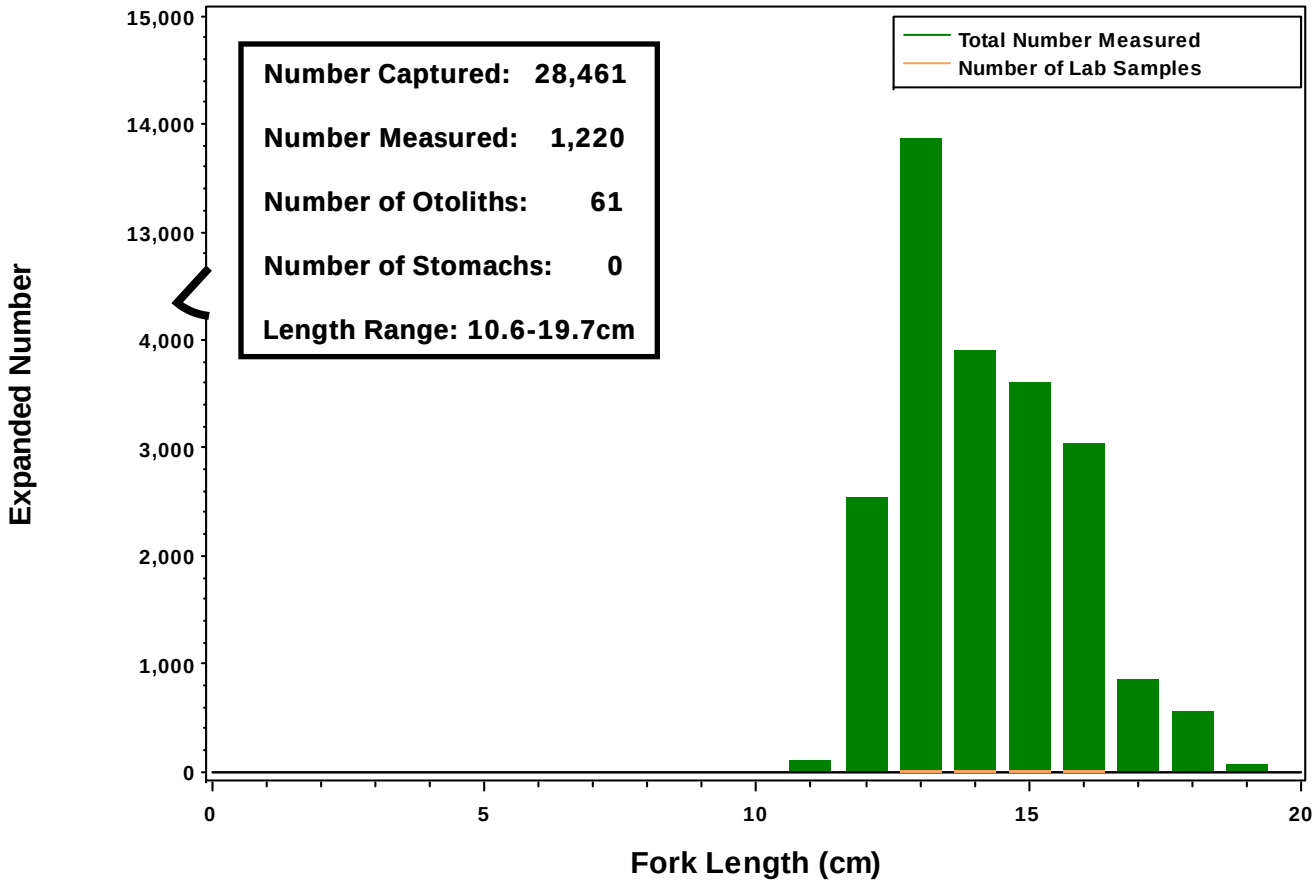
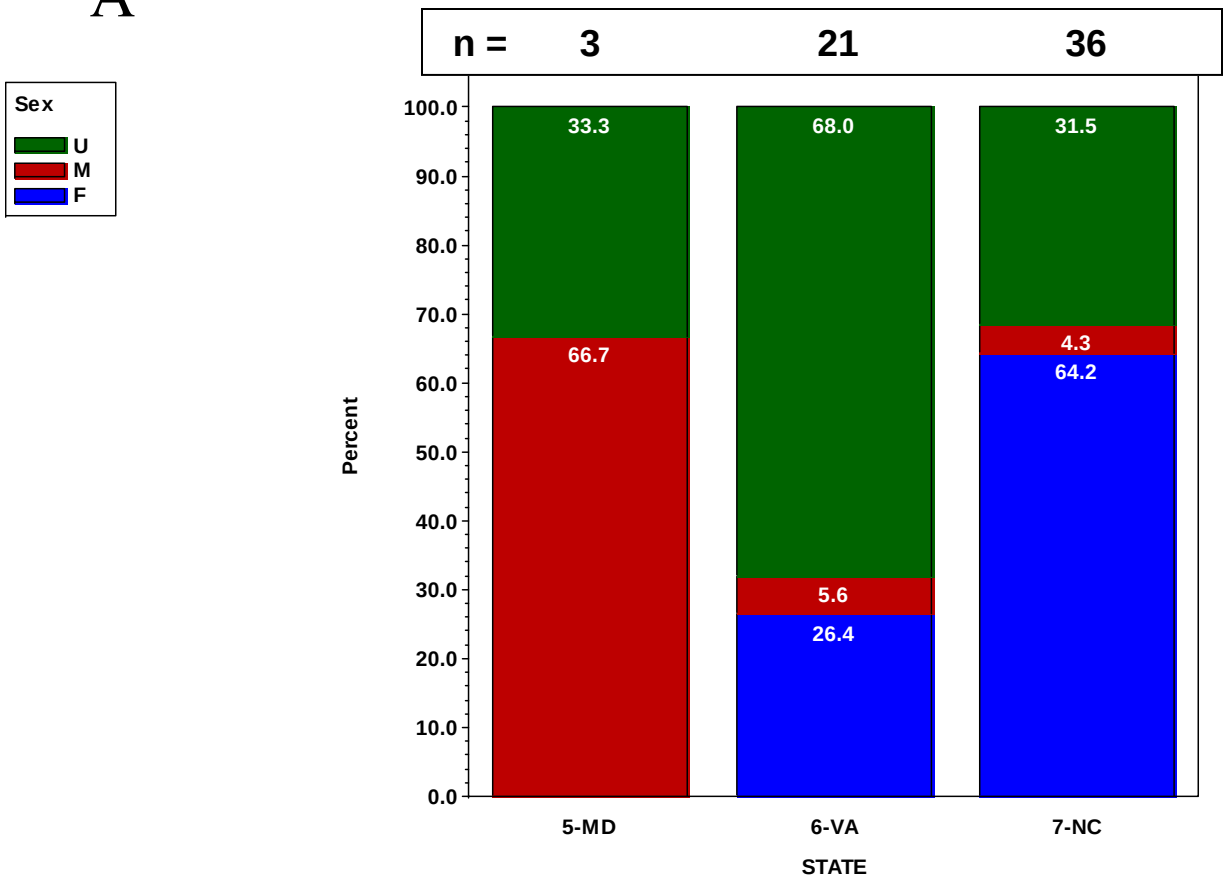
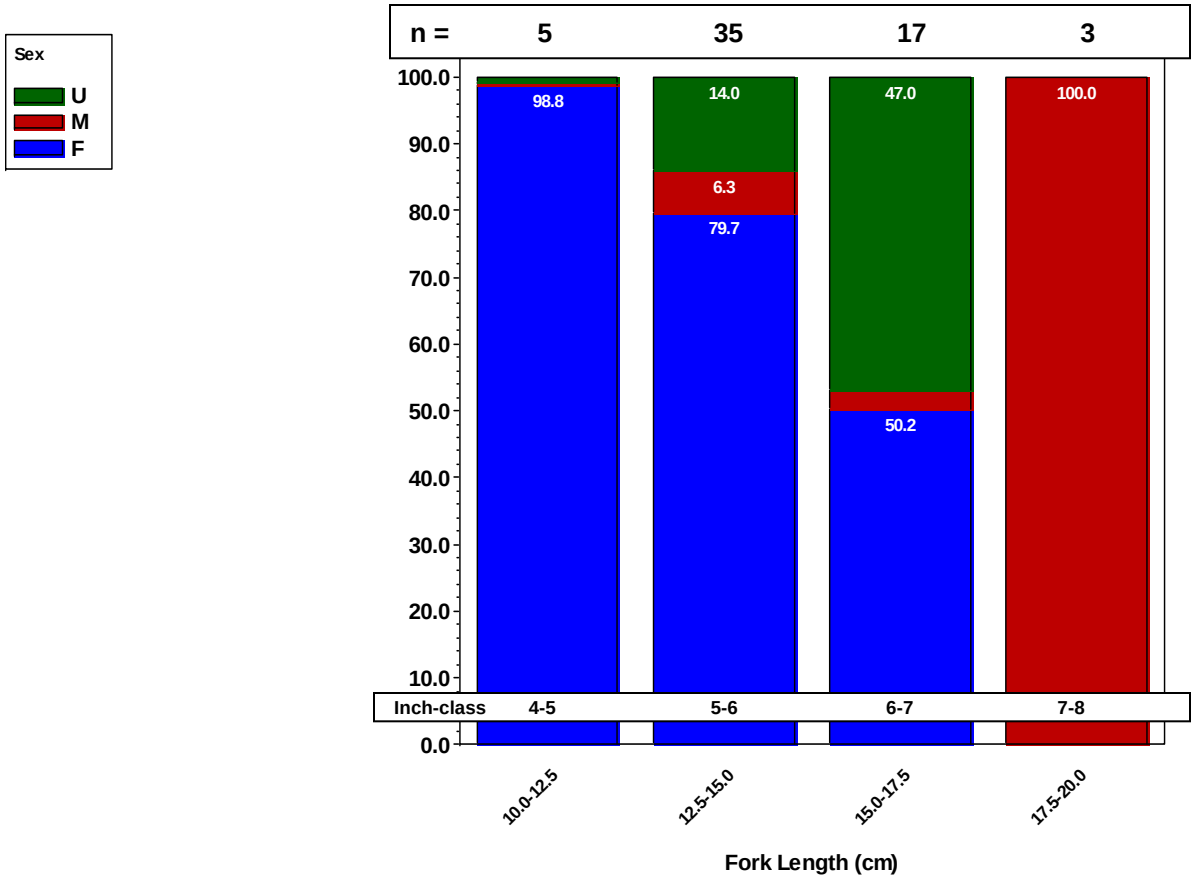


Figure 61. Sex ratios for spot by state (A) and length group (B).

A



B



Spotted Hake
(Priority D)

Table 26. Number, biomass, minimum and maximum size of specimens captured, by state and region, for spotted hake.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	19	4.156	149	375
RI	BI	8	0.62	89	317
NY	01	1	0.005	92	92
NY	02	64	3.495	90	378
NY	03	87	3.933	69	309
NY	04	80	1.256	48	287
NY	05	110	1.78	77	334
NJ	06	144	2.645	85	246
NJ	07	1,174	21.069	60	310
NJ	08	222	3.783	71	255
DE	09	498	18.319	78	410
MD	10	1,349	25.73	60	338
VA	11	4,978	99.751	70	324
VA	12	1,221	19.734	60	325
VA	13	662	11.65	57	208
NC	14	936	20.612	81	196
NC	15	164	3.164	88	204

Figure 62. Geometric mean catch per area swept by state and overall, with summary catch rates, for spotted hake.

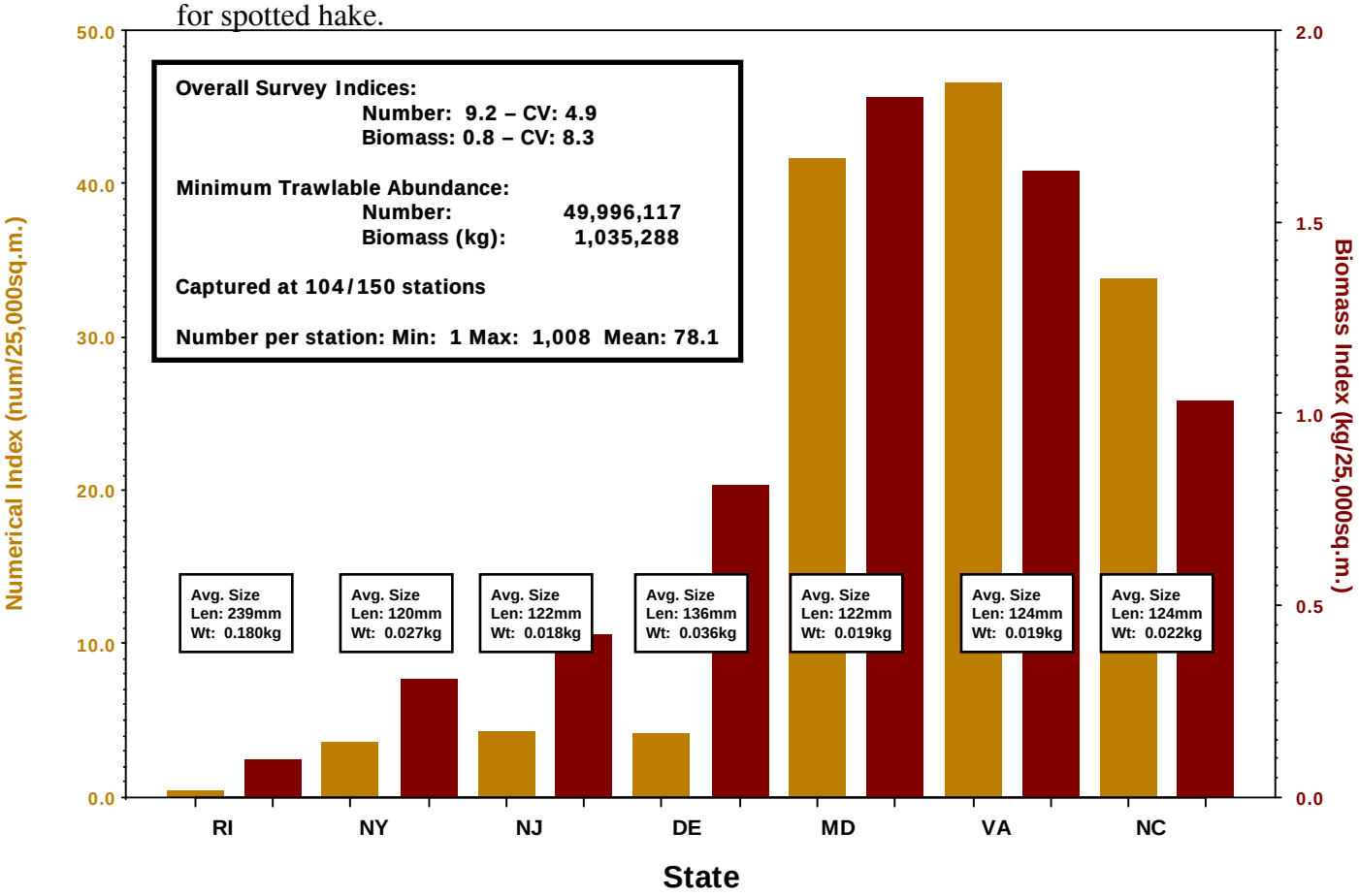
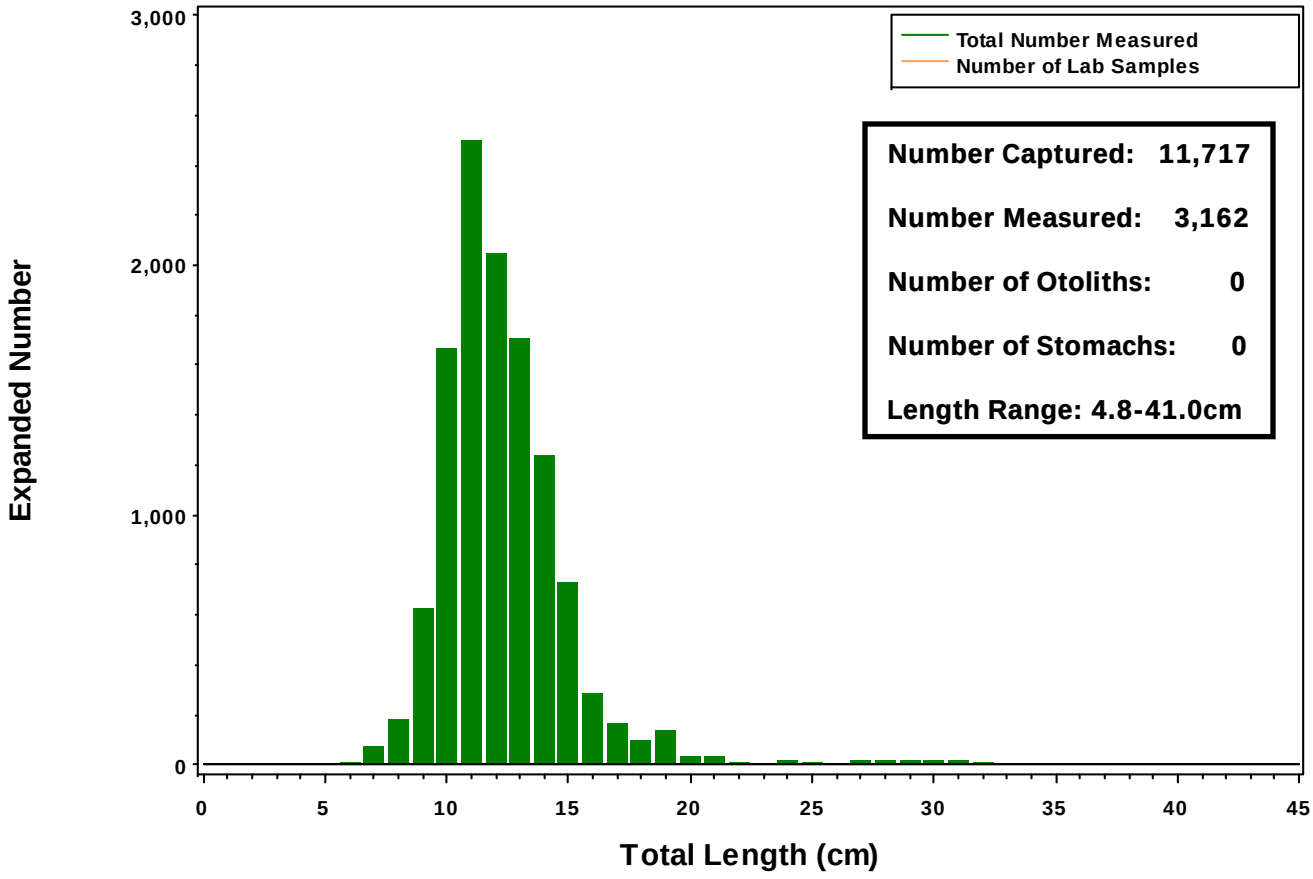


Figure 63. Length frequency histogram for spotted hake.



Striped Anchovy (Priority D)

Table 27. Number, biomass, minimum and maximum size of specimens captured, by state and region, for striped anchovy.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04	44	0.224	36	87
NY	05				
NJ	06	2	0.075	134	137
NJ	07	1	0.01	137	137
NJ	08	1	0.016	110	110
DE	09	5	0.075	106	121
MD	10				
VA	11				
VA	12	18	0.311	107	132
VA	13	334	5.406	97	136
NC	14	713	11.63	93	124
NC	15	80	1.248	103	133

Figure 64. Geometric mean catch per area swept by state and overall, with summary catch rates, for striped anchovy.

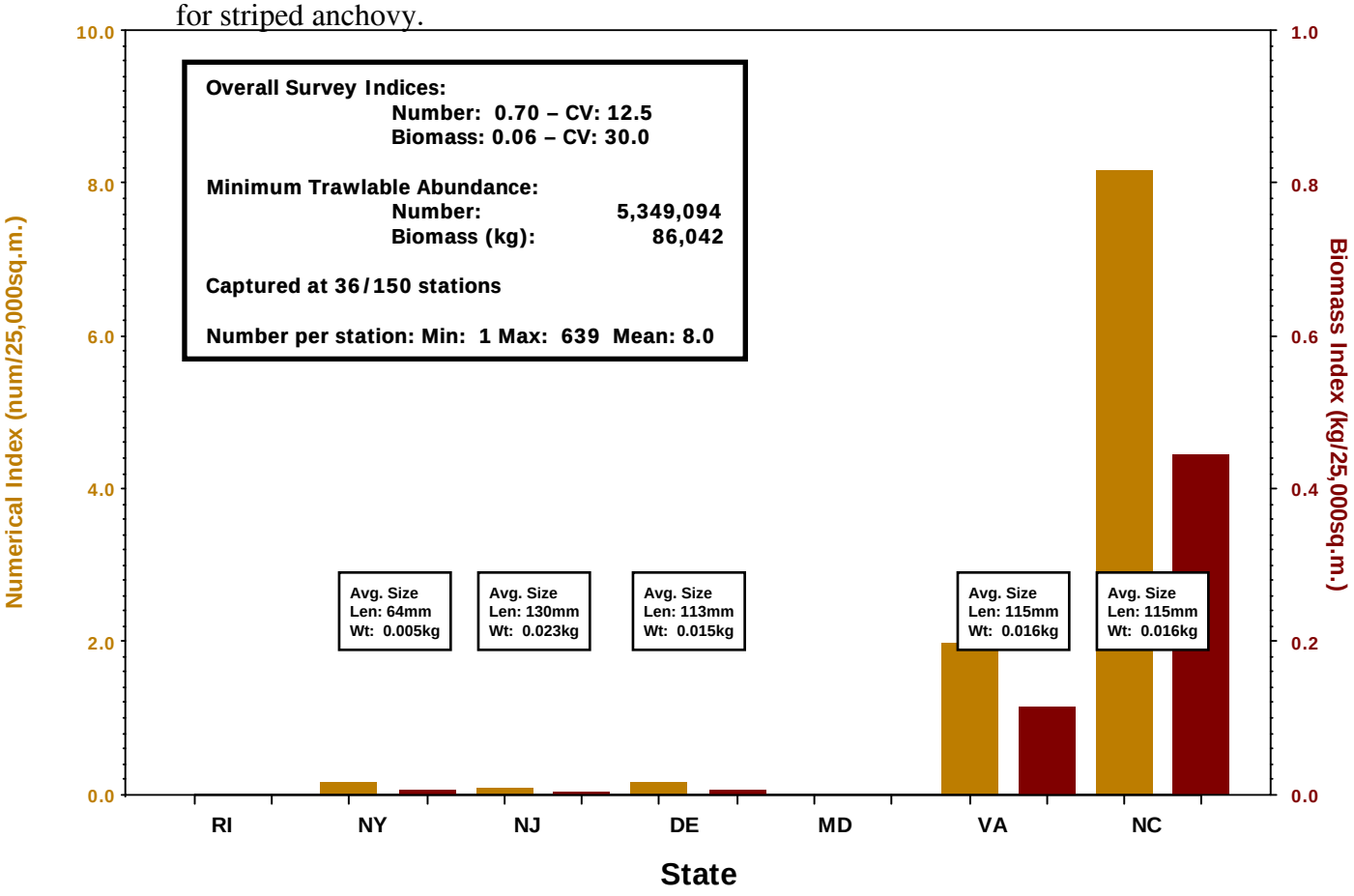
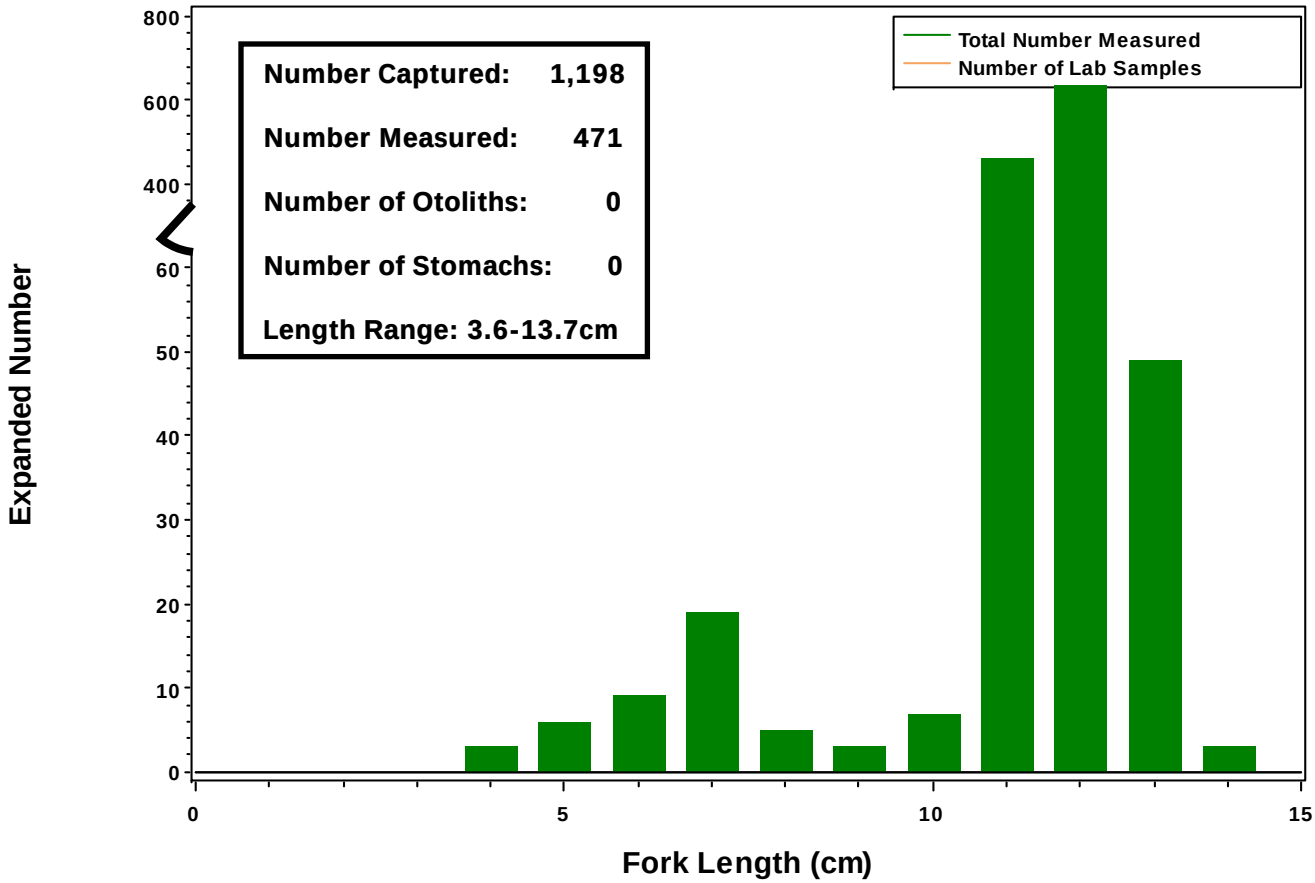


Figure 65. Length frequency histogram for striped anchovy.



Striped Searobin (Priority D)

Table 28. Number, biomass, minimum and maximum size of specimens captured, by state and region, for striped searobin.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI	45	1.41	88	360
NY	01				
NY	02	2	1.235	351	374
NY	03	22	6.8	119	383
NY	04	9	3.548	153	372
NY	05	10	4.04	126	357
NJ	06	77	27.514	138	426
NJ	07	228	38.304	101	358
NJ	08	11	2.039	121	327
DE	09	6	1.45	91	325
MD	10	1	0.03	134	134
VA	11	3	0.054	106	120
VA	12				
VA	13				
NC	14				
NC	15				

Figure 66. Geometric mean catch per area swept by state and overall, with summary catch rates, for striped searobin.

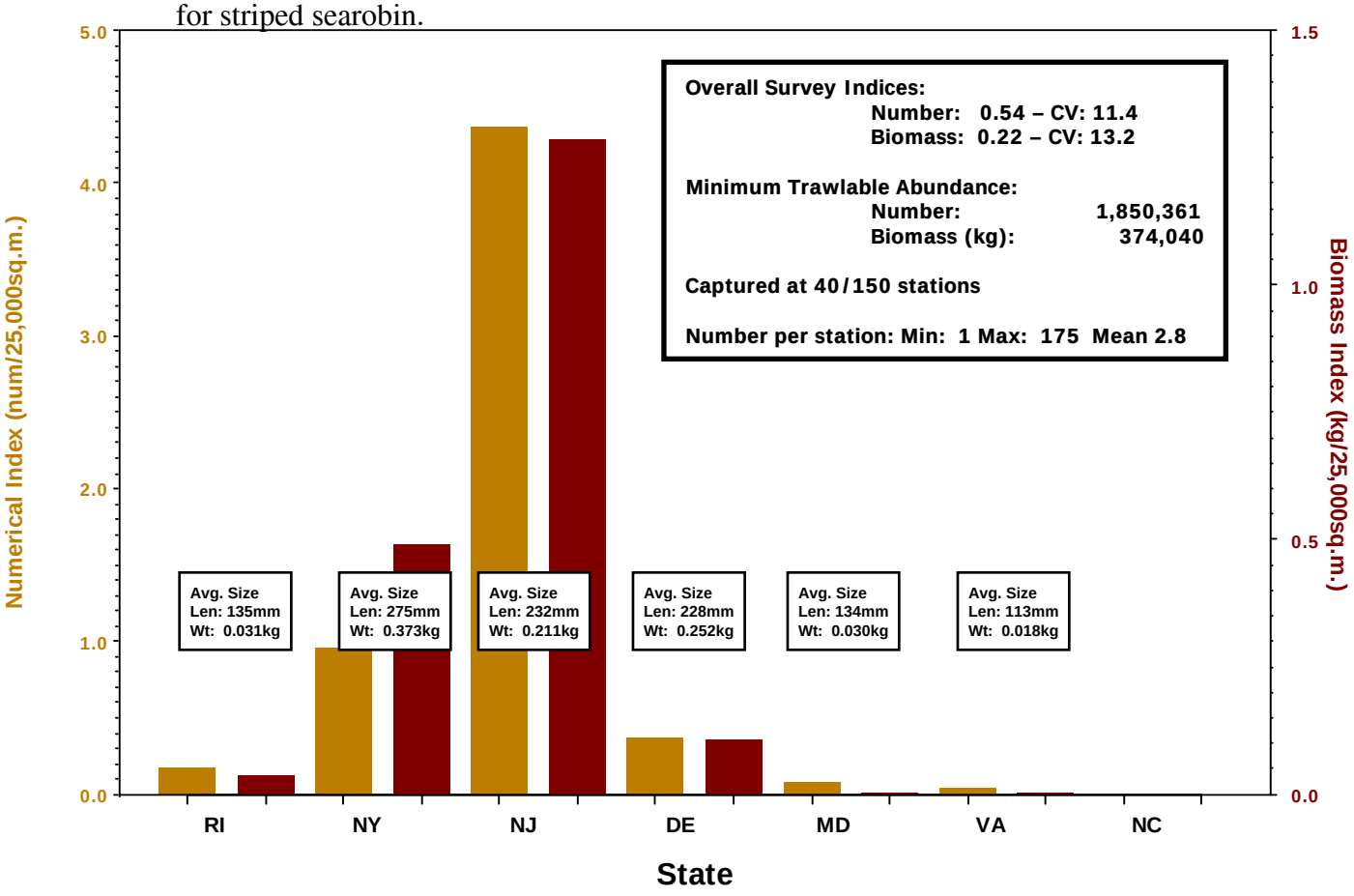
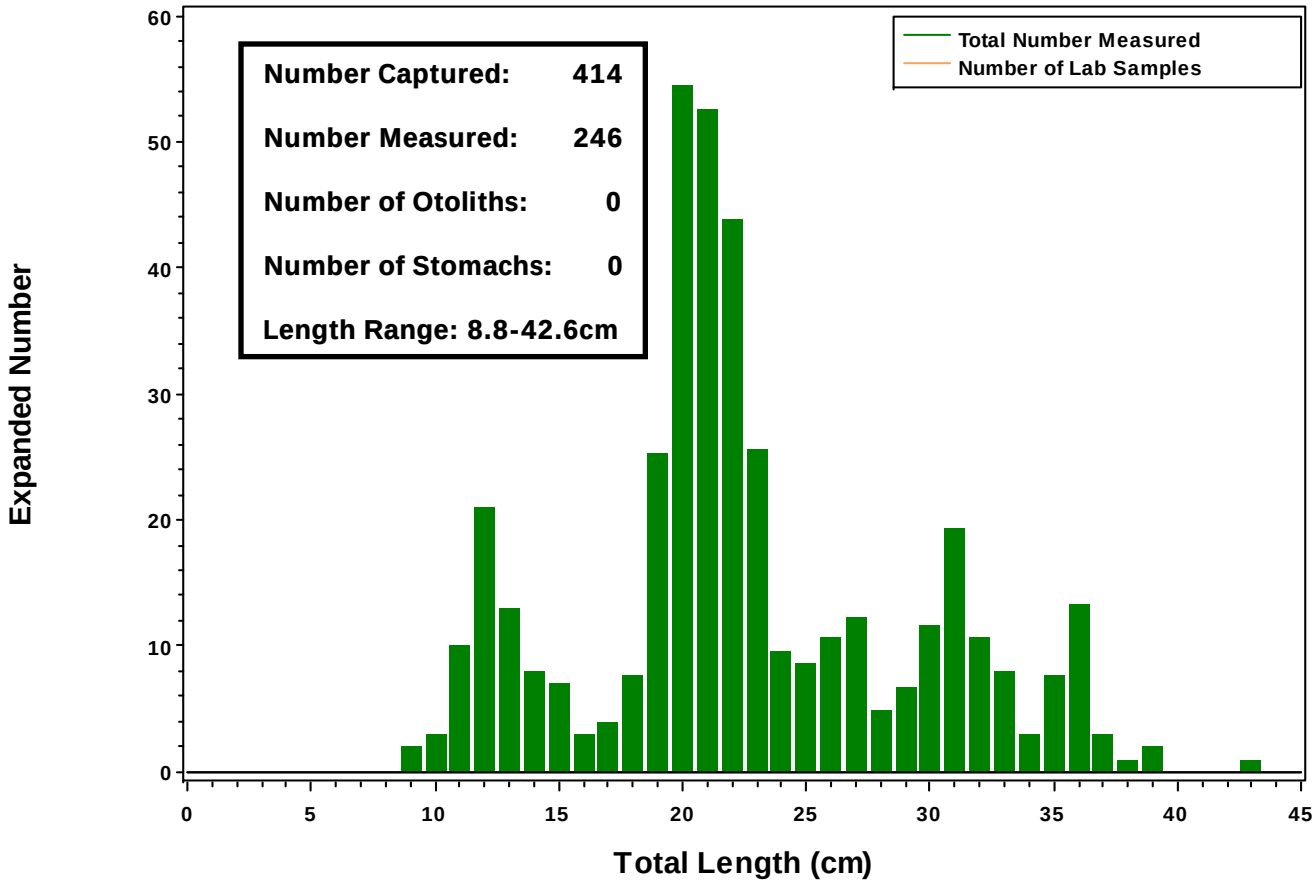


Figure 67. Length frequency histogram for striped searobin.



Summer Flounder (Priority A)

Table 29. Number, biomass, minimum and maximum size of specimens captured, by state and region, for summer flounder.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	95	101.256	290	666
RI	BI	69	65.578	265	665
NY	01	32	23.93	290	570
NY	02	34	29.092	308	577
NY	03	125	92.333	262	660
NY	04	91	73.357	259	620
NY	05	39	25.827	286	586
NJ	06	32	18.804	282	595
NJ	07	45	22.612	249	635
NJ	08	37	14.622	249	468
DE	09	25	10.159	250	522
MD	10	33	10.654	214	513
VA	11	65	20.263	214	530
VA	12	9	2.06	187	386
VA	13	24	12.862	254	581
NC	14	1	0.21	291	291
NC	15	12	3.386	227	455

Figure 68. Geometric mean catch per area swept by state and overall, with summary catch rates, for summer flounder.

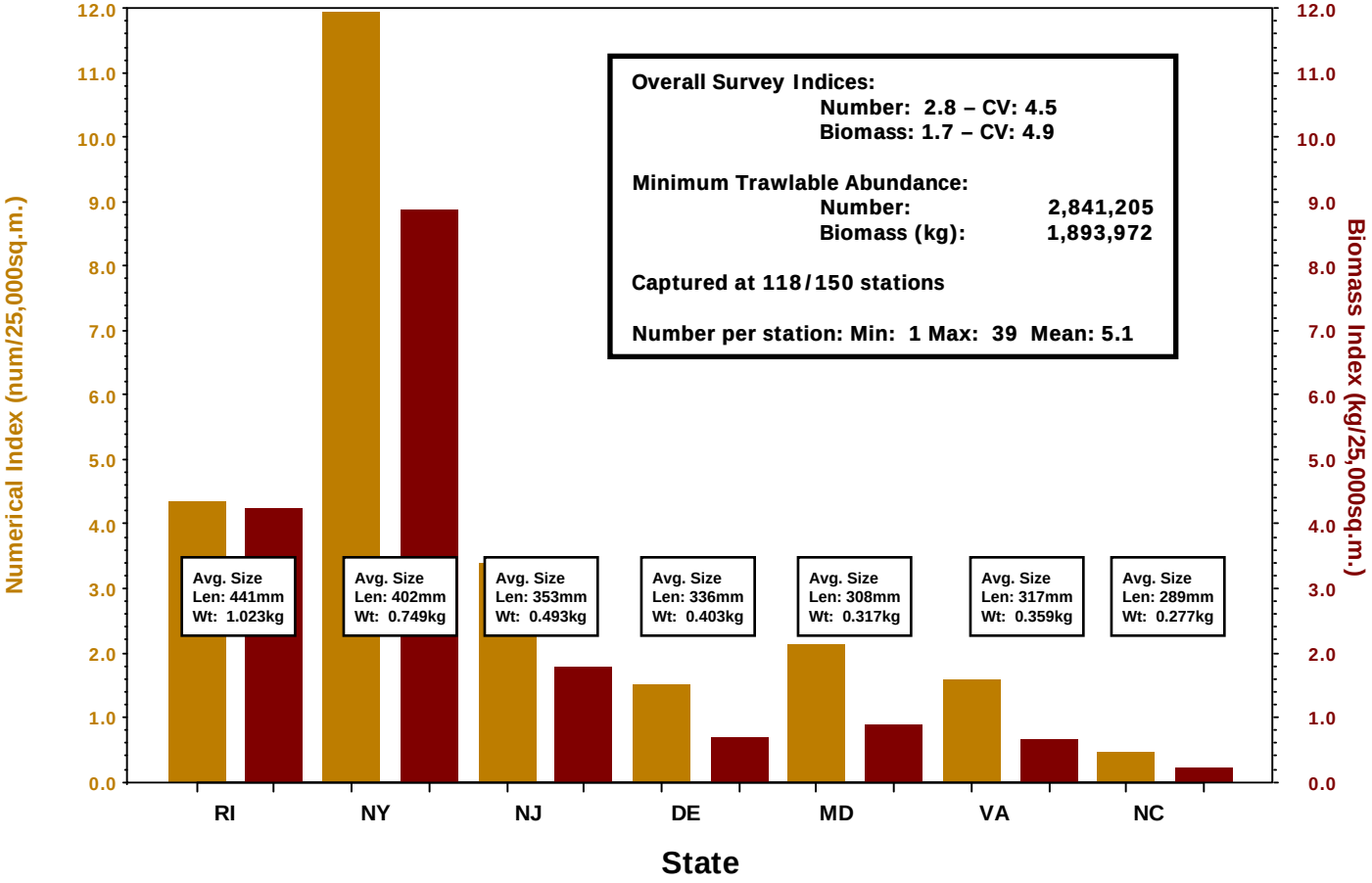


Figure 69. Length frequency histogram for summer flounder.

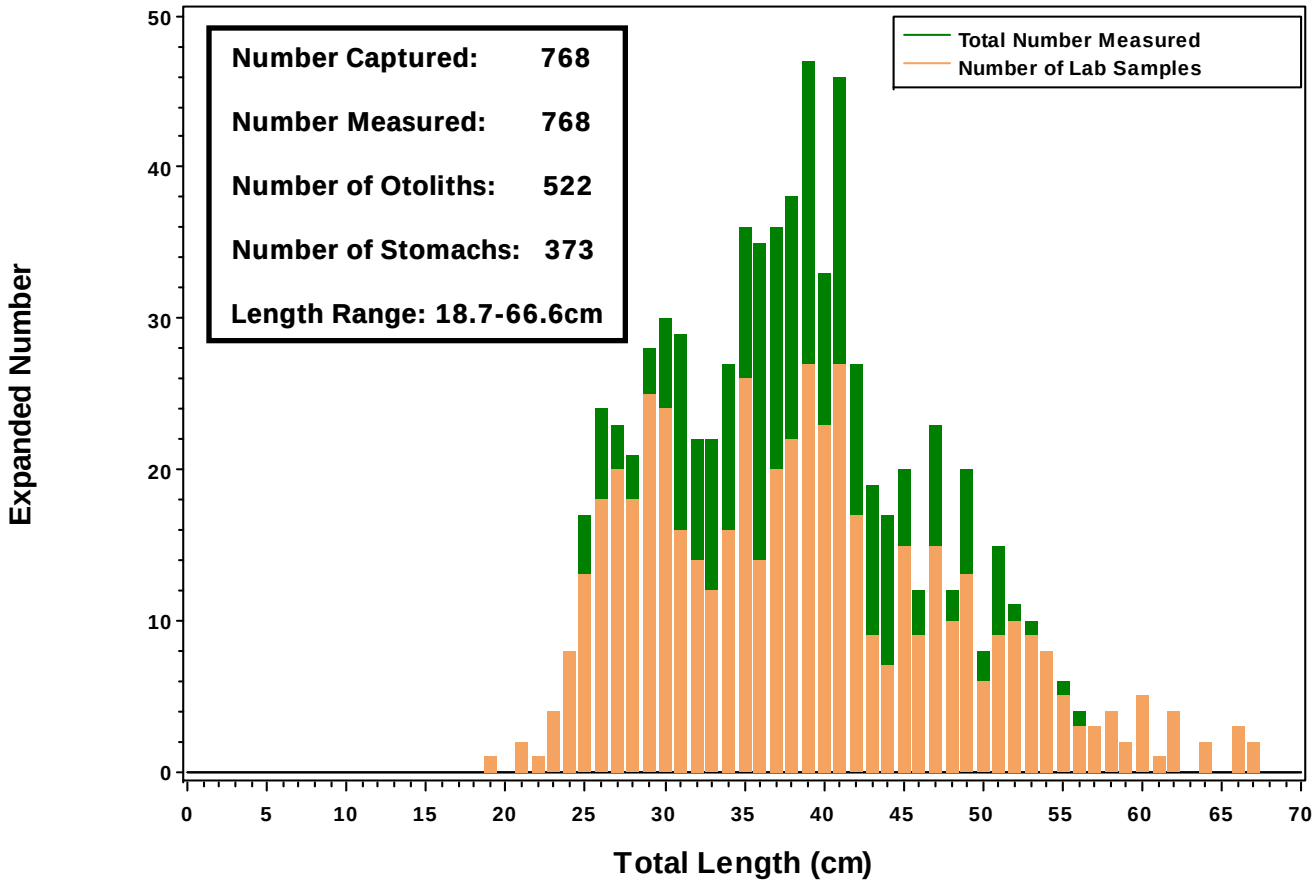
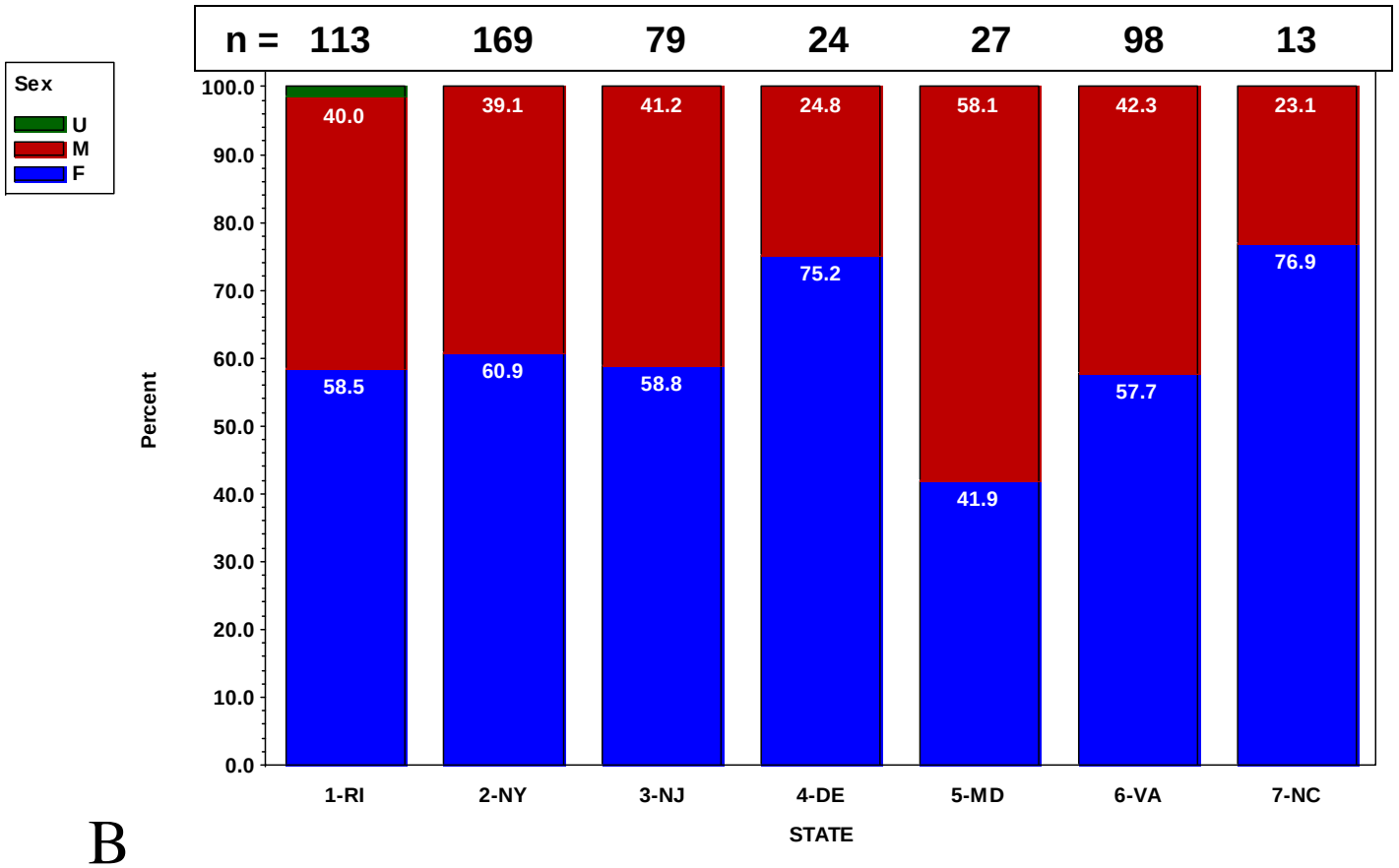
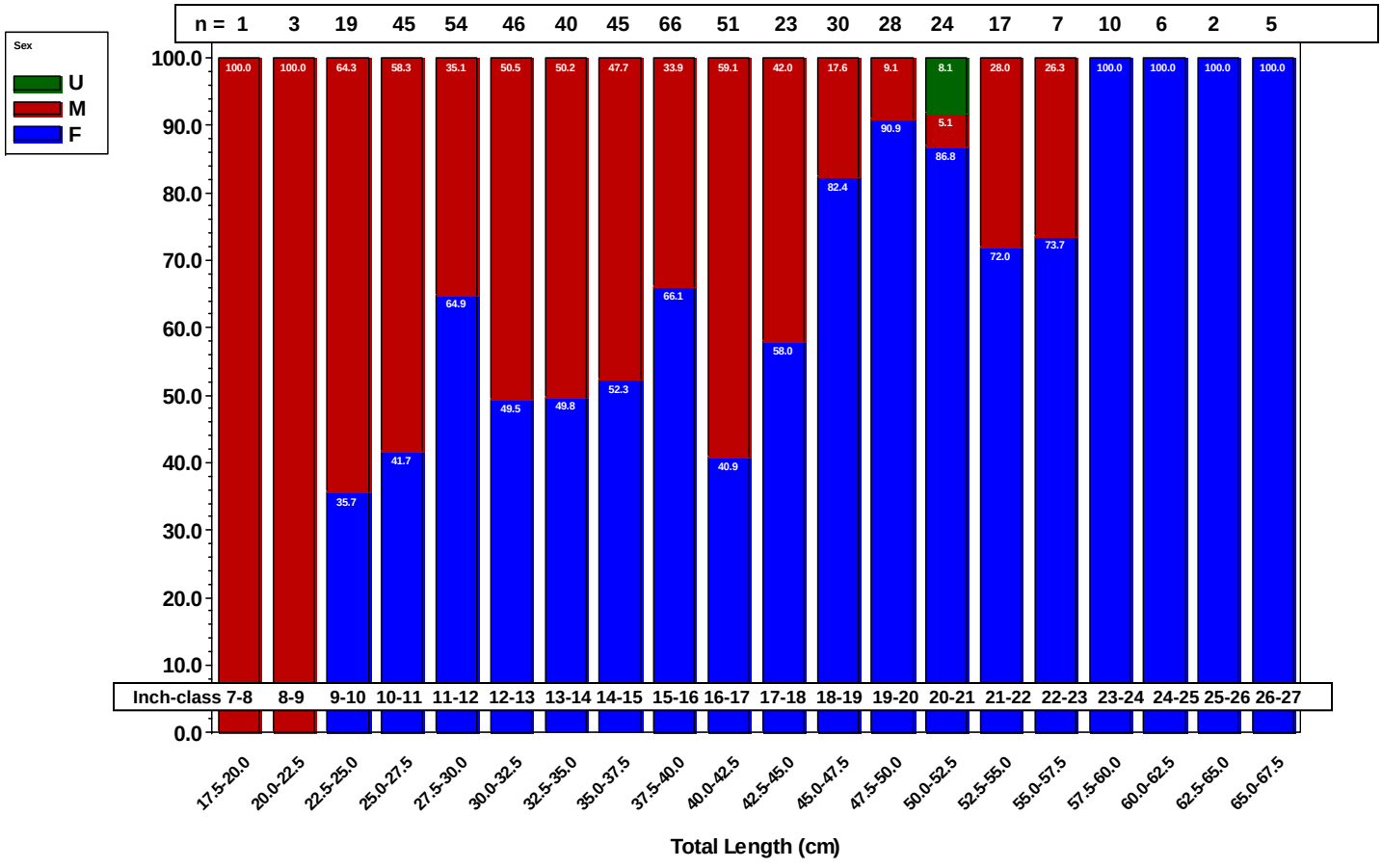


Figure 70. Sex ratios for summer flounder by state (A) and length group (B).

A



B



Weakfish
(Priority A)

Table 30. Number, biomass, minimum and maximum size of specimens captured, by state and region, for weakfish.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI				
RI	BI				
NY	01				
NY	02				
NY	03				
NY	04				
NY	05				
NJ	06	15	1.493	196	253
NJ	07	37	5.218	161	448
NJ	08	1	0.1	223	223
DE	09	197	16.309	186	334
MD	10	615	40.378	128	298
VA	11	522	33.892	136	271
VA	12	81	5.188	149	255
VA	13	3,170	218.889	133	274
NC	14	28,577	1587.183	125	250
NC	15	6,365	290.177	80	252

Figure 71. Geometric mean catch per area swept by state and overall, with summary catch rates, for weakfish.

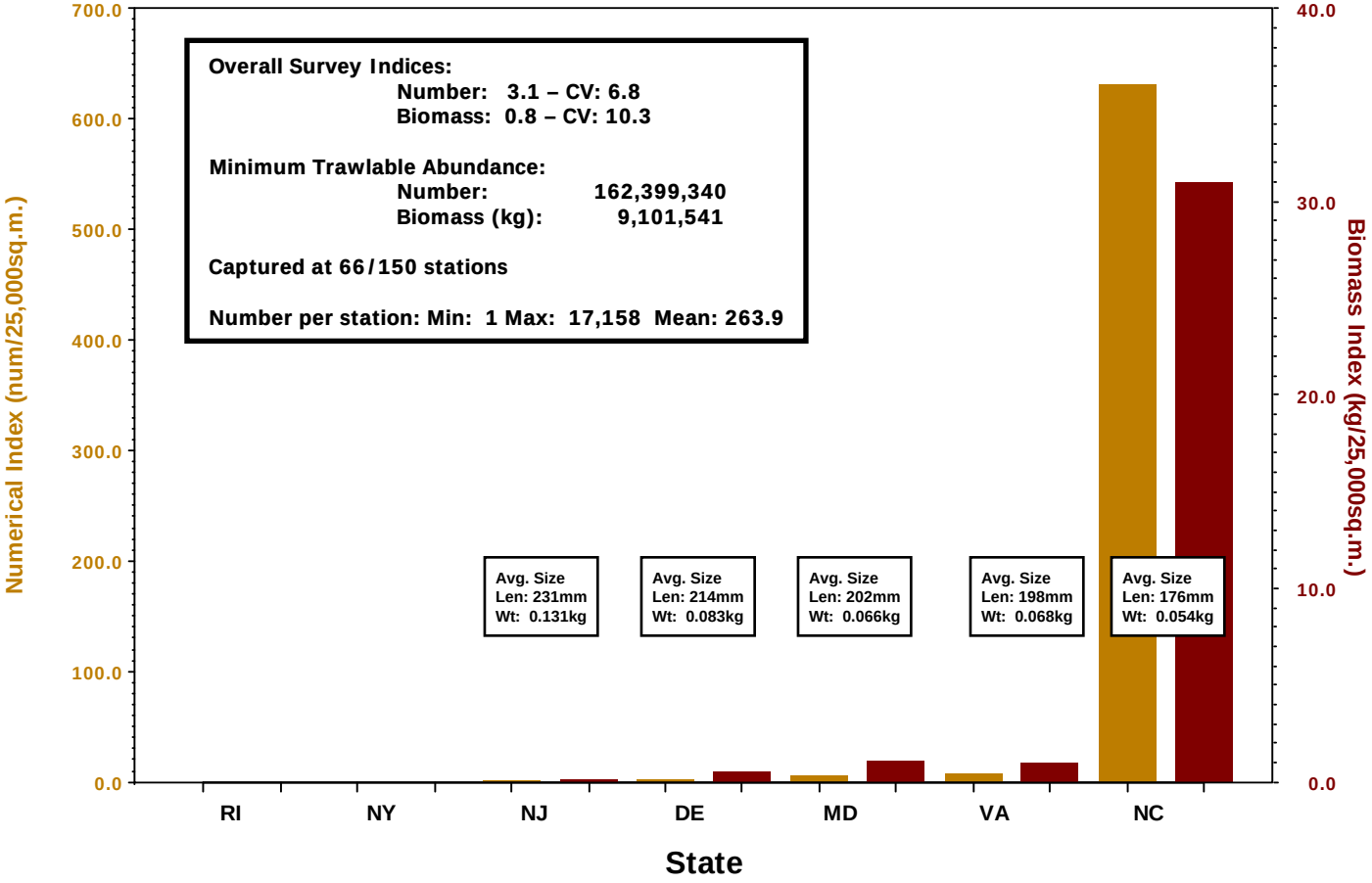


Figure 72. Length frequency histogram for weakfish.

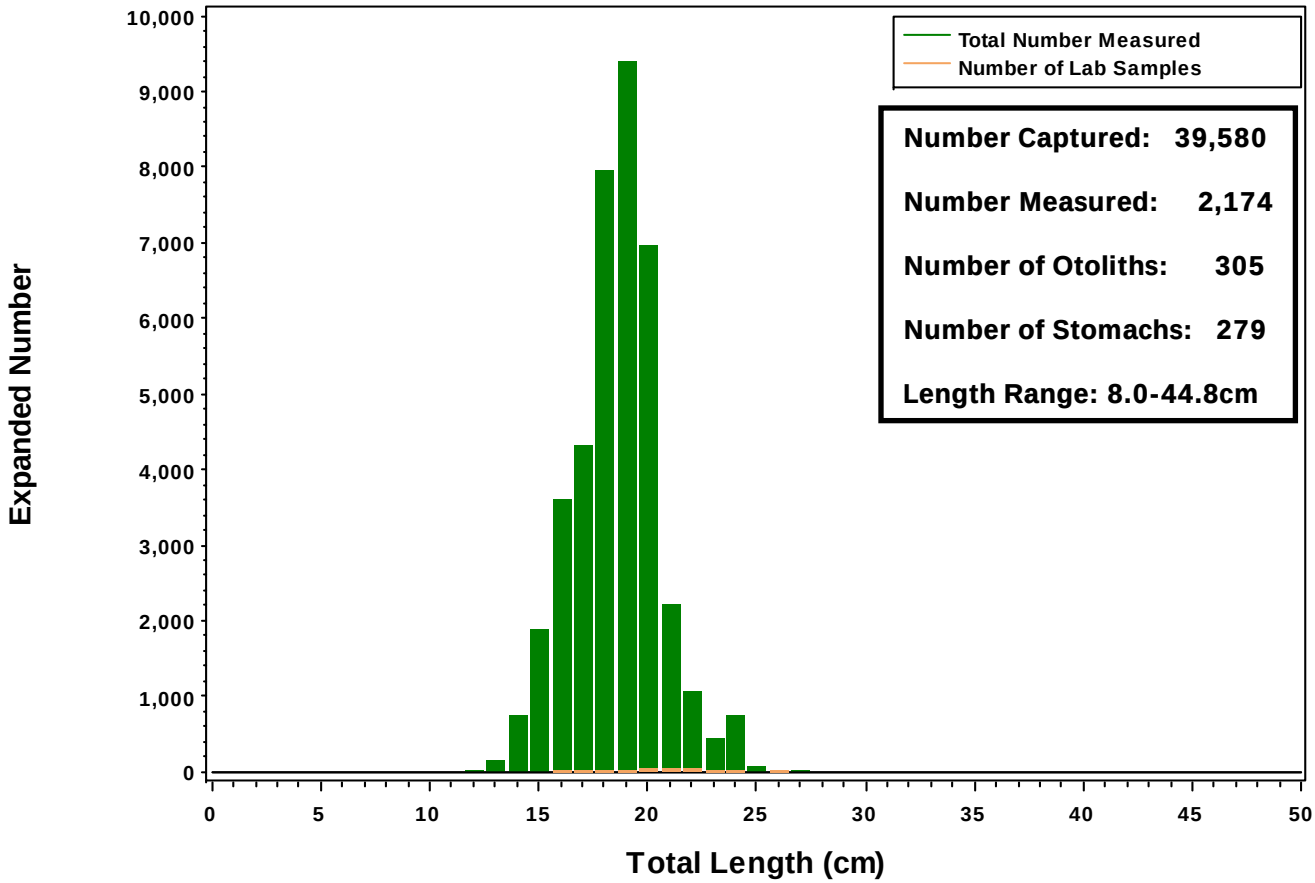
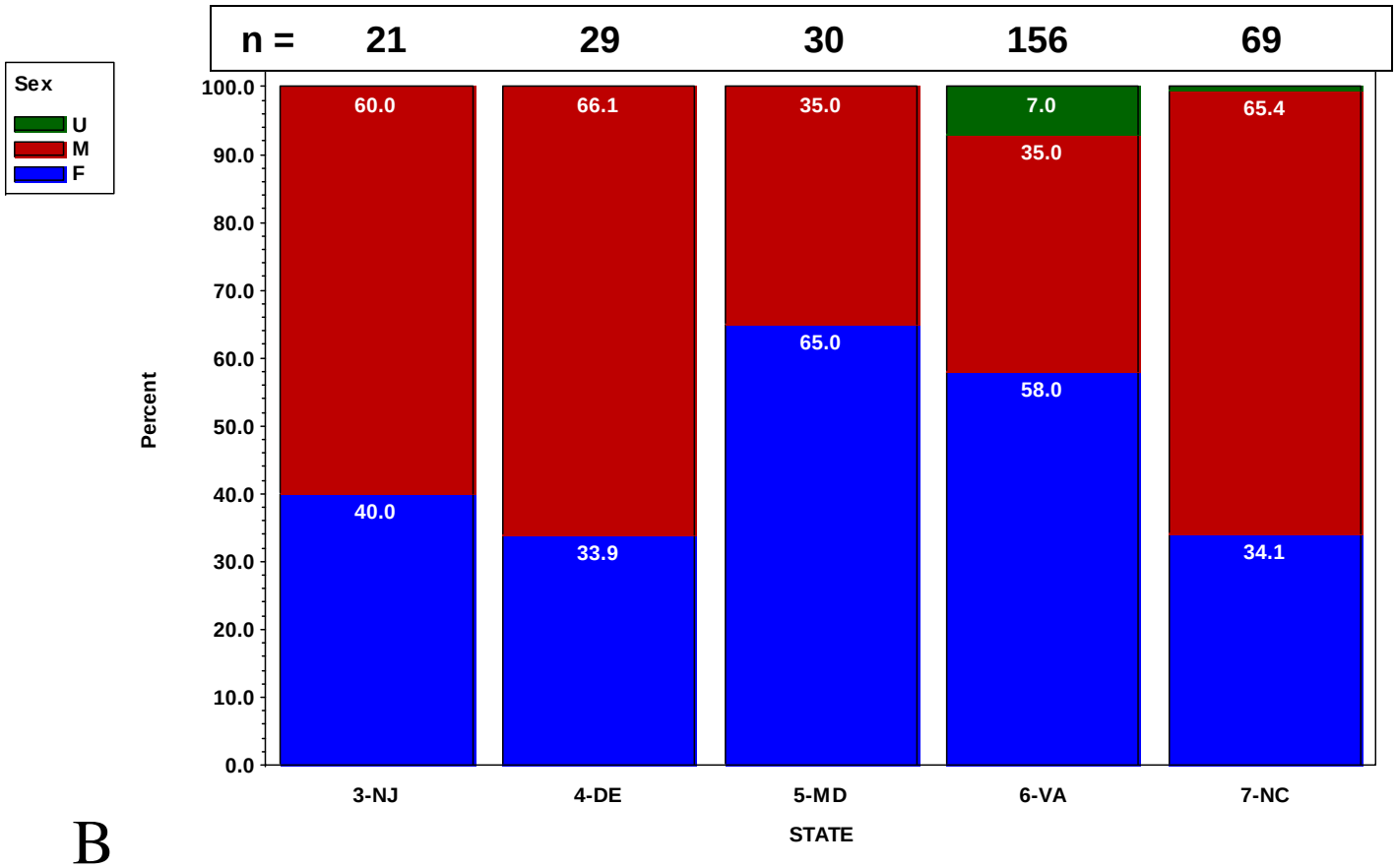
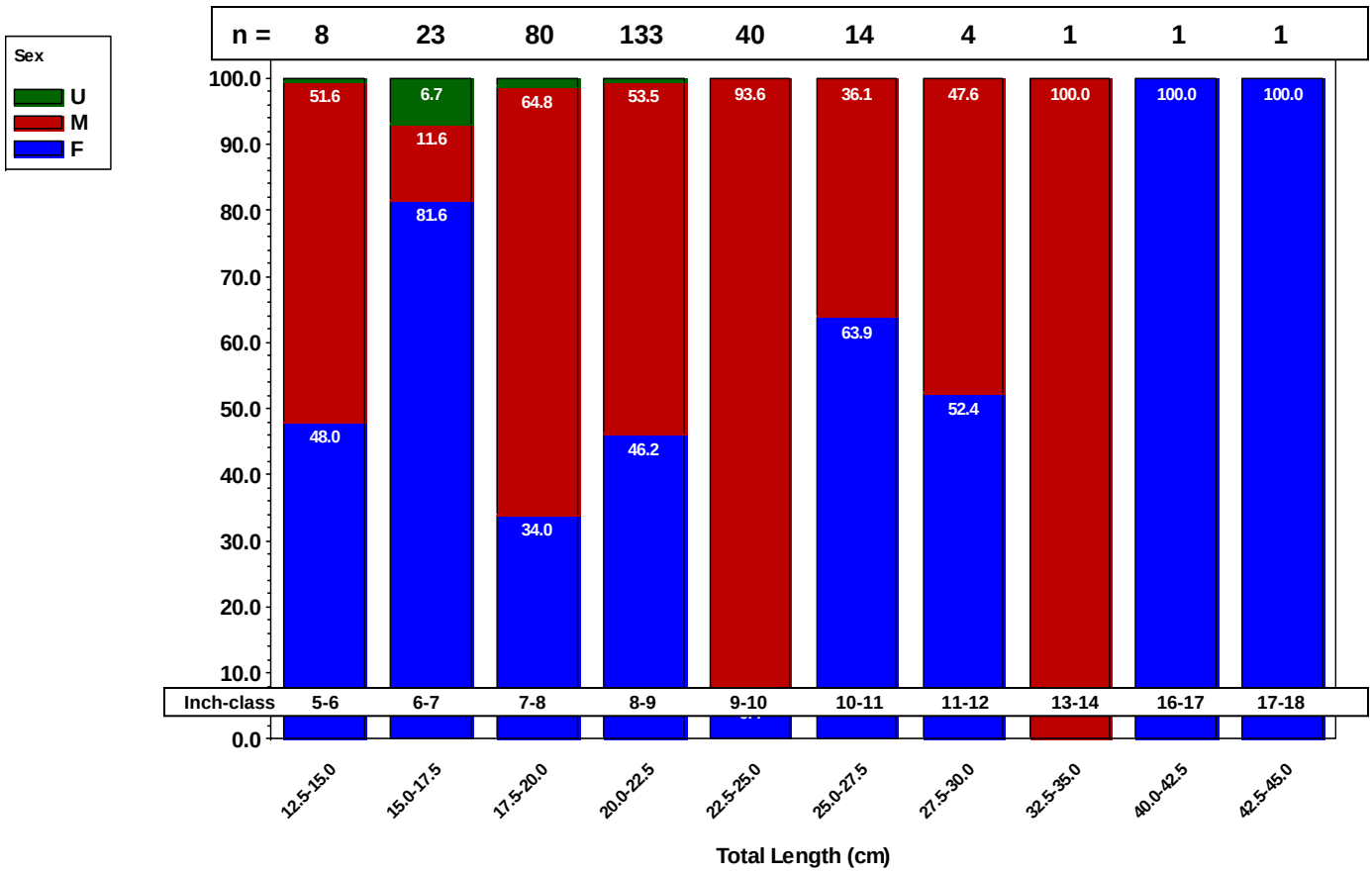


Figure 73. Sex ratios for weakfish by state (A) and length group (B).

A



B



Winter Flounder (Priority A)

Table 31. Number, biomass, minimum and maximum size of specimens captured, by state and region, for winter flounder.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	1,191	342.78	99	487
RI	BI	341	89.417	81	422
NY	01	3	2.262	321	416
NY	02	28	13.076	175	470
NY	03	106	44.695	172	434
NY	04	61	24.423	159	446
NY	05	32	11.708	131	411
NJ	06	47	14.128	131	381
NJ	07	36	8.098	156	350
NJ	08	16	3.02	153	386
DE	09	2	0.538	225	299
MD	10				
VA	11				
VA	12				
VA	13				
NC	14				
NC	15				

Figure 74. Geometric mean catch per area swept by state and overall, with summary catch rates, for winter flounder.

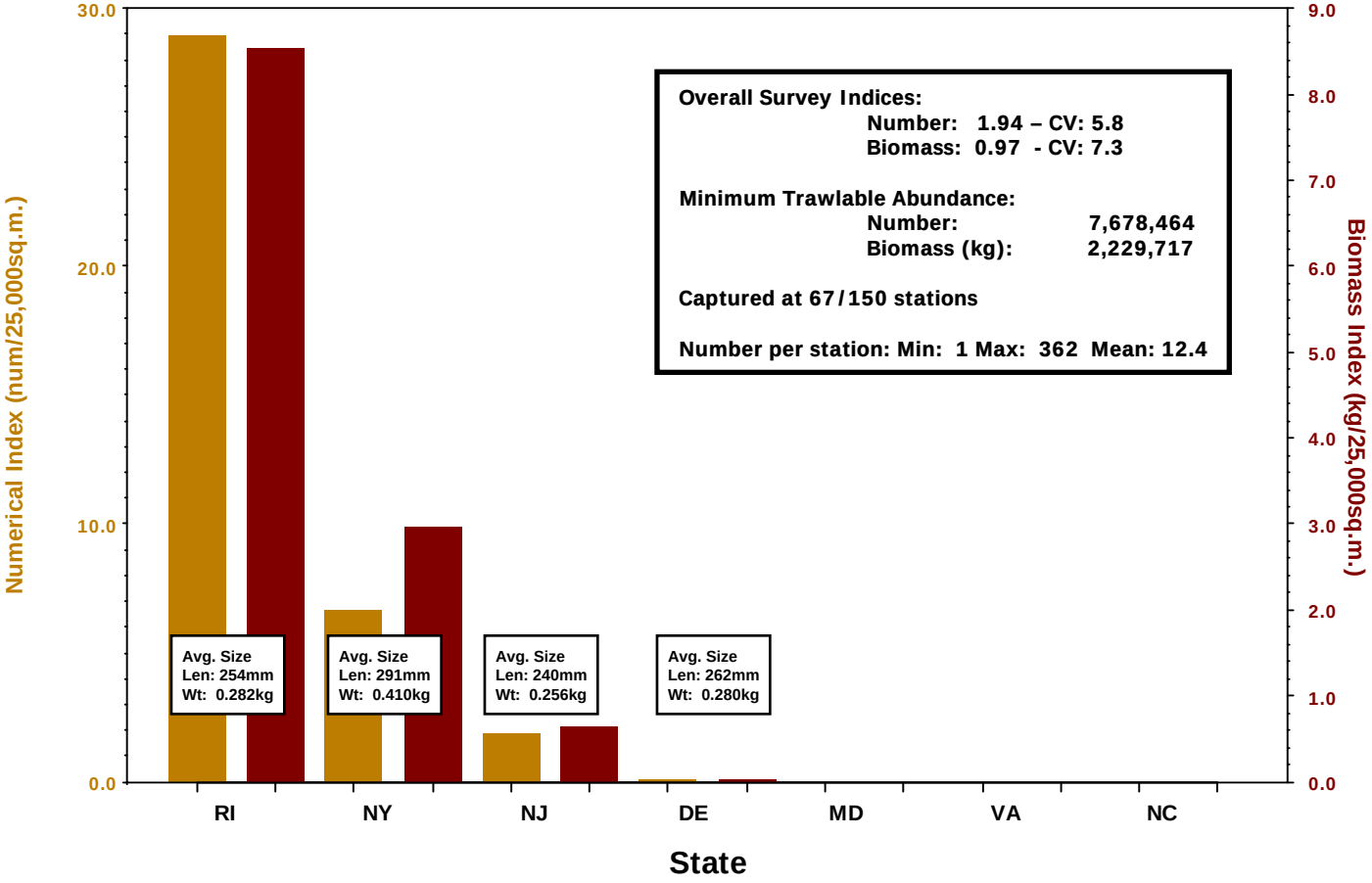


Figure 75. Length frequency histogram for winter flounder.

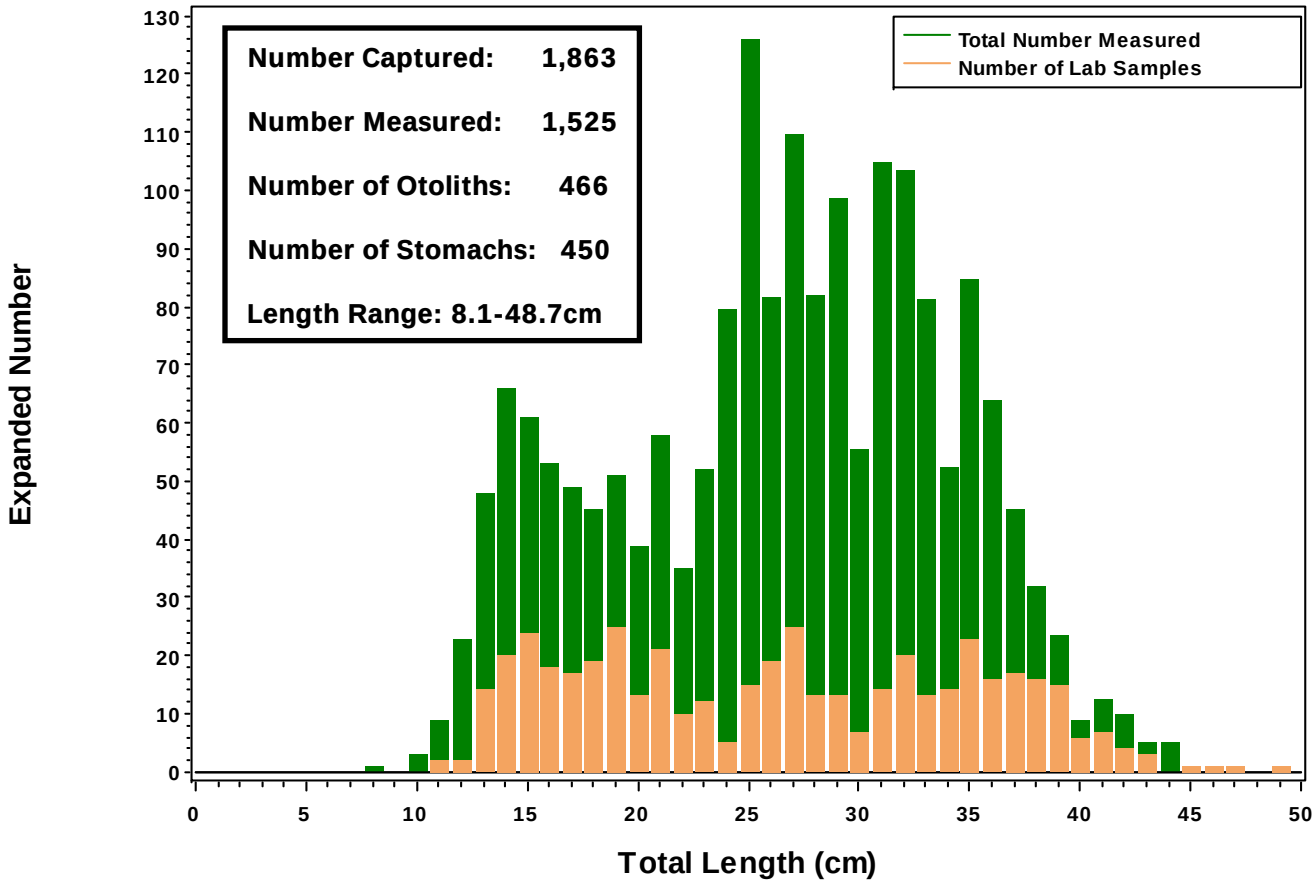
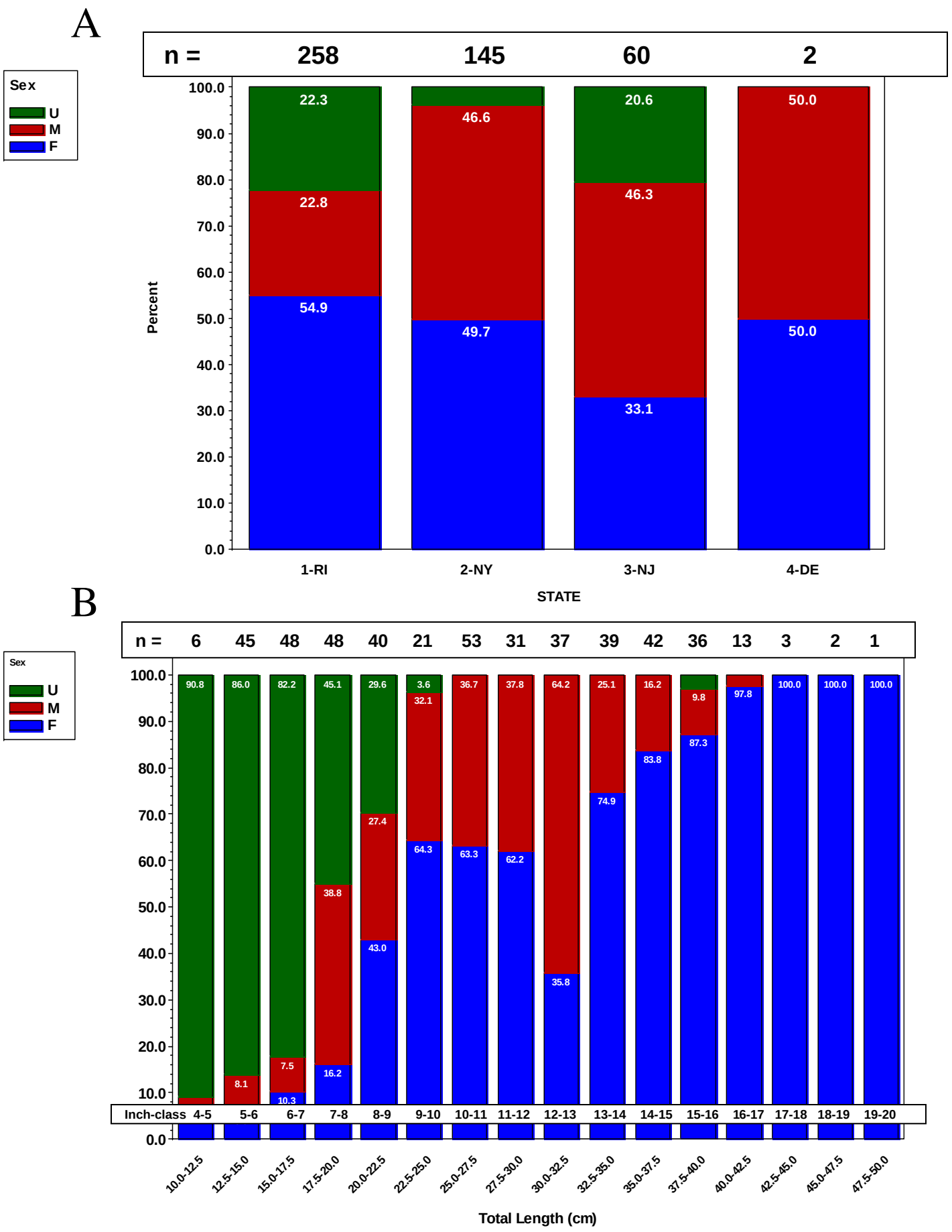


Figure 76. Sex ratios for winter flounder by state (A) and length group (B).



Winter Skate
(Priority B)

Table 32. Number, biomass, minimum and maximum size of specimens captured, by state and region, for winter skate.

State	Region	Number Caught	Biomass (kg)	Min Length	Max Length
RI	RI	365	386.843	156	533
RI	BI	20	17.289	206	411
NY	01	36	52.057	192	514
NY	02	136	173.064	173	499
NY	03	303	766.631	197	524
NY	04	112	149.311	182	507
NY	05	49	81.531	245	491
NJ	06	147	244.756	191	553
NJ	07	145	255.504	189	510
NJ	08	90	217.989	202	516
DE	09	107	291.513	181	533
MD	10	66	185.617	223	643
VA	11	71	177.084	211	570
VA	12	18	42.25	244	533
VA	13	45	116.305	274	528
NC	14	3	10.546	464	491
NC	15				

Figure 77. Geometric mean catch per area swept by state and overall, with summary catch rates, for winter skate.

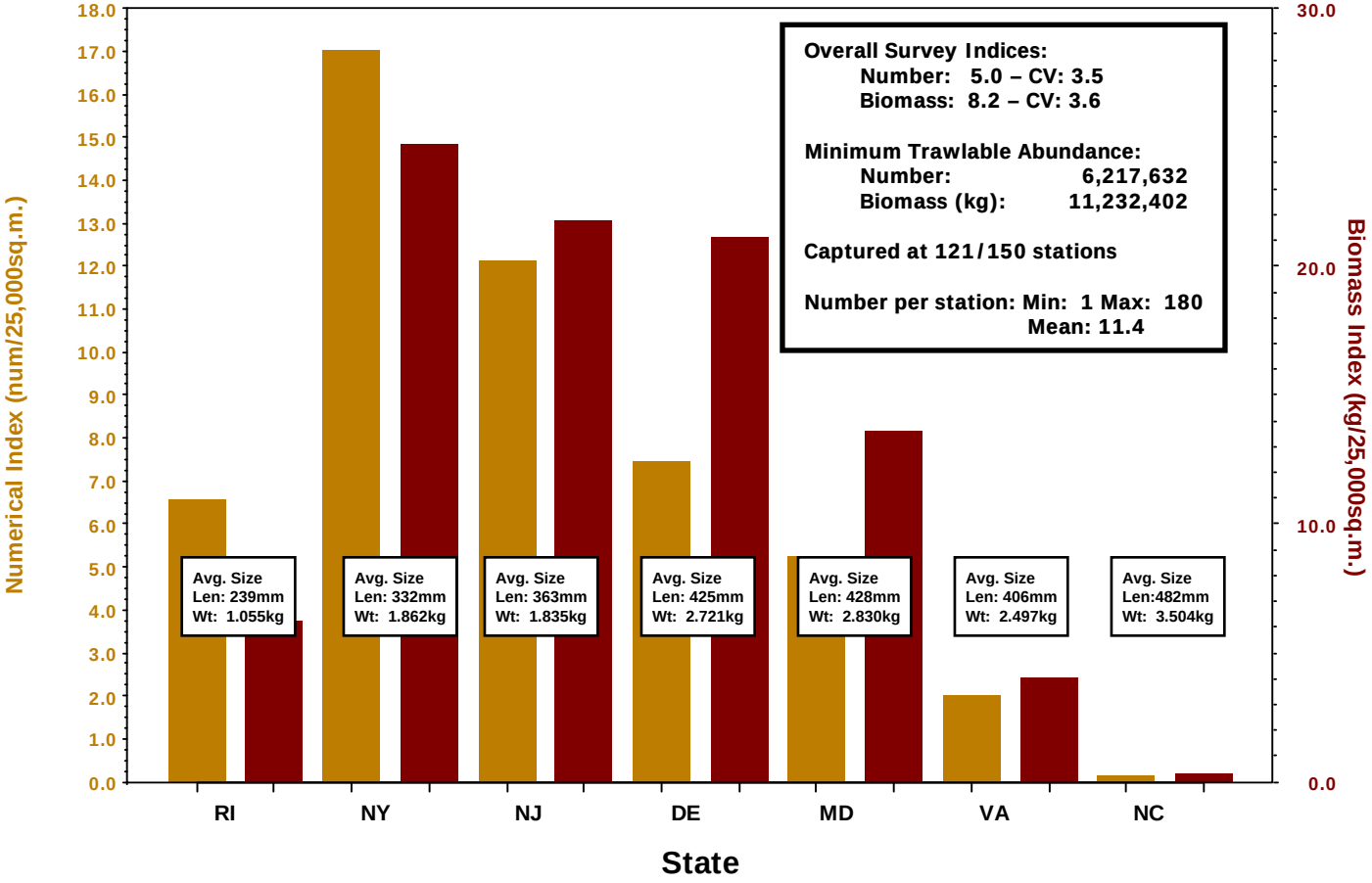


Figure 78. Width frequency histogram for winter skate.

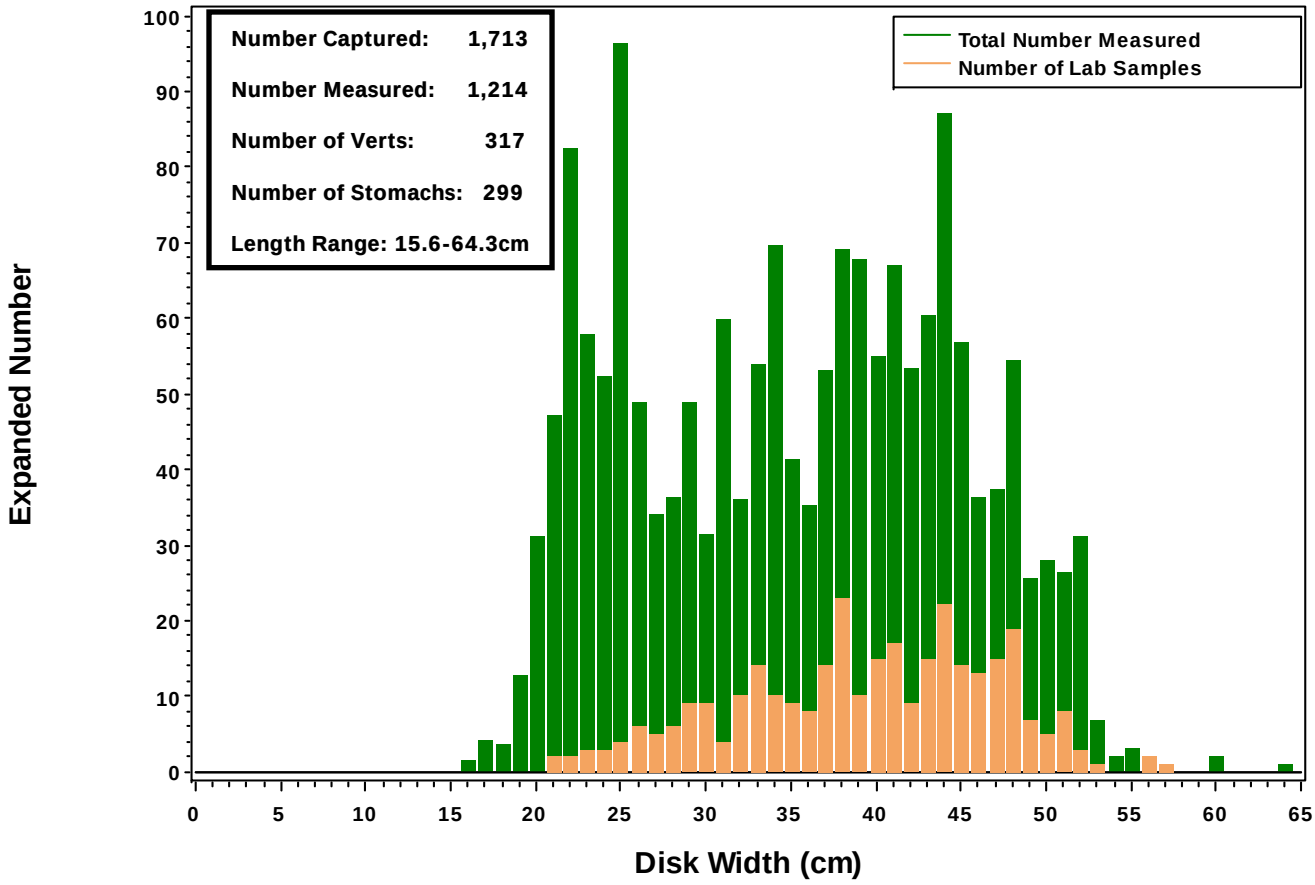


Figure 79. Sex ratios for winter skate by state (A) and width group (B).